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Sedentary Lifestyle

A Multidisciplinary Perspective

*Edited by Luís Branquinho, Nelson Valente,
Pedro Miguel Forte, José E. Teixeira and Ricardo Ferraz*



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Public Health

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Aims and Scope of the Series

Public health is what we as a society do collectively to contribute to and ensure the health and social conditions for the enjoyment of health as a resource for life. It can also be defined as science and research that promotes health, prevents disease, and improves populations' well-being and quality of life. Its objective is to know the risk factors that determine and condition the populations' health levels at present. At the end of the 20th century and the beginning of the 21st century, it is unjustifiable and regrettable that morbimortality according to age plays a leading role when the causes are mostly well known and therefore preventable, such as obesity, AIDS, cirrhosis, diabetes mellitus, addictions and cancer associated with the consumption of tobacco and alcohol, etc. In short, public health is science based on epidemiology and biostatistics, and currently, new technologies and artificial intelligence must be incorporated to identify patterns and trends in what we do collectively as a society to ensure living conditions and prevent risk factors that affect individual and population health. For all these reasons, it is essential to scientifically investigate and act on the determinants that impede the well-being and quality of life related to the health of people, patients, and populations in general, given that to control the determinants of diseases, it is important to control the environment and genetics. Consequently, the current fight for public health must prioritize the control of the environment, such as atmospheric and biological pollution and environmental and social biodiversity, promoting the sensitivity and training of society and its individuals by empowering them to make free and appropriate decisions about these aspects to lead healthy lifestyles based on motivation and responsibility in the face of the challenges they cope with from an individual point of view, such as dealing with the addictions that exist in today's complex world. Public health also requires an ethical vision and incorporates strategies to reduce social inequality.

Meet the Series Editor



José Antonio Mirón Canelo is a physician, doctor, and professor of Preventive Medicine and Public Health at the Faculty of Medicine and Dentistry of the University of Salamanca with over 30 years of experience. He is the director of the USAL's Expert Degree in Health Management, currently in its 13th edition. Prof. Mirón Canelo directs a research group at the Research Institute of Biomedical Sciences (IBSAL) of the University of Salamanca focused on addressing the challenges and care needs of vulnerable people and patients such as the elderly with multiple pathologies and people with disabilities and dependence. As a teacher, he has been recognized for excellence in teaching three times in a period of five years.

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Causal Structure of Healthy Longevity by Sedentary Behaviors in Elderly
Residents in Japan

by Tanji Hoshi, Naoko Nakayama and Miki Kubo

Preface

Sedentary lifestyle has emerged as one of the most significant public health and societal challenges of the twenty-first century. Advances in technology, urbanization, digital connectivity, and demographic transitions have transformed the way people live, learn, work, and age. While these developments have improved many aspects of daily life, they have also contributed to prolonged sitting, reduced movement, and increasingly inactive routines across all age groups. The consequences extend beyond physical health, influencing mental well-being, social functioning, productivity, and long-term quality of life. Addressing sedentary behavior, therefore, requires a comprehensive understanding of its determinants, mechanisms, and outcomes within a multidisciplinary and life-course framework.

This edited volume brings together contributions from diverse disciplines to examine sedentary lifestyles as complex and multifaceted phenomena shaped by behavioral, social, cultural, psychological, and structural factors. The chapters collectively aim to move beyond reductionist perspectives that focus solely on individual responsibility, highlighting instead the broader ecological contexts in which sedentary patterns emerge and persist. By integrating evidence across populations and settings, the book seeks to provide a coherent framework to inform research, practice, and policy aimed at promoting more active and healthier societies.

The volume is organized into two thematic sections that reflect the progression from determinants to consequences.

Section I, “Determinants of Sedentary Behaviour across Contexts”, examines the environmental, socio-cultural, and behavioral factors that shape sedentary patterns across different populations and settings. The opening chapter, “Intersectoral Approaches to Reducing Sedentarism in Children and Adolescents: A Multidimensional Intervention Model”, conceptualizes youth sedentarism as the result of interactions across the individual, family, school, community, and policy levels, and proposes an integrated framework for coordinated action across sectors. This system’s perspective establishes the conceptual foundation for the volume. The following chapter, “Socio-Cultural Correlates of Physical Activity and Sedentary Behaviour in the Gulf Cooperation Council (GCC) through the Theory of Planned Behaviour”, explores how cultural norms, gender roles, environmental constraints, and social expectations influence physical activity and sedentary behavior, and emphasizes the need for culturally tailored interventions. The section concludes with “Exploring Determinants and Factors Associated with Problematic Smartphone Use among Youth”, which addresses the growing role of digital technologies as behavioral drivers of sedentary lifestyles and examines their psychosocial, sleep-related, and academic implications for young populations.

Section II, “Health, Psychological and Life-Course Consequences of Sedentarism”, focuses on the mental, emotional, and long-term health consequences of sedentary lifestyles. The chapter “Physical Activity, Physical Fitness and Mental Health” reviews the relationships between movement, neurobiological mechanisms, and psychological outcomes, highlighting the protective role of physical activity in the prevention and management

of depression and anxiety. This is followed by “Emotional Intelligence and Ageing in a Sedentary World: Impacts on Quality of Life”, which examines emotional intelligence as a key psychosocial resource that can enhance resilience, social engagement, and well-being among older adults in increasingly sedentary environments. The final chapter, “Causal Structure of Healthy Longevity by Sedentary Behaviors in Elderly Residents in Japan”, presents longitudinal evidence on the complex relationships among socioeconomic conditions, lifestyle factors, functional capacity, and sedentary behavior in predicting survival and healthy longevity.

Together, the contributions in this volume portray sedentary lifestyle as a multidimensional phenomenon embedded in contemporary social change, technological environments, and demographic ageing. A common theme across chapters is the need for integrated responses that combine behavioral strategies, supportive environments, cultural sensitivity, and intersectoral policies. Reducing sedentary behavior is not only about increasing physical activity but also about creating conditions that enable active living throughout the life course.

The editor wishes to express sincere gratitude to all contributing authors for their expertise, commitment, and collaboration throughout the development of this volume. Appreciation is also extended to the reviewers and the IntechOpen editorial team for their professional support and guidance during the publication process.

It is hoped that this book will serve as a valuable resource for researchers, health professionals, educators, and policymakers seeking an interdisciplinary understanding of sedentary behavior and its broader implications. By advancing knowledge on its determinants and consequences, this volume aims to contribute to the development of effective strategies that support healthier, more active, and more resilient populations.

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Section 1

Determinants of Sedentary Behaviour across Contexts

Chapter 1

Intersectoral Approaches to Reducing Sedentarism in Children and Adolescents: A Multidimensional Intervention Model

Luís Branquinho, Pedro Forte, Nelson Valente, Elias de França, Tiago Venâncio, Ronaldo Thomatieli dos Santos, José E. Teixeira and Ricardo Ferraz

Abstract

Children and adolescents sedentary lifestyles constitute one of the main threats to the healthy development of younger generations. This chapter critically analyzes the determinants and consequences of sedentary lifestyles in children and adolescents, highlighting the physical, cognitive, emotional, social, and economic impacts, with particular attention to trends observed after 2020. The COVID-19 pandemic acted as a catalyst for inactivity, reinforcing the digitalization of leisure habits and drastically reducing the opportunities for physical activity. However, the problem transcends the individual sphere and must be understood as a multidimensional phenomenon, shaped by family, school, community, technological, and political factors. To respond to this complexity, a multidimensional intervention model is proposed, integrating school, family, community, technology, and public policies, highlighting the need for interdisciplinary collaboration. The analysis highlights that isolated strategies are insufficient: only an integrated and sustainable response, supported by intersectoral policies, can transform the so-called “inactive generation” into a generation on the move. It is concluded that children and adolescents sedentary lifestyles should be viewed not only as a public health issue, but also as a social justice challenge, requiring the construction of environments that recognize physical activity as a fundamental right of childhood and adolescence.

Keywords: sedentary, children, adolescents, health, physical, activity

1. Introduction

The phenomenon of children and adolescents sedentary behavior has emerged in recent decades as one of the most serious public health and human development

problems [1, 2]. Until the beginning of the twenty-first century, the focus of policy and research was primarily on promoting physical activity, the growing consolidation of sedentary behaviors, usually defined as activities performed in a sitting, reclining, or lying position, with low-energy expenditure, has introduced a new layer of complexity to the academic and policy debate [3].

In this regard, the literature clearly distinguishes between sedentarism and physical inactivity. While physical inactivity refers to failure to meet the minimum recommendations for moderate to vigorous physical activity, sedentarism can coexist even among physically active individuals. Thus, it is possible for children and adolescents to meet the daily recommendation of 60 minutes of physical activity but still accumulate more than 8 hours of sedentary activities, with negative health consequences [4]. The clarification of this distinction was consolidated by the Sedentary Behavior Research Network (SBRN), through the consensus led by Tremblay et al. [3], which has become an essential reference in the field.

The impact of a sedentary lifestyle on children and adolescents is not only physical. It is a multidimensional phenomenon, with cognitive, emotional, social, and economic repercussions [5]. Childhood and adolescence are a critical phase of human development, during which habits are formed and tend to become ingrained throughout life [6]. The prevalence of sedentary patterns among children and adolescents compromises not only their immediate health but also projects risks into adulthood, including a greater predisposition to cardiovascular and metabolic diseases, and mental health problems [7].

The COVID-19 pandemic posed a real challenge to this issue. Confinement measures, the transition to remote learning, and the accelerated digitalization of leisure activities have substantially increased screen time and reduced opportunities for physical activity [8]. International studies published after 2020 demonstrated average increases of more than 2 hours per day in sedentary time among children and adolescents, even after the return to in-person schools [9–12]. More than a transitory phenomenon, the pandemic solidified new habits that persist in the post-pandemic period, revealing the urgent need to rethink intervention strategies.

The debate about sedentary behavior in children and adolescents cannot be reduced simply to counting hours spent in front of screens. It is necessary to understand the complexity of the contexts that shape this behavior: family structure, school environment, community opportunities, the configuration of urban spaces, and the influence of digital cultures [13, 14]. Sedentary behavior is typically defined as time spent in activities in a sitting or lying position, during which there is low energy expenditure, generally below 1.5 MET (metabolic equivalent of the task) [3].

Despite the abundance of research published in the recent decades, the literature remains fragmented into disciplinary silos. Studies in health, education, psychology, and urban planning tend to analyze individual aspects of the problem in isolation, which limits the development of effective responses. This fragmentation has been criticized by several authors [15, 16], who argue for the need for interdisciplinary approaches capable of integrating different areas of knowledge and social sectors.

This chapter aims to bring together these fragmented perspectives, weaving them into a coherent framework that makes sense of the phenomenon from an integrated perspective. First, it critically analyzes the determinants and consequences of children and adolescent's sedentary lifestyle considering the most recent evidence. Then, it proposes a multidimensional model that integrates school, family, community, public policies, and technology, highlighting the need for interdisciplinary collaboration.

Finally, it presents conclusions and recommendations aimed not only at reducing sedentary lifestyles but also at promoting structural and sustainable change, capable of transforming the so-called “inactive generation” into a generation on the move.

2. Determinants of children and adolescent’s sedentary lifestyle

Children and adolescents sedentary lifestyle is a complex phenomenon, resulting from the interaction of multiple individuals, family, school, community, environmental, and sociocultural factors [17, 18]. Understanding such complexity requires an ecological approach, such as that proposed by Bronfenbrenner, which allows us to analyze the human development from different levels of influence [19–21]. By adopting this perspective, it is possible to understand that sedentary lifestyle is not simply an individual choice, but a network of conditioning determinants and consequences that structure the daily lives of children and adolescents and this network forms the foundation of our Multidimensional Intervention Model.

2.1 Individual determinants

Among individual determinants, psychological and emotional factors play a central and multifaceted role in the emergence and consolidation of sedentary behaviors among children and adolescents. The COVID-19 pandemic created a context of heightened psychological vulnerability, marked by increased levels of anxiety, stress, and depressive symptoms, which have been strongly associated with changes in coping strategies and motivational patterns in children and adolescents. According to contemporary emotion-regulation frameworks, children and adolescents tend to rely on low-effort, easily accessible strategies to mitigate the negative effects. Consequently, sedentary leisure activities—such as passive screen use, social media browsing, and digital gaming, became prominent tools for emotional regulation during this period [22]. This reliance on digitally mediated coping mechanisms contributed to the early establishment of sedentary habits.

The transition to remote learning further intensified these patterns by substantially increasing daily screen exposure and reducing opportunities for spontaneous physical activity. Studies conducted after 2020 indicate that children and adolescents increased their overall screen time by an average of 2 to 3 hours per day relative to the pre-pandemic period, with approximately 40–50% of this increase directly attributable to online educational demands [23, 24]. However, the persistence of elevated screen use following the reopening of schools demonstrates that new behavioral routines were established rather than temporarily adopted. This aligns with habit-formation theory, which suggests that repetitive behaviors under stable contexts can consolidate into enduring patterns of action, particularly when they provide immediate psychological reward [25, 26].

Another essential determinant is motor self-efficacy, grounded in Social Cognitive Theory. Children and adolescents who perceive themselves as having low physical competence or who have experienced repeated discomfort or failure in physical activity environments are more likely to avoid participation in active behaviors, thereby reinforcing sedentary tendencies [7]. The perception of lower competence compared to peers in sports participation may lead many adolescents to retreat into sedentary activities, such as video gaming or consuming digital content.

2.2 Family determinants

The role of family shaping lifestyle habits is widely documented. Children of physically active parents are almost twice as likely to meet the WHO recommendations for daily physical activity [27]. However, recent studies show that only a minority of families establish clear rules regarding screen time or promote active family routines [28, 29]. Socioeconomic conditions introduce significant inequalities. Families in vulnerable contexts face multiple barriers: lack of adequate play spaces, insecure neighborhoods, financial difficulties in paying for extracurricular activities, and long work hours that limit parental supervision [7]. Consequently, a sedentary lifestyle cannot be seen solely as a failure of individual choice, but also as a reflection of inequalities that shape opportunities for physical activity and leisure. These inequalities are embedded in broader social systems such as urban planning, education, labor policies, and income distribution that systematically privilege some groups while constraining others. Access to safe environments, quality public spaces, and affordable sports and recreational programs often depend on socioeconomic status, reinforcing cycles of inactivity and exclusion.

Furthermore, the pandemic has amplified the role of the family in regulating sedentary behavior. In many cases, the parental burden associated with teleworking has led to increased permissiveness regarding children's screen time [30]. The lack of strategies for balancing work and family responsibilities has made digital time a "convenient substitute" for the lack of active leisure alternatives.

2.3 School determinants

The school environment is, paradoxically, one of the contexts that contributes most to sedentary lifestyles. Data from the OECD reveal that adolescents spend, on average, seven hours a day in sedentary school activities [31]. Lecture-centered pedagogy, combined with long classroom hours and limited active breaks, perpetuates the problem, whereas Physical Education remains frequently marginalized in school curricula [32]. In many industrialized countries, it is treated as a secondary subject, with insufficient instructional time and limited resources [7]. International studies show that schools that implemented active break programs and physical activity-based pedagogy reduced students' daily sedentary time by up to 65 minutes, without compromising academic performance [33]. It is also important to emphasize that social inequalities are reflected in the school environment. In more disadvantaged contexts, schools tend to have fewer resources, spaces, and equipment to promote physical activity, which exacerbates exclusion [34] and increases sedentary behaviors during school time.

2.4 Community and environmental determinants

Community and urban environments exert a decisive influence on sedentary behavior, not only through the physical availability of infrastructure but also through the social and interpretive processes that shape children and adolescents opportunities for physical activity. Well-designed neighborhoods with accessible parks, bike paths, green areas, and recreational facilities are consistently associated with higher levels of physical activity among children and adolescents [13, 35]. However, grounded theories such as those proposed by Buckley and Waring [36] highlight that environmental affordances do not operate in isolation; rather, they are filtered

through parental perceptions, norms, and risk assessments. Parents function as gatekeepers, shaping children's mobility and autonomy by deciding whether, when, and under what conditions community spaces may be used. This aligns with the broader ecological frameworks [37, 38], which emphasize that physical opportunity and social permission must interact to produce active behavior. Empirical evidence reinforces that parental concerns related to safety, traffic, neighborhood cohesion, and supervision strongly influence children's access to outdoor environments [39, 40]. Consequently, even in areas equipped with high-quality facilities, environments perceived as unsafe, socially fragmented, or insufficiently supervised often discourage children's independent use of community spaces, reinforcing sedentary patterns despite favorable urban design [40–43]. In this sense, the community environment and parental involvement constitute an interdependent determinant, requiring alignment between structural conditions and supportive parental gatekeeping to facilitate active lifestyles.

2.5 Sociocultural determinants

Cultural transformations linked to digital technology have profoundly altered patterns of leisure and sociability. Social media, streaming platforms, and online video games have become central to children and adolescents daily lives, often replacing in-person interaction practices [44].

A previous report revealed that 80% of adolescents spend more than 3 hours a day on social media, with a direct impact on physical activity levels [45]. However, there are also positive impacts such as dance challenges and digital exercise programs show that digital technology can also stimulate physical activity.

Gender and socioeconomic status interact with these dynamics [46, 47]. Boys tend to accumulate sedentary habits through video games, while girls do so through social media interactions and prolonged study [48]. Children and adolescents from higher-income families generally access structured sports programs and active technologies that promote the physical activity. In contrast, those from lower-income families often face limited recreational options and fewer safe outdoor spaces, making home-based screen activities such as television, social media, and digital gaming the most accessible form of leisure [7, 49]. As a result, they engage proportionally more in sedentary screen time, reflecting socioeconomic constraints rather than preference. Thus, a sedentary lifestyle must also be understood as a reflection of changing cultural practices, which cannot be analyzed solely through a single disciplinary lens, but must also be approached from sociological and anthropological perspectives.

In summary, the five levels of determinants (i.e., individual, family, school, community, and sociocultural) form an interconnected system that shapes children and adolescents sedentary behavior through complex interactions between psychological, environmental, and structural factors. Individual traits such as emotional regulation and motor self-efficacy interact with family routines, school organization, and the built environment, while cultural and digital transformations redefine how children and adolescents spend their leisure time. Drawing on Bronfenbrenner's ecological framework [37], sedentary behavior should therefore be understood as the product of a dynamic system in which proximal and distal influences operate simultaneously, highlighting the need for interventions that address multiple levels of influence rather than isolated factors. In this sense, the determinants constitute the causal foundations of the multidimensional consequences described in the following section.

3. Multidimensional consequences

3.1 Physical domain consequences

Sedentary behavior in childhood and adolescence is strongly associated with increased adiposity, reduced cardiorespiratory fitness, and early metabolic risk factors such as hypertension and insulin resistance. Studies have also highlighted a worrying acceleration in childhood obesity rates partly driven by pandemic-related restrictions and sustained digital lifestyles [8]. Prolonged sedentary behavior alters energy balance, muscular function, and metabolic regulation [50]. Evidence associates excessive screen time with higher adiposity, cardiovascular risk, and reduced motor competence, but it is important to note that obesity is not synonymous with sedentarism [51]. Some individuals maintain normal weight while exhibiting physiological markers of inactivity, such as reduced cardiorespiratory fitness or insulin sensitivity [52]. These changes often begin subtly in childhood, progress through adolescence, and become chronic into adulthood, reinforcing the long-term health burden.

3.2 Cognitive and academic consequences

Cognitive and academic consequences emerge from prolonged sedentary routines that limit opportunities for embodied learning and active engagement, undermining executive function, sustained attention, and working memory [53, 54]. Excessive passive screen exposure contributes to attentional fragmentation and a decline in task persistence, effects that can accumulate over time and affect academic progress. These vulnerabilities often create feedback loops where cognitive fatigue leads to increased reliance on low-effort sedentary behaviors, reinforcing patterns of inactivity. In disadvantaged contexts, reduced access to physical activity-rich learning environments can exacerbate cognitive disparities [55]. Schools therefore play a central role in counteracting these risks through active pedagogies, while families and communities shape routines that integrate physical activity into daily life. Within the ecosystemic logic of this chapter, cognitive consequences function not only as outcomes but also as amplifiers of sedentarism across scales.

3.3 Psychological consequences

Sedentarism generates psychological consequences that emerge gradually as sedentary activities become primary tools for emotional regulation, particularly in contexts of stress or social isolation [22, 56]. While digital engagement can initially serve adaptive purposes, chronic reliance on passive screen-based coping increases vulnerability to anxiety, depressive symptoms, emotional dysregulation, and diminished resilience. Reduced participation in physical and social activities disrupts neurobiological mechanisms that underpin mood regulation, reinforcing recursive cycles of avoidance and inactivity [25]. These psychological vulnerabilities often spill over into physical, cognitive, and social domains, shaping broader developmental trajectories. Effective mitigation therefore requires coordinated involvement of families, educators, mental-health professionals, and community agents to create emotionally supportive and physical activity-enriched environments. Within the ecosystem, psychological consequences represent key leverage points where sustained, intersectoral intervention can interrupt negative feedback loops.

3.4 Social consequences

Sedentarism reshapes social development by narrowing opportunities for cooperative play, embodied interaction, and community participation, constraining the acquisition of social skills and diminishing peer-related confidence [57, 58]. When digital communication replaces face-to-face engagement, children and adolescents may experience reduced interpersonal efficacy and diminished belonging, especially in contexts with limited active social opportunities. Environmental barriers, such as unsafe neighborhoods or lack of accessible public spaces, amplify these vulnerabilities and reinforce cycles of social withdrawal and inactivity [39]. Social consequences interact with psychological and cognitive domains, as loneliness and low self-efficacy reduce motivation for participation in active environments. Community programs, family involvement, and school-based initiatives are therefore essential to reintroduce physical activity-rich social contexts that foster cooperation, empathy, and collective engagement. These social pathways represent critical points for interrupting the feedback loops that sustain sedentary lifestyles.

3.5 Economic and political consequences

Economic and political consequences arise from the cumulative impact of sedentary-related vulnerabilities across physical, cognitive, psychological, and social domains. Increased healthcare expenditure, reduced productivity, and lower academic achievement translate into long-term societal costs [59]. These burdens disproportionately affect socioeconomically disadvantaged children and adolescents, reinforcing structural inequalities in access to safe spaces, quality education, and supportive environments. Politically, sedentarism exposes gaps in public policy coordination and highlights the need for integrated, equity-driven strategies [16]. As distal consequences, economic and political outcomes also function as determinants of future vulnerability, shaping resource allocation, intervention sustainability, and community resilience. Addressing these systemic challenges requires intersectoral governance that treats sedentarism as a multidimensional public concern rather than an individual behavioral issue.

3.6 Concluding synthesis: From consequences to the multidimensional model

The ecosystem of consequences across physical, cognitive, psychological, social, and economic domains demonstrates that children and adolescents sedentarism operates as a dynamic and interdependent system rather than a set of isolated outcomes. These consequences accumulate through feedback loops where the consequences of sedentary behavior become causes that progressively reinforce vulnerabilities across contexts, supporting the ecological argument that sedentary behavior reflects the reciprocal interactions between individuals and their environments [15, 37]. As noted earlier, determinants function across multiple levels; the consequences mapped here represent their observable manifestation, revealing how risks evolve over time. This synthesis establishes the conceptual bridge to the Multidimensional Intervention Model, where a network of interdependent families, educators, policymakers, health professionals, and community leaders collaborate to interrupt these recursive patterns [16]. The Multidimensional Intervention Model thus emerges as a systemic response capable of modifying determinants and mitigating consequences through coordinated, adaptive, and intersectoral action. In this way, the framework restores physical activity not merely as a health behavior but as a developmental right of childhood and adolescence.

4. The multidimensional intervention model

An analysis of the determinants and consequences of children and adolescents sedentarism unequivocally reveals that the problem cannot be addressed from a single perspective. Schools, families, communities, urban spaces, technology, and public policies are intertwined in the development of sedentary lifestyles and, simultaneously, in the potential for their reversal in children and adolescents. Therefore, a multidimensional model is essential in that it overcomes disciplinary and institutional fragmentation and is capable of coordinating interventions across different perspectives. **Figure 1** seeks to summarize this vision, not as a set of “watertight boxes,” but as an interdependent system in which the various dimensions interact in a dynamic circle. This multidimensional model, by offering a conceptual framework, serves as a guide for sustainable interventions in both research and practice”.



Figure 1.
Multidimensional Intervention Model for promoting strategies and recommendations for promoting active lifestyles in children and adolescents.

4.1 Strategies and recommendations for promoting active lifestyles in children and adolescents

Schools contribute to inactivity, given the long hours spent sitting in the classroom and the limited integration of physical activity into teaching routines [7]. Restructuring school schedules to incorporate active breaks, physical activity-based learning, and structured recess periods has proven to be an effective way to develop healthy habits and reduce daily sedentary time. Evidence from international research demonstrates that such strategies can decrease sitting time by more than an hour per day without compromising academic performance, and in some cases even enhancing attention and engagement [32, 60]. Restructuring school schedules to include physical activity opportunities and more structured recess periods helps internalize healthy habits and promotes long-term behavioral change toward more active lifestyles [33, 61].

In schools, Physical Education contributes to the development of lifelong physical, cognitive, and socioemotional skills [7, 62]. However, to achieve this, its curricular value, expansion of instructional hours, and investment in teacher training are essential. Repositioning Physical Education being a core component of the curriculum transforms schools from passive environments that perpetuate sedentarism into dynamic spaces that cultivate physical activity as a fundamental educational right and a cornerstone of lifelong well-being.

The family can help in the formation of children's first habits and routines. It is within the family context that norms about free time, screen use, and participation in physical activity are first established. Parents influence their children both through their own behavior and by providing opportunities for active leisure [7, 27]. However, the ability of families to fulfill this role is deeply conditioned by the socioeconomic context. Inactive families face barriers related to time, security, and financial resources. The pandemic has exacerbated this inequality, while also overloading parents with work and household responsibilities, leading many to resort to digital time as a "convenience substitute" [22]. Therefore, policies to support families, such as subsidies for extracurricular activities, free community programs, and work-life balance measures, are the essential components of a comprehensive response.

In relation to the community, the existence of accessible parks, bike paths, and sports facilities is directly associated with lower levels of sedentary behavior in children and adolescents [13]. However, the use of these resources depends on the perception of safety and adaptation to local needs. In urban areas marked by insecurity, children and adolescents avoid public spaces even when available. In rural areas, the challenge is the scarcity of formal facilities. These localized disparities require contextualized responses: while in urban neighborhoods, the redevelopment of spaces and the promotion of safety become priorities, in rural communities, activity-based community programs or partnerships with local associations may be more effective [7].

Technology, often seen only as a driver of sedentary lifestyles, can also stimulate physical activity when used strategically. Mobile applications and wearable activity monitors provide children and adolescents with immediate feedback on their physical activity levels, promoting self-awareness and motivation to move more regularly [63]. By integrating personalized goals, reminders, and progress tracking, these tools can encourage children and adolescents especially those less engaged in sports to adopt more active daily routines. When used in educational or family contexts, such devices help bridge the gap between digital engagement and healthy behavior, demonstrating that technology can act not only as a source of entertainment but also as a catalyst for behavioral change.

The positive use of technology is extended in the model to include monitoring, gamification techniques embedded in digital platforms and wearable devices transform physical activity into a playful and socially engaging experience [64]. The use of technology refers to digital resources that support motor literacy, formative feedback, and self-regulation, such as monitoring applications, wearable devices, or platforms that track active behavior. Gamification, in turn, constitutes a specific pedagogical process that uses game mechanisms (points, challenges, rewards) to enhance engagement, motivation, and adherence. It therefore represents a distinct strategy that is not necessarily dependent on monitoring technologies or informational support. Virtual challenges, progress badges, and peer-based competitions make exercise more enjoyable and relatable to children's digital culture, increasing adherence and long-term engagement. When well-structured, these systems can convert traditional screen time into active participation, fostering motivation through reward loops and community interaction. However, their effectiveness depends on maintaining a balance between virtual incentives and real world, embodied experiences, ensuring that technology complements rather than replaces active, in person play.

Public awareness campaigns, taken alone, tend to have limited impact. However, when combined with other intersectoral policies and accompanied by concrete interventions such as the creation of bike paths, the provision of free programs, or partnerships with schools, they can achieve significant changes [65]. The example of campaigns integrated into local contexts, which combine communication with real-world opportunities for practice, demonstrates that effectiveness lies in the coherence between discourse and action.

Ultimately, the sedentary child or adolescent is at the center of this network, acting as the connecting agent among the multiple dimensions previously described. Around them converge the efforts of health professionals, educators, families, urban planners, and policymakers, whose actions must be articulated rather than fragmented. Multidisciplinary collaboration thus becomes the focal point of the model. The creation of cooperation platforms that unite researchers, practitioners, and decision-makers from different fields is essential to overcome the traditional siloed approach. Qualitative evaluation, as advocated by Greene [66], demonstrates that initiatives integrating diverse perspectives not only yield more effective outcomes but also sustain impact over time. Interdisciplinarity should constitute a foundational principle for research, intervention, and public policy, centered on the lived experience and developmental needs of sedentary children and adolescents.

The Multidimensional Model, by articulating these different dimensions, demonstrate that combating children and adolescents sedentarism requires simultaneous individual, family, community, institutional, and political changes. Only the convergence of these domains can reverse the growing trend toward inactivity and build environments that foster physical activity as a daily practice and a fundamental right of children and adolescents.

The Multidimensional Intervention Model was conceived to demonstrate how each domain of action school, family, community, and technology intersects with both the determinants and the multidimensional consequences of children and adolescents sedentarism. The connections between these domains are not static or unidirectional; rather, they represent reciprocal relationships, in which determinants shape interventions, and interventions, in turn, modify underlying determinants and consequences. This ecosystemic logic aligns with the ecological models of human development proposed by Bronfenbrenner [19–21], emphasizing that effective change occurs through the mutual influence between individuals and their contexts with include the family

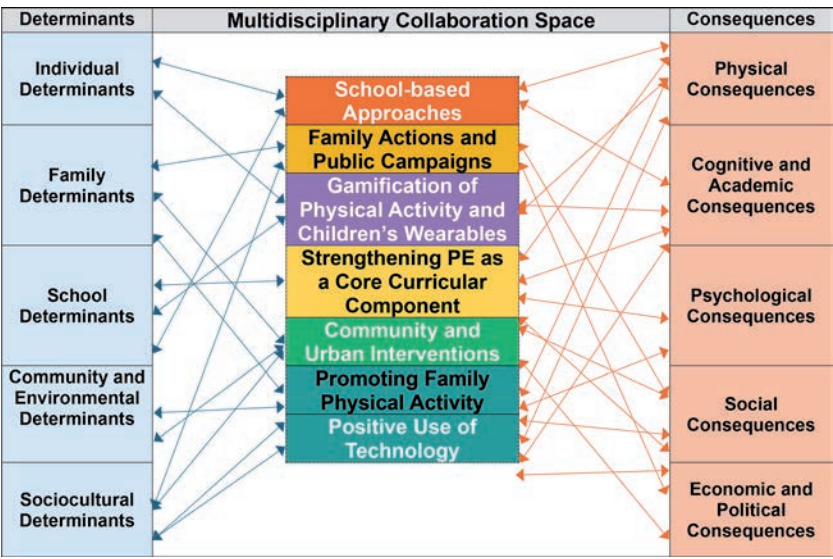


Figure 2.
The multidimensional collaborative space with the multidimensional intervention model and intersectoral interactions between determinants and consequences (outcomes) for reducing sedentarism in children and adolescents.

environment, school settings, community structures, and broader sociocultural and policy frameworks. In **Figure 2**, these reciprocal dynamics are operationalized through the double-headed arrows that connect each determinant to the specific intervention domains that influence and are influenced by its underlying conditions.

School-based approaches and strengthening Physical Education as a core curricular component primarily address school determinants and cognitive, academic, and physical consequences. Schools constitute one of the few universal platforms capable of reaching all children, independent of socioeconomic conditions [32, 33]. Interventions such as active breaks, integrated physical activity-based learning, and enhanced PE curricula directly mitigate sedentary time while improving academic engagement and physical health. These domains also connect to psychological and social consequences, since physical activity within educational settings supports self-efficacy, belonging, and emotional well-being. Consistent with these mechanisms, the figure includes arrows linking school determinants to School-based Approaches, Strengthening PE, and Gamification/Wearables, and arrows from these interventions to physical, cognitive/academic, psychological, and social consequences, reflecting their multidimensional reach. Physical education teachers, school leaders, and health educators are the key agents in implementing these measures, but their effectiveness depends on coordination with families and local policy frameworks.

Family actions and public campaigns link closely to family determinants, sociocultural determinants, and psychological and social consequences. The home environment is the first arena in which physical activity norms and screen-time behaviors are established. Campaigns that educate parents, offer community incentives, or promote intergenerational participation have shown success in normalizing active lifestyles and countering passive leisure patterns [27–30]. The family, when supported by accessible policies and media campaigns, becomes both a target and a mediator of behavior change facilitating consistent reinforcement of activity habits beyond school

settings. For this reason, the model displays arrows connecting family determinants to Family Actions and Public Campaigns, Promoting Family Physical Activity, and Community and Urban Interventions, and arrows linking these interventions to social and economic–political consequences, capturing their broader societal impact.

Promoting family physical activity connects both the family and community domains, representing an intermediate bridge between private and public spheres. Activities such as weekend community events, shared recreational spaces, or subsidized family programs strengthen social cohesion and reduce inequalities in access to physical activity opportunities. This area also addresses social and psychological consequences, as family-based participation fosters emotional bonding, role modeling, and positive identity formation through shared activity experiences. Accordingly, the model includes arrows linking Promoting Family Physical Activity with family, community/environmental, and sociocultural determinants, as well as arrows indicating its contributions to physical, psychological, and social consequences.

Community and urban interventions intersect with community and environmental determinants but also extend their influence to economic and political consequences. The design of safe, inclusive, and accessible environments directly affects physical activity opportunities and public health outcomes [13, 35]. These interventions involve leaders of recreational departments in municipalities and local advocacy organizations (such as soccer clubs), and urban planners. Such interventions generate spillover effects, reducing health disparities and reinforcing collective well-being and are all key aspects of the model's multidimensional scope. Reflecting this, **Figure 2** includes arrows between community/environmental determinants and Community and Urban Interventions, and arrows showing their effects on social and economic–political consequences.

Positive use of technology and gamification of physical activity and children's wearables relate most strongly to individual and sociocultural determinants, as well as cognitive and psychological consequences. Properly designed digital tools and exergames can transform screen-based sedentarism into active engagement [63, 64]. By merging motivation, feedback, and peer interaction, these technologies appeal to children and adolescents digital cultures and provide scalable solutions for behavior change. However, their effectiveness depends on maintaining bidirectional links with schools and families to ensure that digital engagement reinforces, rather than replaces, real-world activity. Educators, health professionals, and technology developers share responsibility for ensuring that design and use remain ethically and developmentally appropriate. Consequently, the figure includes arrows connecting individual, school, and sociocultural determinants to Gamification/Wearables and Positive Use of Technology, and arrows linking these interventions to physical, cognitive/academic, and social consequences, reflecting the multiple pathways through which technology can support or reshape physical activity behavior.

Finally, all interventions converge within the multidisciplinary collaboration space, which functions as the operational core of the model. This collaboration among educators, health specialists, urban planners, psychologists, technologists, and policymakers ensures coherence across the system. The logic of the double-headed arrows across the multidisciplinary collaboration space underscores the dynamic interplay between interventions and determinants: Effective interventions reshape determinants, while evolving determinants necessitate adaptive responses. Thus, the model retains the double arrows between the multidisciplinary collaboration space and all determinant and consequence categories, symbolizing the continuous feedback processes that sustain systemic change. Priority should be given to key structuring axes, such as schools

and families, which exert influence across individual behaviors, social interactions, and environmental contexts. In contrast, interventions with limited multidimensional reach such as standalone technology-based programs should be integrated into broader intersectoral initiatives, for example, coordinated school-community activities or family-centered public health programs, to promote sustained, synergistic effects and enhance the overall impact of the Multilevel Intervention Model.

5. Practical recommendations

Sedentary lifestyles among children and adolescents have become an increasingly visible societal issue, not because they were imposed from above, but because social, educational, technological, and environmental systems have progressively shaped behaviors that favor inactivity. The prevalence of sedentary habits reflects a complex interaction between structural conditions and individual choices, rather than isolated personal responsibility. Recognizing this multidimensional origin is crucial for designing responses that move beyond awareness campaigns toward coordinated, systemic change.

The multidimensional model presented in this chapter represents both a framework for understanding and a roadmap for intervention. It proposes that active lifestyles can only emerge when families, schools, communities, and policymakers collaborate within a shared interdisciplinary space. Those involved within each domain must act on their specific determinants, outcomes, and consequences while maintaining constant communication with those in other domains.

To translate this model into practice, the following recommendations are proposed:

- School-based action:
 - Restructure daily schedules to include active breaks and physical activity-based learning without compromising academic content.
 - Recognize Physical Education (PE) as a core curricular component, ensuring sufficient time allocation, teacher training, and alignment with and that PE is educating for life-long physical activity of recreational and sporting activities.
- Family and community engagement:
 - Develop community programs and campaigns that empower families to participate in shared physical activities, transforming physical activity into a social norm.
 - Provide public incentives (e.g., free recreational spaces, tax benefits, or subsidies) that reduce socioeconomic barriers to active participation.
- Urban and environmental planning:
 - Ensure equitable access to safe and attractive spaces parks, bike lanes, sports facilities—integrated within daily mobility networks.
 - Prioritize safety, accessibility, and inclusivity to encourage active transport and outdoor play.

- Technology and digital culture:
 - Redirect digital engagement toward active and educational purposes through apps, exergames, and wearables that promote the physical activity.
 - Encourage partnerships between educators, developers, and public agencies to design evidence-based digital tools that support active habits rather than replace them.
- Policy and governance:
 - Create intersectoral platforms that unite education, health, urban planning, and technology stakeholders within a shared decision-making space.
 - Implement evaluation frameworks to monitor outcomes and promote accountability across all sectors.

Implementing these recommendations requires sustained dialog among multiple stakeholders that include educators, families, community leaders, health professionals, policymakers, and those in the private sector'. The goal is to activate the multidisciplinary collaboration space at the center of the proposed model, ensuring that individual actions, community programs, and partnerships are aligned.

Each intervention is only as effective as the cooperation that sustains it. Building this shared commitment demands not only policy innovation but also cultural change—one that redefines physical activity as a collective responsibility and a developmental right of sedentary children and adolescents.

6. Conclusion

The challenge of children and adolescents sedentarism demands more than the identification of determinants, consequences, and multidimensional solutions and calls for a transformation in how modern societies conceive the relationship between physical activity, development, and well-being. The Multidimensional Model proposed here is not a definitive solution but an invitation to a conceptual and operational space where disciplines, sectors, and worldviews converge to reconstruct this relationship on new foundations.

At its core, the model exposes a paradox: Societies that celebrate progress and connectivity have also institutionalized immobility as a norm. Reversing this trend requires more than policy alignment; it also demands epistemic alignment a shared understanding that physical activity is not merely a peripheral behavior to be corrected, but a fundamental condition essential for development. The task ahead is therefore intellectual and political: to generate a collective multidimensional space through which education, health, urban design, and technology can communicate coherently about the value of embodied living.

Future progress will depend on a collective ability to render the model negotiable to make it usable and desirable for those who must implement it. Researchers must translate evidence into persuasive narratives; policymakers must convert those narratives into feasible structures; educators and families must incorporate them into them in daily life. Only when these actors recognize themselves as co-authors of the same

multidimensional project will the model transcend theory and begin to operate as a social ecosystem of change to reduce sedentarism in children and adolescents.

Ultimately, the significance of the Multidimensional Model lies not in its complexity, but in its integrative potential. It reframes sedentarism in children and adolescents as a mirror reflecting how societies organize time, space, and value for them to grow, learn, and live well in the twenty-first century a task that begins not just with physical activity, but with an intersectoral willingness to move together.

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Conflict of interest

The authors declare no conflict of interest.

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References

- [1] Ramirez GG, Muñoz LB. Relationship of sedentary lifestyle with obesity and comorbidities. In: *Physical Activity and Bariatric Surgery*. Cham, Switzerland: Springer; 2023. pp. 3-16
- [2] Battista F, Duregon F, Vecchiato M, et al. Sedentary lifestyle and physical inactivity: A mutual interplay with early and overt frailty. *Nutrition, Metabolism, and Cardiovascular Diseases*. 2025;**35**:103971
- [3] Tremblay MS, Aubert S, Barnes JD, et al. Sedentary behavior research network (SBRN) - Terminology consensus project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;**14**:75
- [4] Katzmarzyk PT, Jakicic JM. Physical activity for health - Every minute counts. *JAMA*. 2023;**330**:213-214
- [5] Elliott AS, Moreno-Fernández RD, Cordellat-Marzal A, et al. Intensity of physical activity in young people: Focus on emotional, cognitive, and healthy lifestyle-related variables. *Behavioral Sciences (Basel, Switzerland)*. 2024;**14**:935
- [6] Boraita RJ, Iborat EG, Torres JMD, et al. Gender differences relating to lifestyle habits and health-related quality of life of adolescents. *Child Indicators Research*. 2020;**13**:1937-1951
- [7] Meek G. Changing sedentary behavior in children and adolescents: Understanding research and alternative clues and cues for behavioral formation and change. In: Mullings J, Paul TJ, Dunn L, et al., editors. *Sedentary Behaviour – A Contemporary View*. Rijeka: IntechOpen; 2024. DOI: 10.5772/intechopen.114253
- [8] Kovacs VA, Starc G, Brandes M, et al. Physical activity, screen time and the COVID-19 school closures in Europe–An observational study in 10 countries. *European Journal of Sport Science*. 2022;**22**:1094-1103
- [9] Salway R, Foster C, de Vocht F, et al. Accelerometer-measured physical activity and sedentary time among children and their parents in the UK before and after COVID-19 lockdowns: A natural experiment. *International Journal of Behavioral Nutrition and Physical Activity*. 2022;**19**:51
- [10] Hurter L, McNarry M, Stratton G, et al. Back to school after lockdown: The effect of COVID-19 restrictions on children's device-based physical activity metrics. *Journal of Sport and Health Science*. 2022;**11**:530-536
- [11] Moller N, Gomes Junior SC, Marano D, et al. Adherence of Brazilian minors to the 24-hour physical activity guidelines after in-person school return. *International Journal of Environmental Research and Public Health*. 2024;**21**:930
- [12] Pfladderer CD, Beets MW, Burkart S, et al. Impact of virtual vs. in-person school on children meeting the 24-h physical activity guidelines during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*. 2022;**19**:11211
- [13] Squillacioti G, De Petris S, Bellisario V, et al. Urban environment and green spaces as factors influencing sedentary behaviour in school-aged children. *Urban Forestry & Urban Greening*. 2023;**88**:128081
- [14] Sarmiento OL, Rubio MA, King AC, et al. Built environment in programs to

promote physical activity among Latino children and youth living in the United States and in Latin America. *Obesity Reviews*. 2021;22:e13236

[15] Owen N, Healy GN, Dempsey PC, et al. Sedentary behavior and public health: Integrating the evidence and identifying potential solutions. *Annual Review of Public Health*. 2020;41:265-287

[16] Lakerveld J, Woods C, Hebestreit A, et al. Advancing the evidence base for public policies impacting on dietary behaviour, physical activity and sedentary behaviour in Europe: The policy evaluation network promoting a multidisciplinary approach. *Food Policy*. 2020;96:101873

[17] Wachira L-J. Lifestyle Transition towards Sedentary Behavior among Children and Youth in Sub-Saharan Africa: A Narrative Review. London, UK: IntechOpen; 2021. Epub ahead of print 2021. DOI: 10.5772/intechopen.95840

[18] Sukatemin S, Muhalla HI, Muarrofah M, et al. Sedentary lifestyle and the threat of obesity among young people. *The Journal of Academic Science*. 2025;2:232-240

[19] Bronfenbrenner U. Beyond policies without people: An ecological perspective on child and family policy. In: *Child and Family Policy: Perspectives from the American Social Policy*. New York, NY: Plenum Press; 1983. pp. 392-414

[20] Bronfenbrenner U. Ecological models of human development. In: *Readings on the Development of Children*. 3rd ed. 1994. pp. 37-43

[21] Crawford M. Ecological systems theory: Exploring the development of the theoretical framework as conceived by

Bronfenbrenner. *Journal of Public Health Issues and Practices*. 2020;4:170

[22] Runacres A, Mackintosh KA, Knight RL, et al. Impact of the COVID-19 pandemic on sedentary time and behaviour in children and adults: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*. 2021;18:11286

[23] da Costa B, Lopes M, de Mello G, et al. Changes in screen time behaviours from before (2019) to after (2022) the COVID-19 pandemic among Brazilian adolescents. *Academic Pediatrics*. 2025;25:102885

[24] Choi EJ, King GKC, Duerden EG. Screen time in children and youth during the pandemic: A systematic review and meta-analysis. *Global Pediatrics*. 2023;6:100080

[25] Marciano L, Viswanath K, Morese R, et al. Screen time and adolescents' mental health before and after the COVID-19 lockdown in Switzerland: A natural experiment. *Frontiers in Psychiatry*. 2022;13:981881

[26] Wiguna T, Minayati K, Kaligis F, et al. The influence of screen time on behaviour and emotional problems among adolescents: A comparison study of the pre-, peak, and post-peak periods of COVID-19. *Heliyon*;10. Epub ahead of print 2024. DOI: 10.1016/j.heliyon.2023.e23325

[27] Rhodes RE, Guerrero MD, Vanderloo LM, et al. Development of a consensus statement on the role of the family in the physical activity, sedentary, and sleep behaviours of children and youth. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17:74

- [28] Gans KM, Jiang Q, Tovar A, et al. Physical activity and screen time practices of family child care providers: Do they meet best practice guidelines? *Childhood Obesity*. 2022;**18**:281-290
- [29] Willett R, Wheeler N. Maintaining family stability in the age of digital technologies: An analysis of d/discourse informing domestic screen media practices in three US families. *Children and Society*. 2021;**35**:722-735
- [30] Ozturk Eyimaya A, Yalçın Irmak A. Relationship between parenting practices and children's screen time during the COVID-19 pandemic in Turkey. *Journal of Pediatric Nursing*. 2021;**56**:24-29
- [31] Woods AJ, Probst YC, Norman J, et al. Correlates of physical activity and sedentary behaviour in children attending before and after school care: A systematic review. *BMC Public Health*. 2022;**22**:2364
- [32] Branquinho L, Forte P, Ferraz R, et al. Editorial: "Building" health through physical activity in schools. *Frontiers in Sports and Active Living*;6. Epub ahead of print 2024. DOI: 10.3389/fspor.2024.1359661
- [33] Larose D, Massie CL, St-Aubin A, et al. Effects of flexible learning spaces, active breaks, and active lessons on sedentary behaviors, physical activity, learning, and musculoskeletal health in school-aged children: A scoping review. *Journal of Activity, Sedentary and Sleep Behaviors*. 2024;**3**:30
- [34] Dodd-Reynolds C, Griffin N, Kyle P, et al. Young people's experiences of physical activity insecurity: A qualitative study highlighting intersectional disadvantage in the UK. *BMC Public Health*. 2024;**24**:813
- [35] Wang K, Wang X. Providing sports venues on mainland China: Implications for promoting leisure-time physical activity and national fitness policies. *International Journal of Environmental Research and Public Health*. 2020;**17**:1-11
- [36] Buckley C, Waring M. The evolving nature of grounded theory: Experiential reflections on the potential of the method for analysing children's attitudes towards physical activity. *International Journal of Social Research Methodology*. 2009;**12**:317-334
- [37] Bronfenbrenner U. *Making Human Beings Human: Bioecological Perspectives on Human Development*. Thousand Oaks, CA: Sage Publications; 2005
- [38] Sallis JF, Cervero RB, Ascher W, et al. An ecological approach to creating active living communities. *Annual Review of Public Health*. 2006;**27**:297-322
- [39] Veitch J, Bagley S, Ball K, et al. Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & Place*. 2006;**12**:383-393
- [40] Carver A, Timperio A, Crawford D. Playing it safe: The influence of neighbourhood safety on children's physical activity-A review. *Health & Place*. 2008;**14**:217-227
- [41] Sallis JF, Cerin E, Conway TL, et al. Physical activity in relation to urban environments in 14 cities worldwide: A cross-sectional study. *Lancet*. 2016;**387**:2207-2217
- [42] McCormack GR, Rock M, Toohey AM, et al. Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. *Health & Place*. 2010;**16**:712-726

- [43] Walsh SD, Harel-Fisch Y, Fogel-Grinvald H. Parents, teachers and peer relations as predictors of risk behaviors and mental well-being among immigrant and Israeli born adolescents. *Social Science & Medicine*. 2010;**70**:976-984
- [44] Nguyen MH, Gruber J, Marler W, et al. Staying connected while physically apart: Digital communication when face-to-face interactions are limited. *New Media & Society*. 2022;**24**:2046-2067
- [45] Rutter LA, Thompson HM, Howard J, et al. Social media use, physical activity, and internalizing symptoms in adolescence: Cross-sectional analysis. *JMIR Mental Health*. 2021;**8**:e26134
- [46] Jastrow F, Greve S, Thumel M, et al. Digital technology in physical education: A systematic review of research from 2009 to 2020. *German Journal of Exercise and Sport Research*. 2022;**52**:504-528
- [47] Wang Z. Artificial intelligence in dance education: Using immersive technologies for teaching dance skills. *Technology in Society*. 2024;**77**:102579
- [48] Leonhardt M, Overå S. Are there differences in video gaming and use of social media among boys and girls?—A mixed methods approach. *International Journal of Environmental Research and Public Health*. 2021;**18**:6085
- [49] Western MJ, Armstrong MEG, Islam I, et al. The effectiveness of digital interventions for increasing physical activity in individuals of low socioeconomic status: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;**18**:148
- [50] Pinto AJ, Bergouignan A, Dempsey PC, et al. Physiology of sedentary behavior. *Physiological Reviews*. 2023;**103**:2561-2622
- [51] Barnett TA, Kelly CAS, Young DR, et al. Sedentary behaviors in today's youth: Approaches to the prevention and management of childhood obesity a scientific statement from the American Heart Association. *Circulation*. 2018;**138**:E142-E159
- [52] Myers J, Kokkinos P, Nyelin E. Physical activity, cardiorespiratory fitness, and the metabolic syndrome. *Nutrients*. 2019;**11**:1652
- [53] Lodge JM, Harrison WJ. The role of attention in learning in the digital age. *The Yale Journal of Biology and Medicine*. 2019;**92**:21-28
- [54] Clemente-Suárez VJ, Beltrán-Velasco AI, Herrero-Roldán S, et al. Digital device usage and childhood cognitive development: Exploring effects on cognitive abilities. *Children*. 2024;**11**:1299
- [55] Fiscella K, Kitzman H. Disparities in academic achievement and health: The intersection of child education and health policy. *Pediatrics*. 2009;**123**:1073-1080
- [56] Wen X, Cai Y, Li K, et al. A cross-sectional association between screen-based sedentary behavior and anxiety in academic college students: Mediating role of negative emotions and moderating role of emotion regulation. *Psychology Research and Behavior Management*. 2023;**16**:4221-4235
- [57] Walker G, Venker Weidenbenner J. Social and emotional learning in the age of virtual play: Technology, empathy, and learning. *Journal of Research in Innovative Teaching & Learning*. 2019;**12**:116-132

- [58] Granic I, Morita H, Scholten H. Beyond screen time: Identity development in the digital age. *Psychological Inquiry*. 2020;**31**:195-223
- [59] Goyal J, Rakhra G. Sedentarism and chronic health problems. *Korean Journal of Family Medicine*. 2024;**45**:239-257
- [60] Branquinho L, Forte P, Ferraz R. Pedagogical concerns in sports and physical education for child growth and health promotion. *International Journal of Environmental Research and Public Health*. 2022;**19**:8128
- [61] Bonilla J. Revitalizing learning environments: The impact of incorporating movement breaks in classroom curriculum [master's thesis]. Cambridge (MA): Lesley University; 2024. pp. 5-18. Available from: https://digitalcommons.lesley.edu/expressive_theses/809/
- [62] Ferraz R, Branquinho L, Sortwell A, et al. Teaching models in physical education: Current and future perspectives. *Montenegrin Journal of Sports Science and Medicine*. 2023;**12**: Ahead-of
- [63] Ferraz R, Ribeiro D, Alves AR, et al. Using gamification in teaching physical education: A survey review. *Montenegrin Journal of Sports Science and Medicine*. 2024;**20**:31-44
- [64] Quintas A, Bustamante JC, Pradas F, et al. Psychological effects of gamified didactics with exergames in physical education at primary schools: Results from a natural experiment. *Computers in Education*. 2020;**152**:103874
- [65] Kohl HW III, Murray TD, Salvo D. *Foundations of Physical Activity and Public Health*. 2nd ed. Champaign (IL): Human Kinetics; 2021
- [66] Greene JC. Qualitative program evaluation: Practice and promise. In: Denzin NK, Lincoln YS, editors. *Handbook of Qualitative Research*. 2nd ed. Thousand Oaks (CA): Sage Publications; 2000. pp. 530-544

Socio-Cultural Correlates of Physical Activity and Sedentary Behaviour in the Gulf Cooperation Council (GCC) through the Theory of Planned Behaviour

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Abstract

Physical inactivity (PinA) and sedentary behaviour (SB) in the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) remain critically high. These behavioural patterns are closely associated with the escalating burden of non-communicable diseases. This chapter examines socio-cultural correlates, defined as factors influencing physical activity (PA) and SB framed within the constructs of the Theory of Planned Behaviour (TPB) to inform culturally tailored interventions that promote the active behaviour. A review of 78 studies (including 10 systematic reviews and 3 qualitative studies) published between 2005 and May 2025 was undertaken to identify the most frequently reported correlates of PA, as well as the comparatively underexplored factors influencing SB in the region. Positive attitudes towards PA and a reduction in SB may be fostered through continuous public education and awareness campaigns highlighting the health benefits of active living. Subjective norms, both general and gender-specific, must be aligned with local cultural expectations, with an emphasis on expanding opportunities for female engagement in PA. Enhancing perceived behavioural control is also critical, particularly among individuals with existing health conditions, high self-efficacy, or at advanced stages of behaviour change. Climate extremes can be mitigated by promoting indoor activities. Ultimately, bridging the intention-behaviour gap requires interventions that target socio-cultural and religious norms supportive of active lifestyle. Effective interventions for positive PA and SB should incorporate evidence-based behaviour change techniques (goal-setting, self-monitoring, graded tasks, social support), that are both culturally appropriate and scalable to foster lasting change across the GCC countries.

Keywords: physical activity, barriers, sedentary behaviour, socio-cultural correlates, Gulf Cooperation Council, theory of planned Behaviour

1. Introduction

Physical inactivity (PinA) is a critical global health issue affecting 31% of adults and an alarming 80% of adolescents worldwide [1]. The international community has established targets to reduce PinA by 10% by 2025 and 15% by 2030, using 2010 as the baseline. Failure to meet these goals could have severe economic and health consequences. The estimated costs to public healthcare systems may reach approximately US\$300 billion between 2020 and 2030, which is about US\$27 billion annually [2].

PinA ranks as the fourth leading risk factor for global mortality. It is responsible for 6% of deaths worldwide, following only high blood pressure, tobacco use, and high blood glucose [2]. Compared to physically active individuals, those with PinA have a 20–30% increased risk of death due to noncommunicable diseases (NCDs). PinA is also linked to specific diseases, contributing to 21–25% of breast and colon cancer cases, 27% of diabetes cases, and about 30% of ischemic heart disease cases [2].

Sedentary behaviour (SB), often under-researched, is defined as any waking period of low-energy expenditure (<1.5 METS), such as sitting, reclining, or lying down. SB is an independent risk factor for diabetes, cardiovascular disease, and all-cause mortality [3]. Notably, sitting for more than 8 hours per day increases mortality risk even among those who meet the minimum recommended physical activity (PA) levels.

Current trends show an increase in PinA among adults (not meeting the global recommendations of at least 150 minutes of moderate-to-vigorous aerobic activity, 75 minutes of vigorous intensity activity, or an equivalent combination per week) [2, 4] is rising. From 2010 to 2022, PinA increased by 5 percentage points. If this trend continues, 35% of adults will be inactive by 2030. There are significant age and gender disparities in activity levels. Women are less active than men by an average of five percentage points, a gap unchanged since 2000 [4, 5].

In the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates), PinA and excessive SB have become a significant public health concern. These behaviours are linked to the region's alarmingly high rates of obesity, diabetes, and cardiovascular diseases [6–12]. Reports from the WHO and International Diabetes Federation (IDF) show that the GCC countries rank among the highest globally for obesity and diabetes prevalence [4, 5, 13, 14].

One review study estimated that the proportion of adults meeting the recommended PA levels in the GCC ranges from 39.0 to 42.1% for males and 26.3 to 28.4% for females [6, 8, 9, 15]. Recent estimates place PinA prevalence in the GCC at about 50%, which is lower than global PA levels for both men and women [14, 16]. This is considered well below the percentage of PA levels observed globally for men and women [17, 18]. **Figures 1 and 2**, based on published data from WHO, illustrate the rising PinA rates in the GCC between 2010 and 2022, highlighting a persistent gender gap. If current trends worsen, PinA rates are projected to increase to 45.9% in Bahrain, 65.9% in Kuwait, 55.8% in Oman, 65.4% in Qatar, 53.4% in Saudi Arabia, and 78.5% in the UAE by 2030 [16].

Alongside these inactivity rates, the GCC countries also have some of the highest obesity rates worldwide. Obesity is defined by a body mass index (BMI) over 30. Data from WHO in 2016 showed Kuwait, Saudi Arabia, and Qatar ranked second (after the US), third, and fourth in obesity rates globally, respectively [14]. Regarding female obesity, Kuwait, Qatar, and Saudi Arabia rank first, second, and third, respectively [18].

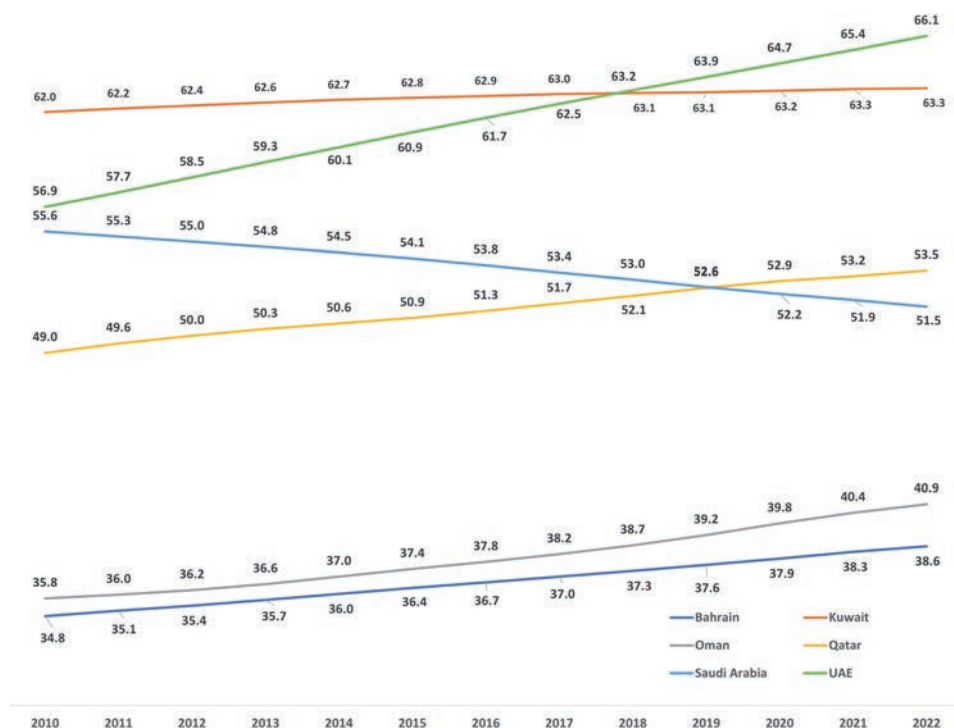


Figure 1.
 Trends of % physical inactivity across the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE), among adults aged 18+ years from 2010 to 2022.

Since the 1970s, GCC economies and societies have undergone rapid transformation due to vast oil and gas discoveries. This transformation established the region as a leader in global finance, trade, aviation, and tourism. Technological advances and increased migration and tourism have accelerated integration into the global economy, bringing new cultural influences and ideas. Few regions have experienced such rapid change within globalization.

Rapid urbanization, economic growth, and lifestyle changes have led to decreased PA and increased sedentary time in the GCC, particularly in work and leisure settings [6, 7]. Factors contributing to this sedentary lifestyle include extensive road networks, increased car use, mechanized appliances, and widespread use of computers, televisions, and electronic gaming devices [16]. Harsh outdoor temperatures, causing desertification and low vegetation, force people indoors and increase reliance on cars, even for short distances [19, 20].

Traditional and socio-cultural constraints also influence lifestyle choices, especially for women. These include limited access to sports and exercise facilities and gender-segregated fitness centres. Additionally, the availability of low-cost migrant labour for domestic work reduces physical activity among indigenous women [6, 21–23]. Limited public awareness of PA benefits and high screen time, especially among people with prediabetes or metabolic risks, further exacerbate sedentary behaviour [3, 23–25].

Efforts to promote PA across the GCC countries have been inconsistent and show limited progress [25, 26]. A comprehensive review analysing 100 studies on PA promotion revealed diverse intervention methodologies implemented in schools,

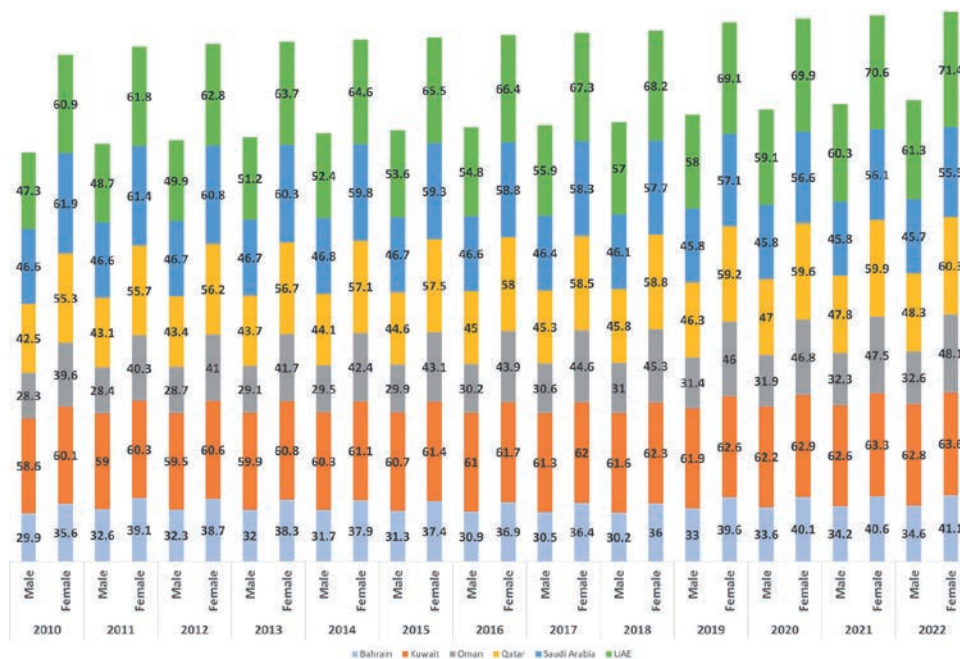


Figure 2.

Trends of % physical inactivity by gender across the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE), among adults aged 18+ years from 2010 to 2022.

workplaces, communities, and clinical settings. These interventions were categorized into three main domains: campaigns and information dissemination, behavioural and social strategies, and environmental and policy measures [27]. The review stresses the importance of applying multifaceted PA initiatives that address a wide range of correlates influencing PA. Specifically, effective PA promotion should target factors at individual, behavioural, social, environmental, and policy levels to create the meaningful and sustainable improvements [25].

2. Objective

This chapter applies the constructs of the Theory of Planned Behaviour (TPB) to understand the socio-cultural correlates influencing PA and sedentary behaviour in the GCC. The TPB framework, which encompasses attitudes, subjective norms, perceived behavioural control, and intention, is used to organize evidence on predictors and interventions to change PA behaviour. Evidence across the literature indicate that negative attitudes, restrictive social norms, and low perceived control are the significant barriers to PA, while positive intentions are necessary but often insufficient for behaviour change [18]. Results from this chapter can be utilized to inform interventions targeting these constructs especially those addressing socio-cultural correlates for increased PA and less SB. Research highlights that interventions underpinned by a sound theoretical framework are more likely to be effective.

3. Theoretical framework: The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) builds on the Theory of Reasoned Action (TRA) which was developed by Ajzen and Fishbein in the 1970s. The basic idea behind the TRA is that attitudes and subjective norms are highly correlated with behavioural intention and intention is correlated with behaviour [28]. However, the TRA did not include the concept of perceived behavioural control. This addition in the TPB was an important one as it allowed for a more nuanced understanding of behaviour, which incorporates self-efficacy, locus of control, and confidence in ability to change behaviour. The TPB posits that behaviour is determined by intention, which in turn is influenced by attitudes (beliefs about the behaviour), subjective norms (perceived social pressure), and perceived behavioural control (perceived ease or difficulty of performing the behaviour) (**Figure 3**).

Notably, there are criticisms of the TPB, and some authors argue that the TPB assumes behaviour is a result of a rationale decision-making process and the role of human attributes such as emotions, habits and unconscious bias are overlooked. Others claim that the TPB is uni-directional with its focus on the individual and their cognitions (thoughts) about the behaviour and lack of acknowledgment of wider influences. However, no one theory is perfect; in reality, people behave in a myriad of ways, depending on variables such as mood, social context, and inter-personal effects. There will always be gaps when trying to explain and understand something as complex as human behaviour. The strengths of applying the TPB in this particular review within the GCC context are outlined below [6, 23, 29, 30].

4. Why the Theory of Planned Behaviour (TPB) is suitable?

4.1 Addresses key socio-cultural determinants

The TPB is particularly suited to explain and predict PA and SB in the GCC because it directly incorporates attitudes, subjective norms, and perceived behavioural control, all of which are strongly influenced by the region's socio-cultural context. In the GCC, factors such as gender roles, family expectations, religious beliefs, and community norms have a significant impact on health behaviours, making the TPB's inclusion of subjective norms especially relevant [9, 31].

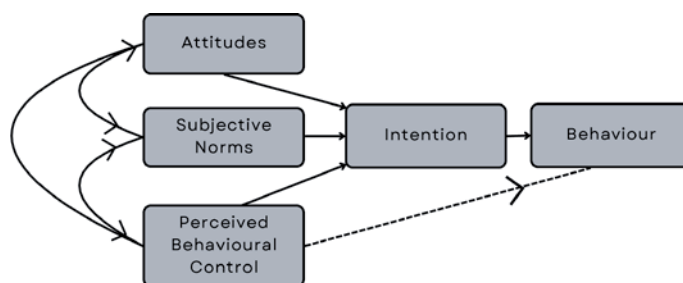


Figure 3.
 The constructs of the Theory of Planned Behaviour available online.

4.2 Proven predictive power across PA behaviours

TPB has demonstrated strong predictive validity for PA behaviours in diverse settings, including Arabic-speaking and GCC countries. It successfully explains the variation in intention to exercise and actual activity levels by emphasizing how beliefs about outcomes (attitude), social pressures (subjective norms), and the perceived ease or difficulty of performing PA (perceived behavioural control) contribute to intention and subsequent action [31].

4.3 Adaptability to sedentary behaviour

The framework's flexibility allows it to be applied not only to PA but also to SB. TPB can accommodate additional influences, such as habit and environmental constraints, which broadens its applicability to the GCC context, where environmental, cultural, and policy barriers to reducing sitting time are prominent.

4.4 Empirical support in the GCC

Several studies and reviews conducted in the GCC have utilized TPB as a guiding framework. These studies found that subjective norms (social/family acceptance and support) and perceived behavioural control (e.g., access, climate, confidence) are among the strongest predictors of PA and sedentary time in GCC populations, more so than purely knowledge-based or risk-perception models such as the Health Belief Model [28, 31].

5. Method

This chapter is based on a systematic literature search conducted to identify studies examining the correlates of PA and SB in the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates). The search aimed to capture both quantitative and qualitative research studies, as well as review articles, published between January 2005 and May 2025 in PubMed, Web of Science, and Scopus. Additional regional databases and government or academic repositories were consulted when local GCC-specific journals were referenced in review articles.

5.1 Search terms

Searches combined Medical Subject Headings (MeSH) and free-text terms related to:

“Physical activity”, “exercise”, “sports”, “movement”, “sedentary behaviour”, “sitting time”, “adults”, “Gulf Cooperation Council”, and the names of individual countries: “Bahrain”, “Kuwait”, “Oman”, “Qatar”, “Saudi Arabia”, “United Arab Emirates”, “determinants”, “correlates”, “predictors”, “barriers”, “facilitators”.

5.2 Inclusion criteria

- Population: Studies involving adults residing in any GCC country.

- Outcomes: Measurement of PA (objectively or by self-report) or sedentary behaviour, including prevalence, intensity, duration, or related correlates.
- Correlates: Examination of social, demographic, behavioural, environmental, cultural, or policy-related factors.
- Study Design: Original research (cross-sectional, cohort, case-control, intervention), systematic reviews, and meta-analyses.
- Language: Publications in English.
- Accessibility: Full-text, peer-reviewed publications.

5.3 Exclusion criteria

- Studies not conducted in GCC countries.
- Case reports, editorials, conference abstracts, and opinion pieces.
- Non-peer-reviewed publications (unless regional data were unavailable elsewhere).
- Studies focusing solely on children and/or clinical populations unrelated to community or population-based PA or sedentary behaviour.

5.4 Article selection process

Two independent reviewers conducted dual screening of titles and abstracts to identify potentially eligible studies, reducing the risk of selection bias. Full-text articles meeting inclusion criteria were reviewed independently by both researchers. Disagreements were addressed through discussion, and when consensus was not achieved, a third reviewer who had not participated in the initial screening was consulted to resolve conflicts, ensuring objectivity, consistency, and high quality in study selection.

5.5 Additional considerations

Reference lists of included articles and recent reviews were hand-searched for additional relevant studies. Where information on country setting or population was unclear, corresponding authors were contacted when feasible. Data on studies were specially highlighted and stratified according to TPB constructs as per the agreed categorization method described below.

5.6 Role of an independent psychologist and categorization and theoretical framework application

An independent psychologist, with expertise in health behaviour theories, collaborated closely with the review team. The psychologist was responsible for reviewing the extracted data on correlates and categorizing them according to the key constructs

of the TPB: attitudes, subjective norms, perceived behavioural control, and intention. Where studies explicitly reported TPB-related constructs, these were mapped directly. In studies lacking explicit reference to TPB, the psychologist worked with the research team to infer likely theoretical alignment based on study descriptions and reported measures. Periodic meetings between the primary reviewers and the psychologist ensured a consensus-driven approach for categorization, enhancing both theoretical coherence and practical interpretability.

5.7 Quality control and consistency in thematic coding

The psychologist independently checked the initial coding and mapping of correlates against TPB constructs performed by the two primary reviewers. Disagreements in classification were discussed, and final decisions reached by consensus, with documentation of the rationale.

5.8 Advisory and oversight role

The psychologist also provided ongoing oversight for the thematic synthesis, ensuring fidelity to the TPB framework and reviewing draft findings for consistency in the application of behavioural theory. This collaborative and quality-oriented process maximized the accuracy, reliability, and theoretical integrity of the review.

5.9 Descriptions used to categorize the pooled data on the socio-cultural correlates of PA and SB in the GCC within the constructs of the TPB

5.9.1 Attitudes (beliefs about health benefits of active behaviour)

Attitudes refer to individuals' positive or negative evaluations of engaging in PA or limiting SB. In the GCC, attitudes towards PA are often shaped by beliefs about health benefits, enjoyment, and cultural appropriateness. Positive attitudes included studies that cited knowledge on the health benefits of the active behaviour, and reporting enjoyment of exercise. However, negative attitudes included barriers such as perceiving PA as tiring, time-consuming, or culturally inappropriate.

5.9.2 Subjective norms (family, religious, and cultural expectations)

Subjective norms reflect perceived social pressure to perform or avoid a behaviour. In the GCC, family, peers, and broader cultural expectations play a significant role. Individuals who perceive positive social support from family and friends are more likely to engage in PA. Cultural norms, including traditional gender roles and expectations about modesty, lack of female-only facilities, and social disapproval, were considered within this construct. Additionally, community influence through walking groups and public health campaigns were included within the subjective norms.

5.9.3 Perceived behavioural control (access to facilities, climate, self-efficacy)

Perceived behavioural control refers to individuals' perceptions of their ability to perform PA or limit SB, considering both internal and external barriers. Environmental barriers (hot climate, lack of safe walking spaces, and limited access to recreational facilities) were cited as perceived behavioural control. Personal barriers (low self-efficacy, lack

of skills, and health problems) were equally categorized within perceived behavioural control. Thus, access to facilities, supportive environments, feeling safe to walk alone, and skill-building programs were all considered to enhance the perceived control.

5.9.4 Intention

Intention is the motivational factor that indicates how much effort an individual is willing to invest in performing a behaviour. Strong intentions were linked to strong desire to be more active. However, the intention is overlapped and limited by persistent barriers in attitudes, norms, and control.

6. Results

A total of 78 articles were comprehensively reviewed and included in this chapter. Of these, 10 were review articles (eight systematic reviews and two narrative reviews) and three were qualitative studies (Figure 3). Tables 1 and 2 present the most frequently cited correlates, defined as factors associated with PA and/or SB, across the GCC countries. Among the original research studies (excluding reviews), the majority were conducted in Saudi Arabia (n = 38), followed by Kuwait (n = 13), the United Arab Emirates (n = 11),

Correlates	Countries						TPB (Constructs) Attitudes (A), Subjective Norms (S), Perceived Behavioural Control (P), Intention (I)
	BH	KW	OM	QA	SA	UAE	
Younger age	[32]	[33, 34]	[20, 35, 36]	[30]	[37, 38]	[24, 39]	S
Male gender	[24, 32]	[34]	[19, 35]		[37, 40–42]		S
Being married		[43]	[19]		[37, 38, 44]		S
High Educational level		[33, 45]				[22, 46]	S
Being employed			[20, 35, 36]		[41]	[47]	S
Presence of a health condition			[19, 24, 35, 36]			[48]	P
High self-efficacy			[49]	[30]	[50]		P, I
Active stages of behavior change			[35, 49]		[51]		P, I
Aimed to lose/maintain weight				[30]	[52, 53]*	[54, 55]	I
Aware of PA health benefits and importance		[43, 45]	[19, 20, 35]	[30]	[52]*[53, 56–60]	[24, 47, 54, 55]	A

Correlates	Countries						TPB (Constructs) Attitudes (A), Subjective Norms (S), Perceived Behavioural Control (P), Intention (I)
	BH	KW	OM	QA	SA	UAE	
Positive dietary habits			[35, 49]		[23, 24, 40, 46, 61–64] [61]**		A, P
Improve physical & general health			[19, 20, 36]	[30, 65, 66]	[67]**		A, S, I
Recreational/ fun to do					[63, 64, 67]**[23]		A, I
Presence of social support	[32]	[33]	[35, 49]		[7, 52, 67]	[48]	S, I
Positive religious beliefs supportive of exercise	[32]	[24]		[25, 30, 65]	[29]		A, S, I

Bahrain (BH), Kuwait (KW), Oman (OM), Qatar (QA), Saudi Arabia (SA), United Arab Emirates (UAE).
**in Females only.*
***in Males only.*

Table 1.

Correlates with positive influence on PA and sedentary behavior in the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates).

Correlates	Countries						TPB (Constructs) Attitudes (A) Subjective Norms (S) Perceived Behavioral Control (P) Intention (I)
	BH	KW	OM	QA	SA	UAE	
Older age	[4, 7, 23, 24]	[33, 68, 69]	[19, 20, 35]		[37, 40–42, 56, 61, 70–72] [73]**	[48, 55]	S
Female gender		[64, 69]	[19]	[7, 22, 47]	[56, 61, 71, 72]	[24, 39]	S
Being married		[74]			[9, 40]	[23, 24, 34]	S
High parity (more than 5 pregnancies)					[75]		S
High educational level			[20]		[56]		S
Less education		[76]			[9, 42, 44, 53, 77]	[22, 46]	S

Correlates	Countries						TPB (Constructs)	
	BH	KW	OM	QA	SA	UAE	Attitudes (A)	Subjective Norms (S)
							Perceived Behavioral Control (P)	Intention (I)
Being employed					[56, 77]		S	
Lack of self-efficacy			[49]		[57, 58, 62]		P, I	
Lack of motivation or will-power or self-confidence		[43]	[35, 36, 78]		[38, 51, 56, 58, 73, 79–82], [67] [*] , [79] [*]	[31, 83]	P, I	
Lack of awareness on PA health benefits		[33, 48]	[20, 36]	[23, 66, 78]	[79, 84] [*] [67] ^{**} [7, 23, 58, 70]	[48]	A	
Unhealthy food habits and high BMI		[33]	[36]		[23, 40, 61, 63, 64], [61] ^{**}		S	
Presence of a disease or health condition		[33]			[56]		P, I	
Lack of time	[48]	[33, 54]	[35, 36]	[7, 65, 85]	[23, 51, 56–58, 61, 86] [59] [*] , [53] [*] , [52] [*] , [9] ^{**}	[6, 7, 23]	P, I	
Working for long hours/shift duties					[44, 79], [52, 53] [*]		P, I	
High screen time/ fewer sleeping hours		[33]		[66]	[38, 58, 64, 87]		P, I	
Fear of criticism					[84]		P, I	
Lack of social support		[43]	[36, 49]	[66]	[7, 9, 23, 41, 53, 56, 80]	[10, 22, 47]	S, I	
Lack of suitable facilities		[45, 48, 88]	[36, 49]	[66]	[41, 53, 56–60], [62] [*] [67] ^{**}	[31, 47]	P	
Bad (hot) weather	[24, 32, 89]	[34, 45, 88]	[19, 35, 36, 49]	[22, 23, 45]	[6, 23, 40, 41, 80]	[22, 25, 47, 78]	P	
Negative cultural norms (over use of care/ domestic workers/perceptions on sports clothing)	[21, 24, 32]	[64]	[35, 36, 49]	[4, 31, 34, 85, 90]	[24, 30, 46, 62]	[6, 11, 22, 23, 48]	S, I	

Bahrain (BH), Kuwait (KW), Oman (OM), Qatar (QA), Saudi Arabia (SA), United Arab Emirates (UAE).
^{*}in Females only.
^{**}in Males only.

Table 2.
Correlates with negative Direction toward PA and sedentary behavior in the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates)

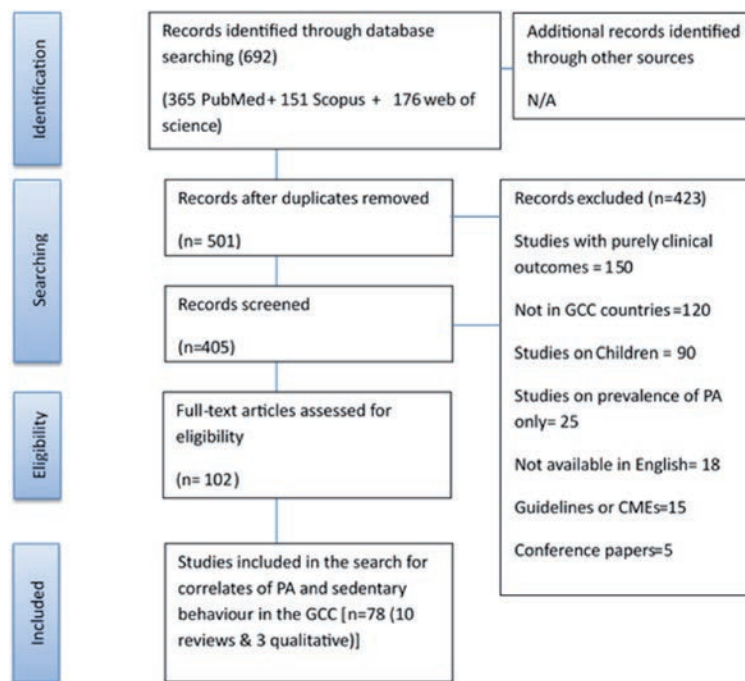


Figure 4.
Illustration on the search method for socio-cultural correlates for physical activity and sedentary behaviour in the GCC from 2005 to 2025.

Qatar (n = 11), Bahrain (n = 9), and Oman (n = 5). The identified correlates were categorized based on whether they were associated with increased PA or reduced SB, or conversely, with decreased PA or increased SB. Notably, the vast majority of studies focused exclusively on PA, with only a limited number (n = 9) addressing both PA and SB, typically measuring the latter through indicators such as sitting time (**Figure 4**).

6.1 The socio-cultural correlates with positive direction utilizing the constructs of the TPB

Positive attitudes (n = 5): aware of PA health benefits and importance, positive dietary habits, improve physical & general health, recreational/fun to do, positive religious beliefs supportive of exercise (**Table 1**) [19, 20, 23–25, 29, 30, 32, 35, 36, 40, 43, 45–47, 49, 52–67].

Positive subjective norms (n = 8): younger age, male gender, being married, high educational level, being employed, the presence of a health condition, improve physical & general health, the presence of social support, positive religious beliefs supportive of exercise [7, 19, 20, 22, 24, 25, 29, 30, 32–47, 49, 52, 65–67].

Positive perceived behavioural control (n = 4): the presence of a health condition, high self-efficacy, active stages of behaviour change, and positive dietary habits [19, 23, 24, 30, 35, 36, 40, 46, 48–51, 61–64].

Positive intentions (n = 7): high self-efficacy, active stages of behaviour change, aimed to lose/maintain weight, improve physical and general health, recreational/fun to do, presence of social support, and positive religious beliefs supportive of exercise [7, 19, 20, 23–25, 29, 30, 32, 33, 35, 36, 48–55, 63–67].

6.2 The socio-cultural correlates with negative direction utilizing the constructs of the TPB

Negative attitudes (n = 1): Lack of awareness on PA health benefits (**Table 2**) [7, 20, 23, 33, 36, 48, 58, 66, 67, 70, 78, 79, 84].

Negative subjective norms (n = 10): older age, female gender, being married, high parity (more than five pregnancies) less education, being employed, unhealthy food habits and high BMI, lack of social support, negative cultural norms (over use of care/domestic workers/perceptions on sports clothing) [4, 6, 7, 9, 11, 19–24, 30–37, 39–44, 46–49, 53, 55, 56, 61–64, 66, 68–77, 80, 85, 90].

Negative perceived behavioural control (n = 9): lack of self-efficacy, lack of motivation or will-power or self-confidence, the presence of a disease or health condition, lack of time, working for long hours/shift duties, high screen time/fewer sleeping hours, fear of criticism, lack of suitable facilities sports, and bad (hot) weather [6, 7, 9, 19, 22–25, 31–36, 38, 40, 41, 43–45, 47–49, 51–54, 56–62, 64–67, 73, 78–89].

Negative intentions (n = 9): lack of self-efficacy, lack of motivation or will-power or self-confidence, the presence of a disease or health condition, lack of time, working for long hours/shift duties, high screen time/fewer sleeping hours, fear of criticism, lack of social support, and negative cultural norms (over use of care/domestic workers/perceptions on sports clothing) [6, 7, 9–11, 21–24, 30–33, 35, 36, 38, 41, 43, 44, 46–49, 51–54, 56–59, 61, 62, 64–67, 73, 78–87].

7. Discussion

This chapter explored the alarming increasing trends of a preventable risk factor namely PinA and SB in the GCC. This increase is reflected in the high rates of NCDs across all countries of the GCC with incidence exceeding global rates indicating that the socio-cultural environment in the GCC evidently fails to promote sufficient PA. Thus, the aim of this chapter was to explore the cited/reported socio-cultural correlates or factors for PA and SB in the GCC in order to inform effective interventional designs to promote active living. The search included a comprehensive review of 78 studies (including 10 systematic reviews and 3 qualitative studies) and 65 original research studies from 2005 to May 2025. Results were described according to the constructs of the TPB including correlates with both: positive and negative directions to PA and SB.

Notably, correlates frequently overlapped across intrapersonal, interpersonal, and environmental domains, reflecting the dynamic nature of socio-cultural factors. Considering the unique socio-cultural context of the GCC, studies reported more barriers than facilitators with more citations on lack of motivation or will-power or low self-confidence, lack of awareness on PA health benefits, unhealthy food habits, lack of time, lack of social support, lack of suitable facilities, bad (hot) weather, and negative cultural norms (over use of care/domestic workers/perceptions on sports clothing).

Positive attitudes towards PA and reducing SB can be enhanced through a range of evidence-based behaviour change techniques (BCTs) such as goal setting; action planning; setting graded tasks; prompting focus on past success; prompting self-monitoring of behaviour; barrier identification/problem solving; providing information on when and where to perform behaviour; and plan of social support/change [25, 30, 49, 65]. Interventions targeting schools, universities and academic institutes can be encouraged to include BCTs and physical health education within their curriculums.

Use of community leaders and influencers can equally enhance awareness on the benefits of PA. One practical example includes school- and university-based health curricula in Saudi Arabia supported by public health officials advocating for physical education in schools and community spaces for women and children [33, 37, 43, 51, 54, 59, 65, 72, 73].

Positive subjective norms including younger age, and male gender were consistent with global trends on the dominance of younger age and male gender in PA participation. Higher PA levels observed in some studies among younger age groups are encouraging given the fact that the population of the GCC is considered to be young (50% of the population under the age of twenty-five years old). Lower PA among women has been attributed to gender norms, including conservative dress that is not suitable for PA, the need for women to be chaperoned in public spaces, and the paucity of gender-segregated fitness facilities. In addition, cultural values put a premium on comfort for both genders, physical exertion is avoided, and public spaces, such as streets, are not considered appropriate for physical activity. Thus, both general norms and gender norms converge to discourage PA [21, 91].

Marital and occupational status were described interchangeably as positive and negative correlates depending on interactions between the socio-cultural and economic factors. More efforts should be put in place to encourage women to do more PA and reduce SB in leisure, work, and transportation domains of PA. A practical example includes “women-only gyms” in Oman under the “Healthy Lifestyle Project” which have provided culturally acceptable spaces and encouragement for female PA participation [36].

A lack of social support has been consistently identified as a barrier to participation in PA. Evidence indicates that both informal support networks (e.g. family and friends) and formal sources (e.g. healthcare providers) play a significant role in promoting PA engagement. Social support not only enhances individuals’ self-confidence but also serves as a source of motivation to initiate and maintain exercise routines. Engaging in PA with friends or family members further reinforces commitment and participation. Additional facilitators include organizing social events that incorporate PA and building relationships with physically active individuals through settings such as gyms, exercise groups, or hiking clubs. Among older adults, the need for social support appears to be greater compared to younger populations. Health professionals can contribute by encouraging elderly individuals to take part in group-based activities tailored to their age, abilities, and fitness levels.

Studies underpinned with evidence-based BCTs are proven to have more positive PA promotion outcomes compared to studies that are not linked to goal setting or BCTs [92]. Positive perceived behavioural control in the presence of a health condition, high self-efficacy, and being in an advanced/active stage of behaviour change can be utilized when setting goals to promote activity and change behaviour.

7.1 Practical applications

While planning for interventions to promote PA, bridging the intention-behaviour gap could be encouraged through interventions that target socio-cultural and religious factors supportive of exercise, to make the “physically active” choice the easy choice. Motivating factors for PA include emphasizing pleasurable PA and group formats, scheduling PA for times in the day or the week when energy levels are high. Emphasizing pleasure and accessibility rather than prescriptive targets mirrors emerging international best practice to reduce drop-out and promote adherence. Barriers cited, such as lack of time, could be

addressed through the individualized BCTs linked to use of monitoring daily activity with the aid of a smart phone and fitness trackers, PA apps. Barriers cited regarding extreme weather (very hot or cold seasons) could be addressed by improving/promoting availability and appropriate opportunities to use indoor activities, such as indoor cycling, aerobic dance, indoor swimming, stair climbing, or mall walking, that are always available, regardless of the weather.

Changing ingrained behaviour patterns is challenging. The available evidence indicates that multicomponent (e.g. media, behavioural, social, policy, and environmental), multisector (e.g. public health, transportation, recreation, healthcare), and multisite (e.g. work, school, community organization) community-wide campaigns can be effective in increasing participation in PA. Additionally, building workforce capacity, surveillance systems, and policy implementation infrastructure remain a significant challenge in the GCC context.

7.2 Strengths and limitations

To our knowledge, this is the first analysis to map behavioural constructs onto reported socio-cultural correlates for PA and SB in the GCC. Despite strong evidence that promotion of PA and decreasing SB are a key preventable risk factor for addressing the high rates of NCD in the GCC, studies and interventions remain scarce. Behavioural aspects and use of BCTs is not well highlighted. Future research could consider including BCTs to encourage positive socio-cultural changes at individual, and community levels.

Limitations include the restriction of the search strategy to Scopus, PubMed and Google Scholar. However, the included systematic reviews have searched several literature sources for primary studies, which minimize the risk of publication bias in our overview. The search included studies on factors associated with participation in PA published up to 2025. The majority of the included studies were cross-sectional and had not been designed to assess causal association.

8. Conclusions

Adapting positive attitudes towards PA and reducing SB in the GCC requires ongoing public communication that highlights the benefits of an active lifestyle. Expanding opportunities for women to engage in PA, alongside developing supportive infrastructures for schools, workplaces, and communities, is essential. Building awareness around local cultural and gender-specific expectations through education, training, and environmental changes including accessible indoor activity can strengthen individuals' confidence to be active, especially those managing health conditions or already motivated to change. Interventions should be underpinned by culturally and religiously meaningful motivators and frame PA as both enjoyable and fulfilling. Future research must focus on testing effective, culturally appropriate PA promotional interventions linked to behaviour change techniques including goal-setting, self-monitoring, and social support.

Conflict of interest

The authors declare no conflict of interest.

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References

- [1] World Health Organization. Physical Activity Fact Sheet. Physical Activity Fact Sheet. World health organization; 2024. Available from: <https://www.who.int/news-room/fact-sheets/detail/physical-activity> [Accessed: June 12, 2025]
- [2] World Health Organization. Global Recommendations on Physical Activity for Health. WHO&IDF; 2010. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK305049/> [Accessed: July 15, 2025]
- [3] Wilmot EG, Edwardson CL, Achana FA, Davies MJ, Gorely T, Gray LJ, et al. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: Systematic review and meta-analysis. *Diabetologia*. 2012;**55**:2895-2905. DOI: 10.1007/s00125-012-2677-z
- [4] Strain T, Flaxman S, Guthold R, Semenova E, Cowan M, Riley LM, et al. National, regional, and global trends in insufficient physical activity among adults from 2000 to 2022: A pooled analysis of 507 population-based surveys with 5.7 million participants. *The Lancet Global Health*. 2024;**12**:e1232-e1243. DOI: 10.1016/s2214-109x(24)00150-5
- [5] Ong KL, Stafford LK, McLaughlin SA, Boyko EJ, Vollset SE, Smith AE, et al. Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: A systematic analysis for the global burden of disease study 2021. *The Lancet*. 2023;**402**:203-234. DOI: 10.1016/S0140-6736(23)01301-6
- [6] Mabry R, Koohsari MJ, Bull F, Owen N. A systematic review of physical activity and sedentary behaviour research in the oil-producing countries of the Arabian peninsula. *BMC Public Health*. 2016;**16**. DOI: 10.1186/s12889-016-3642-4
- [7] Mabry RM, Reeves MM, Eakin EG, Owen N. Evidence of physical activity participation among men and women in the countries of the Gulf cooperation council: A review. *Obesity Reviews*. 2010;**11**:457-464. DOI: 10.1111/j.1467-789x.2009.00655.x
- [8] Al-Hazzaa HM, Abahussain NA, Al-Sobayel HI, Qahwaji DM, Musaiger AO. Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. *International Journal of Behavioral Nutrition and Physical Activity*. 2011;**8**:140. DOI: 10.1186/1479-5868-8-140
- [9] Al-Hazzaa HM. Physical inactivity in Saudi Arabia revisited: A systematic review of inactivity prevalence and perceived barriers to active living. *International Journal of Health Sciences (Qassim)*. 2018;**12**:50-64
- [10] Khalifa E, Daniel G, Johanna SJ, Emily R, Yahya A-F, Ameera AAN, et al. The case for investing in the prevention and control of non-communicable diseases in the six countries of the Gulf cooperation council: An economic evaluation. *BMJ Global Health*. 2022;**7**:e008670. DOI: 10.1136/bmjgh-2022-008670
- [11] Alqadasi ET, Chamroonsawasdi K, Saejeng K, Nagi MA. Burden of non-communicable diseases in health Council of Gulf Cooperation (GCC) countries. *Journal of Taibah University Medical Sciences*. 2024;**19**:877-884. DOI: 10.1016/j.jtumed.2024.07.009

- [12] World Health Organization. WHO Burden of Noncommunicable Diseases in the Eastern Mediterranean Region. World Health Organization Eastern Mediterranean Region. World health organization; 2025. Available from: <https://www.emro.who.int/noncommunicable-diseases/publications/burden-of-noncommunicable-diseases-in-the-eastern-mediterranean-region.html> [Accessed: July 10, 2025]
- [13] International Diabetes Federation. IDF Atlas 11th Edition 2025. WHO&IDF; 2025. Available from: file:///C:/Users/t.alghafri/Downloads/IDF_Atlas_11th_Edition_2025-1.pdf
- [14] World Health Organization. The Global Health Observatory. Noncommunicable Diseases: Mortality. WHO&IDF; 2025. Available from: <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ncd-mortality-rate> [Accessed: July 10, 2025]
- [15] Chaabane S, Chaabna K, Abraham A, Mamtani R, Cheema S. Physical activity and sedentary behaviour in the Middle East and North Africa: An overview of systematic reviews and meta-analysis. *Scientific Reports*. 2020;**10**:9363. DOI: 10.1038/s41598-020-66163-x
- [16] World Health Organization. The Global Health Observatory. Physical Activity, Insufficient, among Adults Aged 18+ Years, Prevalence (Age-Standardized Estimate). WHO&IDF; 2025. Available from: [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-\(age-standardized-estimate\)-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-insufficient-physical-activity-among-adults-aged-18-years-(age-standardized-estimate)-(-)) [Accessed: July 10, 2025]
- [17] Cla T. Time to tackle the physical activity gender gap. *Health*. 2018;**6**:e1077-e1086
- [18] El-Sahli Z. Globalization and obesity in the GCC countries. *Middle East Development Journal*. 2023;**15**:26-49. DOI: 10.1080/17938120.2022.2160182
- [19] Alghafri TS, Alharthi SM, Al-farsi Y, Bannerman E, Craigie AM, Anderson AS. Correlates of physical activity and sitting time in adults with type 2 diabetes attending primary health care in Oman. *BMC Public Health*. 2018;**18**:85. DOI: 10.1186/s12889-017-4643-7
- [20] Mabry RM, Winkler EA, Reeves MM, Eakin EG, Owen N. Correlates of Omani adults' physical inactivity and sitting time. *Public Health Nutrition*. 2013;**16**:65-72. DOI: 10.1017/S1368980012002844
- [21] Kruk J, Aboul-Enein BH. Religion- and spirituality-based effects on health-related components with special reference to physical activity: A systematic review. *Religions*. 2024;**15**:835. DOI: 10.3390/rel15070835
- [22] Donnelly TT, AlSuwaidi J, Al Bulushi A, Al Enazi N, Yassin K, Rehman AM, et al. The influence of cultural and social factors on healthy lifestyle of Arabic women. *Avicenna*. 2011;**2011**. DOI: 10.5339/avi.2011.3
- [23] Chaabane S, Chaabna K, Doraiswamy S, Mamtani R, Cheema S. Barriers and facilitators associated with physical activity in the Middle East and North Africa region: A systematic overview. *International Journal of Environmental Research and Public Health*. 2021;**18**:1647. DOI: 10.3390/ijerph18041647
- [24] Osabi LA, Van De Klundert J, Alhurishi SA, Cramm JM. A theory-informed systematic review to understand physical activity among women in gulf cooperation council countries. *BMC Public*

Health. 2023;**23**:1009. DOI: 10.1186/s12889-023-15725-5

[25] Nash EA, Critchley JA, Pearson F, Awad SF, Abu-Raddad LJ, Abu-Hijleh FM, et al. A systematic review of interventions to promote physical activity in six gulf countries. PLoS One. 2021;**16**:e0259058. DOI: 10.1371/journal.pone.0259058

[26] Alzahrani AA, Gelius P, Grunseit A, Bauman A, Gebel K. Physical activity policies in the six gulf cooperation council countries: A qualitative study with document analysis. BMJ Global Health. 2025;**10**:e017627. DOI: 10.1136/bmjgh-2024-017627

[27] Heath GW, Parra DC, Sarmiento OL, Andersen LB, Owen N, Goenka S, et al. Evidence-based intervention in physical activity: Lessons from around the world. The Lancet. 2012;**380**:272-281. DOI: 10.1016/s0140-6736(12)60816-2

[28] Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991;**50**:179-211. DOI: 10.1016/0749-5978(91)90020-T

[29] Alharbi BFH, Baker P, Pavey T, Alharbi MF. Investigating the beliefs of Saudi females regarding physical activity: A qualitative exploration. International Journal of Qualitative Studies on Health and Well-being. 2024;**19**:2296696. DOI: 10.1080/17482631.2023.2296696

[30] Aljayyousi GF, Abu Munshar M, Al-Salim F, Osman ER. Addressing context to understand physical activity among Muslim university students: The role of gender, family, and culture. BMC Public Health. 2019;**19**:1452. DOI: 10.1186/s12889-019-7670-8

[31] Osabi LA, van de Klundert J, Alhurishi SA, Cramm JM. A

theory-informed systematic review to understand physical activity among women in Gulf Cooperation Council countries. BMC Public Health. 2023;**23**(1):1009. DOI: 10.1186/s12889-023-15725-5

[32] Rajab E, Wasif P, Doherty S, Gaynor D, Malik H, Fredericks S, et al. Physical activity and sedentary behaviour of Bahraini people with type 2 diabetes: A cross-sectional study. Digital Health. 2024;**10**:20552076241251997. DOI: 10.1177/20552076241251997

[33] Al-Haifi AR, Al-Fayez MA, Al-Athari BI, Al-Ajmi FA, Allafi AR, Al-Hazzaa HM, et al. Relative contribution of physical activity, sedentary behaviors, and dietary habits to the prevalence of obesity among Kuwaiti adolescents. Food and Nutrition Bulletin. 2013;**34**:6-13. DOI: 10.1177/156482651303400102

[34] Ng SW, Zaghloul S, Ali HI, Harrison G, Popkin BM. The prevalence and trends of overweight, obesity and nutrition-related non-communicable diseases in the Arabian Gulf States. Obesity Reviews. 2011;**12**:1-13. DOI: 10.1111/j.1467-789X.2010.00750.x

[35] Alghafri T, Alharthi SM, Al Farsi YM, Bannerman E, Craigie AM, Anderson AS. Perceived barriers to leisure time physical activity in adults with type 2 diabetes attending primary healthcare in Oman: A cross-sectional survey. BMJ Open. 2017;**7**:e016946. DOI: 10.1136/bmjopen-2017-016946

[36] Mabry RM, Al-Busaidi ZQ, Reeves MM, Owen N, Eakin EG. Addressing physical inactivity in Omani adults: Perceptions of public health managers. Public Health Nutrition. 2014;**17**:674-681. DOI: 10.1017/S1368980012005678

- [37] Al-Qahtani MH. Dietary habits of Saudi medical students at University of Dammam. *International Journal of Health Sciences (Qassim)*. 2016;**10**:353-362
- [38] Alquaiz AM, Kazi A, Qureshi R, Siddiqui AR, Jamal A, Shaik SA. Correlates of cardiovascular disease risk scores in women in Riyadh, Kingdom of Saudi Arabia. *Women & Health*. 2015;**55**:103-117. DOI: 10.1080/03630242.2014.972020
- [39] Burton NW, Barber BL, Khan A. A qualitative study of barriers and enablers of physical activity among female Emirati University Students. *International Journal of Environmental Research and Public Health*. 2021;**18**:3380. DOI: 10.3390/ijerph18073380
- [40] Al-Nozha MM, Al-Hazzaa HM, Arafah MR, Al-Khadra A, Al-Mazrou YY, Al-Maatouq MA, et al. Prevalence of physical activity and inactivity among Saudis aged 30-70 years. A population-based cross-sectional study. *Saudi Medical Journal*. 2007;**28**:559-568
- [41] Amin TT, Al Khoudair AS, Al Harbi MA, Al Ali AR. Leisure time physical activity in Saudi Arabia: Prevalence, pattern and determining factors. *Asian Pacific Journal of Cancer Prevention*. 2012;**13**:351-360. DOI: 10.7314/APJCP.2012.13.1.351
- [42] Al-Hazzaa HM. Health-enhancing physical activity among Saudi adults using the international physical activity questionnaire (IPAQ). *Public Health Nutrition*. 2007;**10**:59-64. DOI: 10.1017/S1368980007184299
- [43] Al-Kandari F, Vidal VL. Correlation of the health-promoting lifestyle, enrollment level, and academic performance of College of Nursing students in Kuwait. *Nursing & Health Sciences*. 2007;**9**:112-119. DOI: 10.1111/j.1442-2018.2007.00311.x
- [44] Almajwal AM. Correlations of physical activity, body mass index, shift duty, and selected eating habits among nurses in Riyadh, Saudi Arabia. *Ecology of Food and Nutrition*. 2015;**54**:397-417. DOI: 10.1080/03670244.2015.1004400
- [45] Musaiger AO, Al-Kandari FI, Al-Mannai M, Al-Faraj AM, Bouriki FA, Shehab FS, et al. Perceived barriers to weight maintenance among university students in Kuwait: The role of gender and obesity. *Environmental Health and Preventive Medicine*. 2014;**19**:207-214. DOI: 10.1007/s12199-013-0377-z
- [46] Addressing Context to Understand Physical Activity among Muslim University Students: The Role of Gender, Family, and Culture - PubMed n.d. Available from: <https://pubmed.ncbi.nlm.nih.gov/31690307/> [Accessed: July 17, 2025]
- [47] Al-Kaabi J, Al-Maskari F, Afandi B, Parkar H, Nagelkerke N. Physical activity and reported barriers to activity among type 2 diabetic patients in the United Arab Emirates. *The Review of Diabetic Studies*. 2009;**6**:271-278. DOI: 10.1900/RDS.2009.6.271
- [48] Ali HI, Baynouna LM, Bernsen RM. Barriers and facilitators of weight management: Perspectives of Arab women at risk for type 2 diabetes. *Health & Social Care in the Community*. 2010;**18**:219-228. DOI: 10.1111/j.1365-2524.2009.00896.x
- [49] Al-Ghafri TS, Al-Harthi S, Al-Farsi Y, Craigie AM, Bannerman E, Anderson AS. Changes in self-efficacy and social support after an intervention to increase physical activity among adults with type 2 diabetes in Oman. *Sultan Qaboos University Medical*

Journal. 2021;**21**:e42-e49. DOI: 10.18295/squmj.2021.21.01.006

[50] Al-Eisa ES, Al-Sobayel HI. Physical activity and health beliefs among Saudi women. *Journal of Nutrition and Metabolism*. 2012;**2012**:1-6. DOI: 10.1155/2012/642187

[51] Al-Otaibi HH. Measuring stages of change, perceived barriers and self efficacy for physical activity in Saudi Arabia. *Asian Pacific Journal of Cancer Prevention*. 2013;**14**:1009-1016. DOI: 10.7314/APJCP.2013.14.2.1009

[52] Albawardi NM, Jradi H, Al-Hazzaa HM. Levels and correlates of physical activity, inactivity and body mass index among Saudi women working in office jobs in Riyadh city. *BMC Women's Health*. 2016;**16**:33. DOI: 10.1186/s12905-016-0312-8

[53] Khalaf A, Ekblom Ö, Kowalski J, Berggren V, Westergren A, Al-Hazzaa H. Female university students' physical activity levels and associated factors—A cross-sectional study in Southwestern Saudi Arabia. *International Journal of Environmental Research and Public Health*. 2013;**10**:3502-3517. DOI: 10.3390/ijerph10083502

[54] Alharballeh S, Dodeen H. Prevalence of body image dissatisfaction among youth in the United Arab Emirates: Gender, age, and body mass index differences. *Current Psychology*. 2023;**42**:1317-1326. DOI: 10.1007/s12144-021-01551-8

[55] Ng SW, Zaghloul S, Ali H, Harrison G, Yeatts K, El Sadig M, et al. Nutrition transition in the United Arab Emirates. *European Journal of Clinical Nutrition*. 2011;**65**:1328-1337. DOI: 10.1038/ejcn.2011.135

[56] Amin TT, Suleman W, Ali A, Gamal A, Wehedy AA. Pattern,

prevalence, and perceived personal barriers toward physical activity among adult Saudis in Al-Hassa, KSA. *Journal of Physical Activity and Health*. 2011;**8**:775-784. DOI: 10.1123/jpah.8.6.775

[57] Gawwad ESA. Stages of change in physical activity, self efficacy and decisional balance among saudi university students. *Journal of Family & Community Medicine*. 2008;**15**:107-115

[58] Awadalla NJ, Aboelyazed AE, Hassanein MA, Khalil SN, Aftab R, Gaballa II, et al. Assessment of physical inactivity and perceived barriers to physical activity among health college students, South-Western Saudi Arabia. *Eastern Mediterranean Health Journal*. 2014;**20**:596-604

[59] Majeed F. Association of BMI with diet and physical activity of female medical students at the University of Dammam, Kingdom of Saudi Arabia. *Journal of Taibah University Medical Sciences*. 2015;**10**:188-196. DOI: 10.1016/j.jtumed.2014.11.004

[60] Memish ZA, Jaber S, Mokdad AH, AlMazroa MA, Murray CJL, Al Rabeeah AA, et al. Burden of disease, injuries, and risk factors in the Kingdom of Saudi Arabia, 1990-2010. *Preventing Chronic Disease*. 2014;**11**:140176. DOI: 10.5888/pcd11.140176

[61] Al-Sobayel H, Al-Hazzaa H, Abahussain N, Qahwaji D, Musaiger A. Gender differences in leisure-time versus non-leisure-time physical activity among Saudi adolescents. *Annals of Agricultural and Environmental Medicine*. 2015;**22**:344-348. DOI: 10.5604/12321966.1152091

[62] Samara A, Aro AR, Alrammah T, Nistrup A. Lack of facilities rather than sociocultural factors as the primary barrier to physical activity among female

Saudi university students. *International Journal of Women's Health*. 9 Mar 2015;7:279-286. DOI: 10.2147/IJWH.S80680

[63] Shaikh MA, Al Sharaf F, Shehzad K, Shoukat F, Naeem Z, Al Harbi S, et al. Prevalence and trends of overweight and obesity amongst Saudi school children, a study done by using three noninvasive methods. *International Journal of Health Sciences (Qassim)*. 2016;10:381-387

[64] Al-Nakeeb Y, Lyons M, Collins P, Al-Nuaim A, Al-Hazzaa H, Duncan MJ, et al. Obesity, physical activity and sedentary behavior amongst British and Saudi youth: A cross-cultural study. *International Journal of Environmental Research and Public Health*. 2012;9:1490-1506. DOI: 10.3390/ijerph9041490

[65] Al-Kuwari MG, Al-Mohannadi AS, Sayegh S. Effectiveness of “step into health” program in Qatar: A pedometer-based longitudinal study. *The Journal of Sports Medicine and Physical Fitness*. 2017;57. DOI: 10.23736/S0022-4707.16.06716-5

[66] Donnelly TT, Al Suwaidi J, Al Enazi NR, Idris Z, Albulushi AM, Yassin K, et al. Qatari women living with cardiovascular diseases—Challenges and opportunities to engage in healthy lifestyles. *Health Care for Women International*. 2012;33:1114-1134. DOI: 10.1080/07399332.2012.712172

[67] Alsubaie ASR, Omer EOM. Physical activity behavior predictors, reasons and barriers among male adolescents in Riyadh, Saudi Arabia: Evidence for obesogenic environment. *International Journal of Health Sciences (Qassim)*. 2015;9:400-408

[68] Oguoma VM, Coffee NT, Alsharrah S, Abu-Farha M,

Al-Refaei FH, Al-Mulla F, et al. Prevalence of overweight and obesity, and associations with socio-demographic factors in Kuwait. *BMC Public Health*. 2021;21:667. DOI: 10.1186/s12889-021-10692-1

[69] Allafi A, Al-Haifi AR, Al-Fayez MA, Al-Athari BI, Al-Ajmi FA, Al-Hazzaa HM, et al. Physical activity, sedentary behaviours and dietary habits among Kuwaiti adolescents: Gender differences. *Public Health Nutrition*. 2014;17:2045-2052. DOI: 10.1017/S1368980013002218

[70] Al-Hazzaa H, Al-Nakeeb Y, Duncan M, Al-Sobayel H, Abahussain N, Musaiger A, et al. A cross-cultural comparison of health Behaviors between Saudi and British adolescents living in urban areas: Gender by country analyses. *International Journal of Environmental Research and Public Health* 2013;10:6701-20. DOI: 10.3390/ijerph10126701

[71] Taha AZA. Self-reported knowledge and pattern of physical activity among school students in Al Khobar, Saudi Arabia. *Eastern Mediterranean Health Journal*. 2008;14:344-355

[72] Al-Hazzaa HM, Alahmadi MA, Al-Sobayel HI, Abahussain NA, Qahwaji DM, Musaiger AO. Patterns and determinants of physical activity among Saudi adolescents. *Journal of Physical Activity and Health*. 2014;11:1202-1211. DOI: 10.1123/jpah.2012-0427

[73] Al-Gelban KS. Dietary habits and exercise practices among the students of a Saudi teachers' training college. *Saudi Medical Journal*. 2008;29:754-759

[74] Al-Isa AN, Campbell J, Desapriya E, Wijesinghe N. Social and health factors associated with physical activity among Kuwaiti college students. *Journal of Obesity*. 2011;2011:1-6. DOI: 10.1155/2011/512363

- [75] Garawi F, Ploubidis GB, Devries K, Al-Hamdan N, Uauy R. Do routinely measured risk factors for obesity explain the sex gap in its prevalence? Observations from Saudi Arabia. *BMC Public Health*. 2015;**15**:254. DOI: 10.1186/s12889-015-1608-6
- [76] Alarouj M, Bennakhi A, Alneseef Y, Sharifi M, Elkum N. Diabetes and associated cardiovascular risk factors in the State of Kuwait: The first national survey: Diabetes and associated cardiovascular risk factors. *International Journal of Clinical Practice*. 2013;**67**:89-96. DOI: 10.1111/ijcp.12064
- [77] Amin TT, Al-Hammam AM, AlMulhimNA, Al-HayanMI, Al-MulhimMM, Al-Mosabeh MJ, et al. Physical activity and cancer prevention: Awareness and meeting the recommendations among adult Saudis. *Asian Pacific Journal of Cancer Prevention*. 2014;**15**:2597-2606. DOI: 10.7314/APJCP.2014.15.6.2597
- [78] Mabry RM, Reeves MM, Eakin EG, Owen N. Evidence of physical activity participation among men and women in the countries of the Gulf cooperation council: a review. *Obesity reviews: An official journal of the International Association for the Study of Obesity*. 2010;**11**(6):457-464. DOI: <https://pubmed.ncbi.nlm.nih.gov/19793376/> [Accessed: July 17, 2025]
- [79] Mandil AM, Alfurayh NA, Aljebreen MA, Aldukhi SA. Physical activity and major non-communicable diseases among physicians in Central Saudi Arabia. *Saudi Medical Journal*. 2016;**37**:1243-1250. DOI: 10.15537/smj.2016.11.16268
- [80] AlQuaiz AM, Tayel SA. Barriers to a healthy lifestyle among patients attending primary care clinics at a university hospital in Riyadh. *Annals of Saudi Medicine*. 2009;**29**:30-35. DOI: 10.4103/0256-4947.51818
- [81] Albujuhlaya N, Stevinson C. Exercise promotion in Saudi Arabia: Understanding personal, environmental, and social determinants of physical activity participation and well-being. *International Journal of Environmental Research and Public Health*. 2023;**20**:3554. DOI: 10.3390/ijerph20043554
- [82] Kandasamy G, Almanasef M, Almeleebia T, Orayj K, Viswanath Reddy LK, Shorog E, et al. Knowledge, attitude and practice towards physical activity among healthcare students at a public university in Saudi Arabia. *Frontiers in Public Health*. 2024;**12**:1428165. DOI: 10.3389/fpubh.2024.1428165
- [83] Al-Hazzaa HM. Physical activity research in the gulf cooperation council countries: Progress made but work still to do. *Journal of Physical Activity & Health*. 2022;**19**(11):9-770. DOI: 10.1123/jpah.2022-0484
- [84] AboZaid HA, Farahat FM. Physical activity profile among patients attending family medicine clinics in western Saudi Arabia. *Saudi Medical Journal*. 2010;**31**:428-433
- [85] Sayegh S, Van Der Walt M, Al-Kuwari M. One-year assessment of physical activity level in adult Qatari females: A pedometer-based longitudinal study. *International Journal of Women's Health*. 2016;**8**:287-293. DOI: 10.2147/IJWH.S99943
- [86] Bajamal E, Robbins LB, Ling J, Smith B, Pfeiffer KA, Sharma D. Physical activity among female adolescents in Jeddah, Saudi Arabia: A health promotion model-based path analysis. *Nursing Research*. 2017;**66**:473-482. DOI: 10.1097/NNR.0000000000000244
- [87] Mahfouz A, Shatoor A, Khan M, Daffalla A, Mostafa O,

Hassanein M. Nutrition, physical activity, and gender risks for adolescent obesity in Southwestern Saudi Arabia. *Saudi Journal of Gastroenterology*. 2011;**17**:318. DOI: 10.4103/1319-3767.84486

[88] Rahim HFA, Sibai A, Khader Y, Hwalla N, Fadhil I, Alsiyabi H, et al. Non-communicable diseases in the Arab world. *The Lancet*. 2014;**383**:356-367. DOI: 10.1016/S0140-6736(13)62383-1

[89] Al-Ghawi A, Uauy R. Study of the knowledge, attitudes and practices of physicians towards obesity management in primary health care in Bahrain. *Public Health Nutrition*. 2009;**12**:1791-1798. DOI: 10.1017/S1368980008004564

[90] AlBurno H, Mercken L, De Vries H, Al Mohannadi D, Schneider F. Determinants of healthful eating and physical activity among adolescents and young adults with type 1 diabetes in Qatar: A qualitative study. *PLoS One*. 2022;**17**:e0270984. DOI: 10.1371/journal.pone.0270984

[91] Sharara E, Akik C, Ghattas H, Makhlouf OC. Physical inactivity, gender and culture in Arab countries: A systematic assessment of the literature. *BMC Public Health*. 2018;**18**:639. DOI: 10.1186/s12889-018-5472-z

[92] Carraça E, Encantado J, Battista F, Beaulieu K, Blundell J, Busetto L, et al. Effective behavior change techniques to promote physical activity in adults with overweight or obesity: A systematic review and meta-analysis. *Obesity Reviews*. 2021;**22**:e13258. DOI: 10.1111/obr.13258

Chapter 3

Exploring Determinants and Factors Associated with Problematic Smartphone Use among Youth

Roseane de Fátima Guimarães, Bruno Pedrini de Almeida and Michael Pereira da Silva

Abstract

Background: Children and adolescents represent the population most susceptible to problematic smartphone use. This vulnerability is supported by developmental, behavioral, and epidemiological evidence. **Objective:** To provide a comprehensive synthesis of current evidence regarding the determinants and factors associated with problematic smartphone use (PSU) among youth. **Methods:** First, a systematized qualitative literature review was developed, and second, exploratory analyses were conducted using data from the SMARTKids Québec pilot study, which surveyed approximately 250 Canadian students aged 6–17. **Main findings:** The review shows that psychosocial vulnerabilities and sleep disruption stand out as the most consistent correlates with PSU. The exploratory findings highlight that higher levels of smartphone use were positively correlated with age and symptoms of depression, anxiety, and stress. Conversely, higher smartphone use was linked to poorer academic performance. **Implications:** The chapter emphasizes the importance of distinguishing between underlying psychosocial determinants and associated behavioral or mental health factors. Ultimately, these insights support the need for a balanced and preventive approach, one that avoids alarmism but acknowledges the potential risks of problematic smartphone use, a multifaceted issue with implications for youth development and well-being.

Keywords: smartphone use, psychosocial determinants, mental health, academic performance, youth

1. Introduction

The objective of this chapter is to provide a synthesis of current evidence related to the determinants and factors associated to problematic smartphone use in youth. More specifically, the first section defines and describes the concept of “problematic smartphone use.” The second section discusses key preexisting

knowledge related to its determinants and impacts in youth. The third section synthesizes the relationship between smartphone use and its possible psychosocial determinants based on exploratory statistical models in a sample of Canadian youth. Finally, the last section of the chapter provides a synthesis of exploratory analysis of the relationship between smartphone use and health outcomes in a sample of Canadian youth.

While several reviews have examined the prevalence and correlates of problematic smartphone use globally, there remains a need to clarify its conceptual boundaries, highlight inconsistencies in the literature, and examine how psychosocial and health-related determinants manifest in specific populations such as Canadian youth. This chapter seeks to address these gaps by offering both a synthesis of existing international evidence and original exploratory analyses that connect problematic smartphone use with psychosocial factors and health outcomes. It contributes not only to consolidating current knowledge but also to shaping more targeted future research questions and informing preventive strategies.

1.1 Definition of problematic smartphone use

Problematic smartphone use (PSU) is broadly defined as a compulsive pattern of smartphone usage that interferes with functioning, work, or academic performance and social relationships [1, 2]. Some researchers point out that the context of fear of missing out (FoMO) can also be applied, as a psychological condition that affects individuals who are afraid of being disconnected and can also increase anxiety levels when they are not with the device [3]. Nevertheless, it is observed that the scientific literature presents a certain inconsistency regarding the best term to be designated for the behavior, indicating that the use may be linked to poor behavioral adaptation, considered as PSU, or linked to an addictive character arising from the dependence caused by the desire to be with the device [4].

The term “smartphone addiction” is often misused to refer to bad digital habits, which are related to overall usage that is detrimental to well-being, relationships, academics, or other important activities, without being linked to a mental health issue. However, it is important to note that no official diagnosis yet exists for smartphone addiction [4].

PSU is a specific behavior that goes beyond a simple reflection of time spent with the smartphone. It is a true disorder that disrupts a young person’s functioning and often involves significant social, emotional, and behavioral problems throughout life. PSU is associated with behavioral symptoms such as [3]:

- Mood swings
- Loss of control
- Withdrawal
- High tolerance for screens
- A propensity to lie about one’s use
- Serious social dysfunction (isolation, failure to meet obligations, reduction or interruption of activities, etc.)

Smartphone use often exceeds the originally intended duration, interfering with essential developmental habits for young people, such as sleep, physical activity, nutrition, and play [5–7].

1.1.1 A question of balance

The number of hours of smartphone use during leisure time is, of course, an indicator to consider when determining the extent of the effects PSU can have on young people's lives [8]. However, experts advise that discretion is essential. Concern should be expressed if, among other things, the young person:

- Often spends more time than expected in front of smartphones [7]
- Is less physically active [9]
- Sleeps less [9]
- Is less socially present [7]
- Has difficulty undertaking other tasks [9]

Is there a right time to evaluate the PSU? The day, context, and type of use must be carefully considered, as smartphone usage can vary significantly depending on whether it is a holiday, weekend, or weekday, periods that differ in the amount of time typically available for leisure activities.

1.2 Conclusion

This section defines the concept of PSU and presents its key characteristics. Several fundamental elements were highlighted and should be retained. For example, the resulting interference of PSU with daily activities. Another important aspect of PSU mentioned concerns physical activity, since the level of engagement in exercise tends to decrease as smartphone use increases. The widespread use of smartphones among youth makes it imperative for researchers to explore the associations between PSU and psychosocial, behavioral, and health outcomes. Without such efforts, public health initiatives risk remaining reactive rather than preventive, and opportunities to safeguard adolescent development in a rapidly digitalizing world may be lost.

2. State of knowledge of the determinants and impacts of problematic smartphone use in youth

Smartphones are deeply embedded in young people's daily lives, both at school and in leisure activities, and they have several benefits. Their use often provides opportunities, such as access to information, social interactions, the development of digital skills, and entertainment. In their free time, young people primarily use it to watch videos, play games, or use social media [10]. However, this increased presence is not without risks, particularly for more vulnerable young people [11]. These uses differ by gender: girls spend more time on social and interactive activities, while boys

are more likely to play games [12–14]. Also, smartphone use generally increases as children get older [15].

2.1 Official screen time recommendations

The Canadian Pediatric Society [16] offers screen time (including smartphone) recommendations by age group. Although these guidelines are sometimes criticized for their lack of empirical support, the effects of prolonged screen exposure and the need to limit it are well established. The recommendation for leisure screen time for children aged 5–17 years is to limit it to less than 2 hours per day.

2.2 Recommendations for healthy lifestyle habits in youth

The Canadian 24-hour movement guidelines for children and youth (ages 5–17 years) are the first evidence-based guidelines to address the whole day [17]. Children and adolescents are encouraged to live an active lifestyle with a daily balance of sleep, sedentary behaviors, and physical activities that support their healthy development. The sedentary guideline recommends no more than 2 hours per day of recreational screen time and limiting sitting for extended periods [17].

2.3 Highest rates of problematic smartphone use

Adolescents, typically defined as individuals between 10 and 24 years of age [18], represent the population most susceptible to PSU (23.3% globally) [19]. This vulnerability is supported by developmental, behavioral, and epidemiological evidence. These outcomes appear more pronounced in adolescent users due to their greater psychological and neurological plasticity [2].

2.3.1 What we know about the current evidence on factors associated with PSU?

To answer this question more broadly and use this evidence as a theoretical basis for this chapter, a systematized qualitative literature review based on publications indexed in Medline was developed to identify the current scientific evidence available on the PSU, exploring the factors associated with this behavior in youth.

The following descriptors were then defined: “cell phone” OR “mobile phone” OR “smartphone” AND “compulsive behavior” OR “addictive behavior” OR “problematic use” AND “adolescent.”¹

The inclusion criteria adopted for selecting the studies were: (1) original studies; (2) studies that show factors associated with PSU; (3) studies that include adolescents as the population (between 10 and 24 years old) [18]; (4) studies published in English. As exclusion criteria, we chose studies that included individuals with a known diagnosis of some disease, as well as studies with young children (<10 years old), adults, and/or elderly people as the population. A filter was applied to the search only for the period of final publication of the articles, indicated as June 1, 2025. Studies with different terminologies to evaluate smartphone use were allowed to be included to expand the group of evidence on this topic.

¹ Adolescents aged 10–24 years are not only more exposed to digital technologies but also more vulnerable to their potential harms, justifying the focus of this review on this specific developmental group.

Of a total of 271 selected articles, 206 were excluded (duplicated and ineligible). Thus, 65 articles comprised the analysis corresponding to the qualitative synthesis. The qualitative synthesis of this review is detailed below.

i. Sociodemographic factors

ii. Contradictory evidence on gender: Some studies identify female gender as a risk factor [20–37], while others associate male gender with higher PSU risk [14, 38–41]. This inconsistency may reflect differences in cultural contexts, PSU measurement tools, or the types of smartphone use (e.g., social media vs. gaming).

iii. Age-related ambiguity: Similarly, both younger age [42–45] and older age [23, 46] appear as risk factors. This suggests that vulnerability may not be linear but context-dependent (e.g., developmental stage and school transition periods).

iv. Gap: More comparative and longitudinal studies are needed to clarify whether gender and age operate as universal predictors or if their impact varies across cultural and technological environments.

v. Behavioral factors

vi. Substance use consistently linked: Alcohol [20, 21, 27], and tobacco/cigarette [21, 47] use repeatedly co-occur with PSU, pointing toward shared mechanisms of addictive behaviors.

vii. Sleep disruption as a strong pattern: Shorter sleep duration [22, 45, 48], delayed sleep [27], and sleep disorders [49, 50] are among the most consistent behavioral correlates of PSU.

viii. Other lifestyle risks: Physical inactivity [32, 44] and bullying [51] appear in fewer studies but align with broader behavioral maladaptation.

ix. Gap: Future research should investigate directionality (whether PSU disrupts sleep and activity, or vice versa) and whether these behaviors act as mediators between psychosocial distress and PSU.

x. Psychosocial factors

xi. Mental health symptoms strongly and consistently linked: depression [30, 38, 42, 50, 52–58], anxiety [20, 42, 50, 54, 59–61], and stress [44, 56, 58, 62, 63] are among the most replicated findings, suggesting PSU may be both a coping mechanism and an exacerbating factor.

xii. Broader psychosocial vulnerabilities: Loneliness [47, 63, 64], suicidal ideation [65], low self-control [32, 66], lower quality of life [67, 68], and psychological distress [23] extend the spectrum of risk.

xiii. Pattern: The psychosocial domain demonstrates the most robust and convergent evidence, suggesting it is central to PSU vulnerability.

- xiv. Gap: More longitudinal designs are needed to clarify causal pathways, whether PSU primarily arises as a maladaptive coping strategy or worsens preexisting psychological symptoms.
- xv. Parental and social factors
- xvi. Parental influence is multifaceted: Risk factors include poor communication [69], parental addiction both general [66, 70] and smartphone-specific [71], parental neglect [72], abusive [73, 74] or violent [47, 66] environments.
- xvii. Peer and teacher relationships: Strained social ties [47, 72] also contribute, underscoring the importance of broader relational ecosystems.
- xviii. Gap: Few studies disentangle whether parental modeling of smartphone use versus parental neglect or abuse exerts a stronger influence. Cross-cultural comparisons could clarify the relative weight of these pathways.
- xix. Academic and physical health factors
- xx. Academic decline is consistently associated with PSU [27, 34, 38], suggesting a reciprocal relationship where distraction leads to poor performance, which in turn fuels problematic use.
- xxi. Physical health consequences (postural changes [75], cervical spine pain [45], and lower health education [39]) appear less frequently, suggesting they are secondary outcomes rather than primary drivers.
- xxii. Gap: More studies are needed to assess whether poor academic performance is a predictor or outcome of PSU and whether physical health problems are sufficiently distinct from other lifestyle risks (e.g., sedentary behavior).
- xxiii. Psychosocial protective factors
- xxiv. High self-esteem [76] emerges as a consistent buffer, contrasting with the strong association of low self-control, depression, and anxiety with PSU. This suggests that fostering positive self-perception may mitigate susceptibility to maladaptive smartphone use.
- xxv. Pattern: Whereas psychosocial risk factors are numerous and well-documented, protective psychosocial factors are comparatively underexplored, leaving an asymmetry in the literature.
- xxvi. Gap: More research is needed to investigate additional potential protective traits (e.g., resilience, emotional regulation, and social competence) that may counterbalance known psychosocial vulnerabilities.
- xxvii. Parental protective factors
- xxviii. Parental education shows a protective influence, with both general parental education [23] and specifically maternal education [46] linked to reduced

PSU. This may reflect increased parental awareness, monitoring skills, or role modeling.

xxix. Quality of parent-child relationship [33, 51, 77] consistently appears as a protective buffer, reinforcing findings that relational environments are central to PSU risk. Stronger parental bonds seem to offset vulnerability even in the presence of individual or contextual risks.

xxx. Pattern: Unlike the risk factors, where parental influences are primarily negative (neglect, poor communication, abuse), the protective evidence highlights the positive role of supportive and educated parents, suggesting a duality in family influence.

xxxi. Gap: The evidence does not yet clarify whether educational attainment operates directly (e.g., through digital literacy) or indirectly (e.g., *via* socioeconomic status or parenting style). Nor is it clear whether father's education plays a similar role to mothers.

2.3.1.1 Key patterns and gaps for risk factors

- Strongest convergence: Psychosocial vulnerabilities and sleep disruption stand out as the most consistent correlates.
- Persistent inconsistencies: Gender and age show contradictory associations, pointing to context- and culture-dependent effects.
- Underexplored mediators: The interplay between behavioral (sleep, substance use), psychosocial (stress, depression), and relational (parental/peer) factors is rarely tested in integrated models.

2.3.1.2 Key patterns and gaps for protective factors

- Strongest convergence: Protective effects cluster around supportive parental relationships and individual self-esteem.
- Imbalance in evidence: Compared to the wide range of identified risk factors, protective factors are sparsely studied, limiting understanding of resilience pathways.

Some of these factors will be explored using pilot data from the SMARTKids Québec study in the next sections.

2.4 Conclusion

Many results are sometimes contradictory or difficult to interpret, particularly due to different measurements and sometimes weak associations. It is also important to note that some effects among young people are still poorly documented or extrapolated from studies conducted on adults. Moreover, although research is increasingly documenting this issue, the data do not always clearly establish which comes first: *smartphone use as the origin of a problem, or as a response to an existing issue.*

Furthermore, the media sometimes tends to report the most alarming conclusions, without reflecting the complexity and nuances of the scientific discourse.

Longitudinal, cross-cultural, and mechanism-focused studies are urgently needed to clarify causal directions and disentangle overlapping pathways. More research should systematically explore positive psychosocial traits (e.g., resilience and coping skills) and family-level buffers (e.g., shared digital literacy and authoritative parenting) to balance the risk-focused literature.

3. Mapping the factors associated with problematic smartphone use in Canadian youth

Screen use is a complex phenomenon omnipresent in our lives. In Canada, only 53% of children and adolescents aged 5 to 17 meet the screen time recommendations of the Canadian 24-hour movement guidelines [78], which is a maximum of 2 hours per day. As children enter school, their digital world expands. Uses diversify, screen time tends to increase, and access to devices changes [79]. This period marks a significant turning point. On one hand, increased digital engagement can support learning, creativity, and social connection. However, it also comes with potential consequences: the effects of screen use, initially moderated by individual and family factors, can become more pronounced over time, particularly concerning academic performance [79]. Excessive or unsupervised screen time may interfere with concentration, sleep, and study habits, ultimately impacting school outcomes [79].

One of the most frequently used screens by young people is the smartphone [80]. Over the last decade, the smartphone has become an almost ubiquitous object in the lives of young people. In Canada, 62% of young people aged 6–17 use a smartphone [80]. More specifically, this use is more prevalent among secondary school students (80%), although it is also very high among primary school students (50%) [80]. While 9% of children aged 6–12 spend more than 15 hours per week on their smartphones, this percentage rises to 26% among adolescents aged 13–17 [80]. Adolescents are generally more prone to impulsive decision-making due to their still-developing self-control [81]. This tendency is often reflected in their smartphone use, particularly given the wide array of entertainment options that these devices provide.

Despite the many benefits associated with smartphone use previously described, its problematic use could lead to multiple problems regarding physical and mental health and interfere with overall well-being [82], possibly linked to lower physical activity, sleep disturbances, and increased sedentary behavior [83]. The quality of social and family interactions [83], as well as academic achievement [20], could also be affected. The presence of a switched-off cell phone on the desk could also affect working memory, which is one of the cognitive functions' skills central to academic learning [84]; the mere sight of the object can interfere with specific cognitive skills [85].

Given all this evidence, it is very important to assess and map possible determinants of PSU in youth and the underlying risk factors to better inform prevention strategies and guide the development of targeted interventions to mitigate its negative impacts on youth well-being.

Note that for this chapter, the aim of this pilot analysis and its exploratory results is to provide preliminary insights that will inform future research on the subject. Rather than drawing definitive conclusions, this section will offer a comprehensive exploration of the key elements linked to PSU in Canadian youth, with the intention of instigating further and more in-depth investigations.

It is divided into two distinct but complementary parts:

3.1 Part 3.1: Psychosocial determinants of problematic smartphone use in Canadian youth

This part focuses on the psychological and social variables that may predispose youth to engage in problematic smartphone behaviors. Drawing on empirical pilot findings, it examines factors such as age, sex, parent's education, body image, and self-esteem, all of which may function as underlying drivers of PSU.

3.2 Part 3.2: Associated factors to problematic smartphone use in Canadian youth

The second part addresses a broader set of variables that have been previously statistically associated with PSU as shown in the literature. These factors may not serve as direct causes but represent important correlates, including lifestyle habits, as physical activity, sedentary behavior, sleep, mental health outcomes, as symptoms of depression, anxiety and stress, and academic performance. By distinguishing between psychosocial determinants and associated factors, this section provides a nuanced understanding of the multifaceted nature of PSU in young populations, offering valuable insights for future research involving educators, clinicians, and policymakers.

To do so, we used data from the *SMARTKids Québec study*, which is a pilot study with a cross-sectional, observational, and correlational design that aims to explore the determinants and factors associated to PSU among youth. The non-probability sample includes approximately 250 students aged 6–17 from primary and secondary schools registered with the School Service Centers of *Mauricie* (Quebec), Canada. The sample size provides an acceptable margin of error and level of precision [86].

The adolescents (or parents if <14 years old) who gave consent to participate in the study were invited to complete an online questionnaire comprising the sections below:

- Sociodemographic factors: age, sex, and parental education level (both mother and father).
- Smartphone use: Smartphone Addiction Scale – Short Version (SAS-SV) [87].
- Self-esteem scale for children and adolescents [88, 89].
- Body image State scale: 9-point scales with higher scores reflecting greater levels of body size satisfaction and attraction. First item ranges from Extremely dissatisfied (1) to Extremely satisfied (9), while the second item ranges from Extremely physically unattractive (1) to Extremely physically attractive (9). Higher scores denote higher body satisfaction [90].
- Physical activity: Physical Activity Questionnaire for Children and Adolescents (PAQ-C and PAQ-A) [91].
- Sleep duration: Canadian Health Measures Survey, Cycle 6 (2018–2019) [92].
- Sedentary behavior: Various contexts (e.g., screens, reading, and homework), characteristics, frequency, and duration. Five questions from the Canadian Health Measures Survey, Cycle 6 (2018–2019) [92].

- Depression, Anxiety, and Stress: Depression, Anxiety, and Stress Scale (DASS-21) [93].
- Academic performance (global performance and French/Mathematics performances): 20 questions from the Quebec Longitudinal Study of Child Development (Phase 3, Quebec Institute of Statistics, 2011) [94]. Each question has a score that must be calculated from the equations pre-established by its user guide.

Descriptive analyses were performed to summarize the sample characteristics. Continuous variables were reported as means and standard deviations (SD), and categorical variables were expressed as frequencies and percentages. Pearson correlation coefficients were calculated to examine the linear relationships between smartphone use and psychosocial variables, behavioral, mental health, and academic predictors. All statistical analyses were conducted using [SPSS 28 (IBM SPSS. Armonk, NY: IBM Corp)]. Statistical significance was set at $p < .05$.

3.3 The psychosocial determinants of problematic smartphone use in Canadian youth

The descriptive results of the differences between girls and boys are shown in **Table 1**. The sample with valid data consisted of 61.1% girls. The average age was approximately 13.2 years ± 2.8 . Regarding parental education, 89.1% of mothers and 82.9% of fathers reported having postsecondary education. In terms of smartphone use, most of girls and boys reported balanced use, 76.1 and 80.6%, respectively.

Variables	Girls (61.1%)	Boys (38.9%)	Total	p
% or Means (SD)				
Sociodemographics				
Age	13.4 (2.9)	13.2 (2.2)	13.2 (2.8)	.37
Mother's education				
Postsecondary	87.4	91.7	89.1	.90
Father's education				
Postsecondary	82.4	83.6	82.9	.87
Smartphone use				
Balanced	76.1	80.6	77.8	.59
Problematic	23.9	19.4	22.2	
Psychosocial				
Body image, score				
Appearance	6 $\pm$ 2	6 $\pm$ 2	6 $\pm$ 2	.38
Body size	6 $\pm$ 2	7 $\pm$ 2	6 $\pm$ 2	.27
Self-esteem, score total	27.2 (2.7)	26.9 (3.5)	27.1 (2.9)	.61

SD: Standard deviation; Body image 9-point Likert scale.

Table 1.
Characteristics of the participants (n = 234).

Overall, 22.2% of participants exhibited problematic use. Under psychosocial characteristics, body image and self-esteem scores were similar across genders. For both subscales of body image, participants reported a mean score of 6 ± 2 about their appearance and body size. Finally, girls had a mean self-esteem score of 27.2 ± 2.7 , and boys had 26.9 ± 3.5 . No differences between sexes were observed.

Figure 1 presents the correlations between psychosocial determinants and smartphone use. Among the variables examined, age emerged as the only factor that was significantly and positively correlated with smartphone use in our sample ($r = .0276$, $p < .001$). This finding suggests that, within this specific population, older individuals reported higher levels of smartphone use compared to their younger counterparts.

3.4 Associated factors to problematic smartphone use in Canadian youth

Table 2 summarizes lifestyle behaviors and mental health indicators among 234 participants (61.1% girls). There was a statistically significant gender difference in physical activity levels; 50.0% of boys were classified as active, compared to only 30.1% of girls ($p < .001$). No significant gender differences were observed for the other variables. Overall, 63.8% of the total sample met the sleep recommendation. Regarding recreational screen time, 76.0% exceeded 2 hours per day. Only 26.9% of girls and 19.1% of boys reported screen time of less than 2 hours daily. Girls presented a mean DASS score of 39.8 ± 12.9 , while boys scored lower on average: 31.9 ± 8.9 , without statistical significance.

Figure 2 shows that all mental health symptoms were positively correlated with smartphone use ($r = 0.330$, $p < .001$). Notably, higher smartphone use was associated with higher depression ($r = 0.348$, $p < .001$), anxiety ($r = 0.228$, $p < .001$), and stress scores ($r = 0.314$, $p < .001$). Concerning the global academic performance, higher smartphone use was related to lower overall academic performance ($r = -.276$, $p < .001$). SAS: Smartphone use scale; PA: physical activity; SED: sedentary time; DASS-total: Depression, anxiety, and stress scale total score; DASS-D: depression score; DASS-A: anxiety score; DASS-S: stress score; Math: mathematics; FR: French.

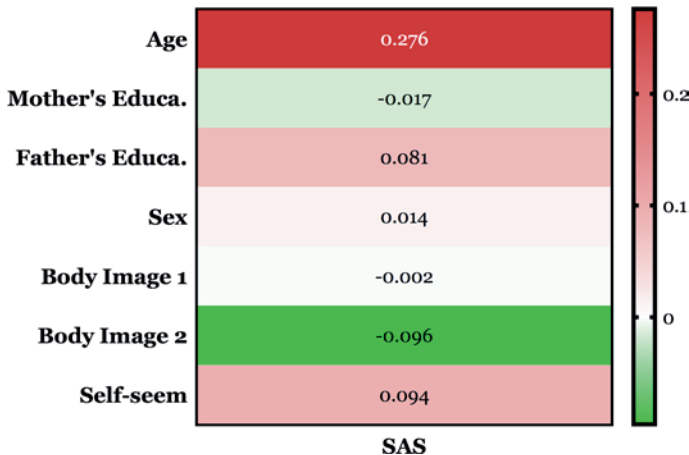


Figure 1.
Correlations between smartphone use and psychosocial factors. SAS: Smartphone use scale.

Variables	Girls (61.1%)	Boys (38.9%)	Total	p
% or Means (SD)				
Lifestyle habits				
Physical activity				
Active	30.1†	50.0†	37.8	<.001
Inactive	69.9*	50.0*	62.2	
Sleep				
< 9 h/d	40.4	30.0	36.2	.20
≥ 9 h/d	59.6	70.0	63.8	
Screen time				
< 2 h/d	26.9	19.1	24.0	.39
≥ 2 h/d	73.1	80.9	76.0	
Mental health				
DASS, score total	39.8 ± 12.9	31.9 ± 8.9	36.9 ± 12.3	<.001
Academic Perf.				
Global (best [#])	63.5%	69.5%	65.9%	.45
Math	76.5 ± 28.2	74.5 ± 30.6	75.6 ± 29.1	.66
French	75.8 ± 27.7	70.2 ± 29.6	73.6 ± 28.5	.21
SD: Standard deviation; †*Significant differences between sexes. Global academic performance items: I am among the worst; I am weaker than average; I am in the average; I am stronger than average; I am among the best ([#] category shown in the table).				

Table 2.
Characteristics of the participants (n = 234).

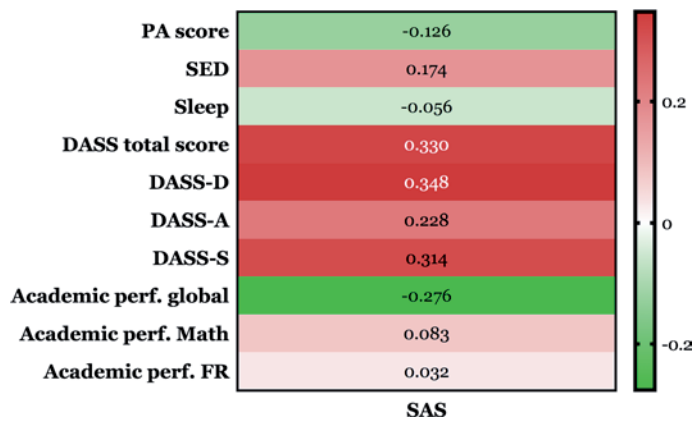


Figure 2.
Correlations between smartphone use and health factors and academic performance.

3.5 Conclusion

Despite the uncertainties that remain in this pilot cross-sectional research, the possible determinants and the risks associated with smartphone use cannot be

ignored. Older adolescents reported higher levels of smartphone use. This behavior was also associated with mental health indicators and seemed to be related to poorer academic performance.

We acknowledge that correlation is not sufficient for causation, but it is necessary to address new and well-directed research questions. It is also worth noting that the sample from this study does not allow the associations to be extrapolated to the entire population of children and adolescents in Canada. However, these exploratory findings generate important, although not conclusive, information from an emerging area for the scientific community and public health as well. Faced with this reality, a preventive approach is essential. Beyond technological enthusiasm or systematic condemnation of smartphones, it is essential to adopt a nuanced stance aimed at protecting public health and the well-being of young people.

Given the rapid pace of digital integration into adolescent life, delaying rigorous, large-scale, and longitudinal investigations risks missing a critical window to prevent long-term harms and to inform evidence-based interventions. In parallel, these insights carry immediate implications for practice: policymakers should prioritize digital health strategies that balance regulation with accessibility; schools should integrate media literacy and healthy technology use into curricula; and families should be supported with guidance on fostering open communication, setting limits, and modeling balanced smartphone use. Only through this coordinated, multi-level approach can the potential benefits of digital connectivity be preserved while minimizing its risks to adolescent development.

4. Practical applications

Considering the evidence presented throughout this chapter on the determinants and associated factors of PSU among Canadian youth, it is essential to outline concrete recommendations aimed at mitigating the associated risks. These recommendations are grounded in current research and acknowledge the diverse contexts in which young people engage with smartphones. They are intended to guide especially educators, families, and public health professionals in fostering healthier digital environments that support the well-being and development of youth. The following recommendations focus on prevention and education for smartphone youth users.

4.1 Recommendation 1

Given the multifaceted and potentially harmful effects of PSU, it is essential to implement targeted, context-sensitive interventions that address both the quantity and quality of screen engagement among youth.

Interventions should prioritize promoting balanced daily routines, ensuring that screen time does not displace critical activities like physical exercise, sleep, and face-to-face social interactions. Public health and educational strategies should also focus on media literacy, helping young people critically assess the content they consume and understand its influence on behavior, body image, and attention.

Moreover, interventions must consider individual differences such as age, sex, and family environment to effectively support the most vulnerable youth, including those facing behavioral challenges or socioeconomic adversity.

Special attention should be given to younger people, whose self-regulation skills are still developing, and who are more susceptible to imitating harmful behaviors seen online.

To be effective, strategies should include parental guidance, structured device use (e.g., screen-free mealtimes and bedtimes), and content-aware policies, rather than focusing solely on limiting screen time. Programs delivered in schools and communities can emphasize the dual hypothesis that:

1. Excessive smartphone use displaces essential developmental activities;
2. The content and social modeling young people encounter online can shape behavior and self-concept in powerful ways.

Addressing both pathways is key to promoting healthier digital habits and minimizing negative impacts on health and academic performance.

4.2 Recommendation 2

A National Assembly committee has recommended that the Government of Quebec prohibit, starting with the 2025–2026 school year, the use of cell phones, headsets, and other personal mobile devices in all elementary and secondary schools until the end of classes, including on school grounds. This ban will be issued through a clear directive to ensure consistent implementation, except when such use is required by the teaching staff's instructional methods, a student's health, or the special needs of a student with a disability or social maladjustment or learning difficulties. The implementation procedures will be established by the authorities provided for in the Education Act and the Act Respecting Private Education, within the limits of their jurisdiction (the school team, students, and parents). The Commission also recommends that the Ministry of Education support schools to facilitate the implementation of the total ban on personal screens, by further promoting access to screen-free activities and encouraging awareness-raising initiatives among students. A further study of our team will be conducted to explore the long-term impacts of this recommendation on smartphone use, health-related outcomes and academic performance in youth.

Considering growing global concerns about the impact of personal mobile device use in schools, other countries are strongly encouraged to consider similar measures to support student well-being and academic success.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- [1] Busch PA, McCarthy S. Antecedents and consequences of problematic smartphone use: A systematic literature review of an emerging research area. *Computers in Human Behavior*. 2021;**114**:106414, pp. 1-47
- [2] Cerniglia L et al. Internet addiction in adolescence: Neurobiological, psychosocial and clinical issues. *Neuroscience and Biobehavioral Reviews*. 2017;**76**(Pt A):174-184
- [3] Bhattacharya S et al. Nomophobia: No mobile phone phobia. *Journal of Family Medicine and Primary Care*. 2019;**8**(4):1297-1300
- [4] Panova T, Carbonell X. Is smartphone addiction really an addiction? *Journal of Behavioral Addictions*. 2018;**7**(2):252-259
- [5] Bacil EDA et al. Exposure to smartphones and tablets, physical activity and sleep in children from 5 to 10 years old: A systematic review and meta-analysis. *American Journal of Health Promotion*. 2024;**38**(7):1033-1047
- [6] de Sá S et al. The influence of smartphones on adolescent sleep: A systematic literature review. *Nursing Reports*. 2023;**13**(2):612-621
- [7] Wacks Y, Weinstein AM. Excessive smartphone use is associated with health problems in adolescents and young adults. *Frontiers in Psychiatry*. 2021;**12**:669042
- [8] Kwon M et al. The smartphone addiction scale: Development and validation of a short version for adolescents. *PLoS One*. 2013;**8**(12):e83558
- [9] Liu J et al. Screen media overuse and associated physical, cognitive, and emotional/behavioral outcomes in children and adolescents: An integrative review. *Journal of Pediatric Health Care*. 2022;**36**(2):99-109
- [10] Boniel-Nissim M et al. A Focus on Adolescent Social Media Use and Gaming in Europe, Central Asia and Canada: Health Behaviour in School-Aged Children International Report from the 2021/2022 Survey. Geneva, Switzerland: WHO. Available from: <https://iris.who.int/handle/10665/378982>
- [11] Fitzpatrick C et al. Associations between preschooler screen time trajectories and executive function. *Academic Pediatrics*. 2025;**25**(2):102603
- [12] WHO, Teens, Screens and Mental Health - New WHO Report Indicates Need for Healthier Online Habits among Adolescents (HBSC Study). Geneva, Switzerland: World Health Organisation; 2024. Available from: <https://www.who.int/europe/news/item/25-09-2024-teens-screens-and-mental-health>
- [13] Leonhardt M, Overå S. Are there differences in video gaming and use of social media among boys and girls? -a mixed methods approach. *International Journal of Environmental Research and Public Health*. 2021;**18**(11):6085, pp. 1-13
- [14] Son H, Park S, Han G. Gender differences in parental impact on problematic smartphone use among Korean adolescents. *International Journal of Environmental Research and Public Health*. 2021;**18**(2):443, pp. 1-10
- [15] Kim SY et al. The relationship between smartphone overuse and sleep in younger children: A prospective cohort study. *Journal of Clinical Sleep Medicine*. 2020;**16**(7):1133-1139

- [16] Ponti M. Digital media: Promoting healthy screen use in school-aged children and adolescents. *Paediatrics and Child Health*. 2019;**24**(6):402-417
- [17] Tremblay MS et al. Canadian 24-hour movement guidelines for children and youth: An integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology, Nutrition, and Metabolism*. 2016;**41**(6 Suppl 3):S311-S327
- [18] Sawyer SM et al. The age of adolescence. *The Lancet Child and Adolescent Health*. 2018;**2**(3):223-228
- [19] Sohn SY et al. Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: A systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*. 2019;**19**(1):356
- [20] Choi SW et al. Comparison of risk and protective factors associated with smartphone addiction and internet addiction. *Journal of Behavioral Addictions*. 2015;**4**(4):308-314
- [21] Muñoz-Mirallès R et al. The problematic use of information and communication technologies (ICT) in adolescents by the cross sectional JOITIC study. *BMC Pediatrics*. 2016;**16**(1):140
- [22] Randler C et al. Smartphone addiction proneness in relation to sleep and morningness-eveningness in German adolescents. *Journal of Behavioral Addictions*. 2016;**5**(3):465-473
- [23] Roser K et al. Problematic mobile phone use of Swiss adolescents: Is it linked with mental health or behaviour? *International Journal of Public Health*. 2016;**61**(3):307-315
- [24] Lee H, Kim JW, Choi TY. Risk factors for smartphone addiction in Korean adolescents: Smartphone use patterns. *Journal of Korean Medical Science*. 2017;**32**(10):1674-1679
- [25] Lee SY et al. Distinct patterns of internet and smartphone-related problems among adolescents by gender: Latent class analysis. *Journal of Behavioral Addictions*. 2018;**7**(2):454-465
- [26] Carbonell X et al. Problematic use of the internet and smartphones in university students: 2006-2017. *International Journal of Environmental Research and Public Health*. 2018;**15**(3):475, pp. 1-13
- [27] Chung JE et al. Smartphone addiction risk and daytime sleepiness in Korean adolescents. *Journal of Paediatrics and Child Health*. 2018;**54**(7):800-806
- [28] Albursan IS et al. National, sex and academic discipline difference in smartphone addiction: A study of students in Jordan, Saudi Arabia, Yemen and Sudan. *Community Mental Health Journal*. 2019;**55**(5):825-830
- [29] Extremera N et al. The role of cognitive emotion regulation strategies on problematic smartphone use: Comparison between problematic and non-problematic adolescent users. *International Journal of Environmental Research and Public Health*. 2019;**16**(17):3142, pp. 1-13
- [30] Park SY et al. Long-term symptoms of mobile phone use on Mobile phone addiction and depression among Korean adolescents. *International Journal of Environmental Research and Public Health*. 2019;**16**(19):3584, pp. 1-11
- [31] Yang Y-S et al. The association between problematic cellular phone use and risky behaviors and low self-esteem

among Taiwanese adolescents. *BMC Public Health*. 2010;**10**:217, pp. 1-8

[32] Yang G et al. Physical exercise decreases the Mobile phone dependence of university students in China: The mediating role of self-control. *International Journal of Environmental Research and Public Health*. 2019;**16**(21):4098, pp. 1-11

[33] Tangmunkongvorakul A et al. Factors associated with smartphone addiction: A comparative study between Japanese and Thai high school students. *PLoS One*. 2020;**15**(9):e0238459

[34] Kliesener T et al. Associations between problematic smartphone use and behavioural difficulties, quality of life, and school performance among children and adolescents. *BMC Psychiatry*. 2022;**22**(1):195

[35] Uher I et al. Mobile phone use and its threat to dependence among secondary school students - an explanatory study. *Annals of Agricultural and Environmental Medicine*. 2023;**30**(2):306-314

[36] Cali MAA et al. Smartphone addiction among adolescents in southern Italy and correlation with other risky behaviors. *Actas Españolas de Psiquiatría*. 2024;**52**(5):632-640

[37] Zhang Q, Ran G, Ren J. Parental psychological control and addiction behaviors in smartphone and internet: The mediating role of shyness among adolescents. *International Journal of Environmental Research and Public Health*. 2022;**19**(24):16702, pp. 1-12

[38] Jamir L et al. Epidemiology of technology addiction among school students in rural India. *Asian Journal of Psychiatry*. 2019;**40**:30-38

[39] Li DL et al. Gender difference in the associations between health literacy and problematic mobile phone use in Chinese middle school students. *BMC Public Health*. 2023;**23**(1):142

[40] Zheng X et al. Nonconforming gender expression and associated problematic smartphone and internet use among Chinese adolescents. *Journal of Behavioral Addictions*. 2023;**12**(3):817-826

[41] Balogun FM, Olatunde OE. Prevalence and predictors of problematic smart phone use among pre-varsity young people in Ibadan, Nigeria. *The Pan African Medical Journal*. 2020;**36**:285

[42] Lu X et al. Text messaging: Are dependency and excessive use discretely different for Japanese university students? *Psychiatry Research*. 2014;**216**(2):255-262

[43] Lopez-Fernandez O et al. Prevalence of problematic mobile phone use in British adolescents. *Cyberpsychology, Behavior and Social Networking*. 2014;**17**(2):91-98

[44] Haug S et al. Smartphone use and smartphone addiction among young people in Switzerland. *Journal of Behavioral Addictions*. 2015;**4**(4):299-307

[45] Nunes PPB et al. Factors related to smartphone addiction in adolescents from a region in northeastern Brazil. *Ciência & Saúde Coletiva*. 2021;**26**(7):2749-2758

[46] Fırat S et al. The relationship between problematic smartphone use and psychiatric symptoms among adolescents who applied to psychiatry clinics. *Psychiatry Research*. 2018;**270**:97-103

- [47] Yayan EH, Suna Dağ Y, Düken ME. The effects of technology use on working young loneliness and social relationships. *Perspectives in Psychiatric Care*. 2019;55(2):194-200
- [48] Freitas B et al. Relationship between lifestyle and self-reported smartphone addiction in adolescents in the COVID-19 pandemic: A mixed-methods study. *Journal of Pediatric Nursing*. 2022;65:82-90
- [49] Zhang J et al. Longitudinal association between problematic smartphone use and sleep disorder among Chinese college students during the COVID-19 pandemic. *Addictive Behaviors*. 2023;144:107715
- [50] Carter B et al. A multi-school study in England, to assess problematic smartphone usage and anxiety and depression. *Acta Paediatrica*. 2024;113(10):2240-2248
- [51] Kim JH. Factors associated with smartphone addiction tendency in Korean adolescents. *International Journal of Environmental Research and Public Health*. 2021;18(21):11668, pp. 1-11
- [52] Yen CF et al. Symptoms of problematic cellular phone use, functional impairment and its association with depression among adolescents in southern Taiwan. *Journal of Adolescence*. 2009;32(4):863-873
- [53] Lee EJ, Ogbolu Y. Does parental control work with smartphone addiction?: A cross-sectional study of children in South Korea. *Journal of Addictions Nursing*. 2018;29(2):128-138
- [54] Jeong B et al. Associations of personality and clinical characteristics with excessive internet and smartphone use in adolescents: A structural equation modeling approach. *Addictive Behaviors*. 2020;110:106485
- [55] Jo YS et al. Internet, gaming, and smartphone usage patterns of children and adolescents in Korea: A c-CURE clinical cohort study. *Journal of Behavioral Addictions*. 2020;9(2):420-432
- [56] Wei X et al. Escaping negative moods and concentration problems play bridge roles in the symptom network of problematic smartphone use and depression. *Frontiers in Public Health*. 2022;10:981136
- [57] Park S, Yoo JY. A study on smartphone dependence and depression in Korean high school students. *Medicine (Baltimore)*. 2023;102(12):e33354
- [58] Fekih-Romdhane F et al. The relationship between technology addictions and schizotypal traits: Mediating roles of depression, anxiety, and stress. *BMC Psychiatry*. 2023;23(1):67
- [59] Lee M et al. Investigation of correlated internet and smartphone addiction in adolescents: Copula regression analysis. *International Journal of Environmental Research and Public Health*. 2020;17(16):5806, pp. 1-12
- [60] Xiong J, He C, Wei H. Negative school gossip and youth adolescents' Mobile phone addiction: Mediating roles of anxiety and experiential avoidance. *International Journal of Environmental Research and Public Health*. 2023;20(2):1444, pp. 1-10
- [61] Lee YS et al. Association between smartphone overdependence and generalized anxiety disorder among Korean adolescents. *Journal of Affective Disorders*. 2023;321:108-113

- [62] Hong YP, Yeom YO, Lim MH. Relationships between smartphone addiction and smartphone usage types, depression, ADHD, stress, interpersonal problems, and parenting attitude with middle school students. *Journal of Korean Medical Science*. 2021;**36**(19):e129
- [63] Kim NH et al. Association between smartphone overdependency and mental health in Korean adolescents during the COVID pandemic; Age-and gender-matched study. *Frontiers in Public Health*. 2022;**10**:1056693
- [64] Zhang Y et al. The relationship between loneliness and mobile phone addiction among Chinese college students: The mediating role of anthropomorphism and moderating role of family support. *PLoS One*. 2023;**18**(4):e0285189
- [65] Lee J et al. Psychological characteristics and addiction propensity according to content type of smartphone use. *International Journal of Environmental Research and Public Health*. 2020;**17**(7):2292, pp. 1-10
- [66] Kim HJ et al. Relationship among family environment, self-control, friendship quality, and adolescents' smartphone addiction in South Korea: Findings from nationwide data. *PLoS One*. 2018;**13**(2):e0190896
- [67] Lu L et al. Mobile phone addiction in Tibetan and Han Chinese adolescents. *Perspectives in Psychiatric Care*. 2019;**55**(3):438-444
- [68] Lee SY et al. The Matthew effect in recovery from smartphone addiction in a 6-month longitudinal study of children and adolescents. *International Journal of Environmental Research and Public Health*. 2020;**17**(13):4751, pp. 1-17
- [69] Lee EJ, Kim HS. Gender differences in smartphone addiction behaviors associated with parent-child bonding, parent-child communication, and parental mediation among Korean elementary school students. *Journal of Addictions Nursing*. 2018;**29**(4):244-254
- [70] Kim C, Kang KI, Lee N. Intergenerational transmissions of mother-adolescent smartphone dependency: The mediating role of negative parenting and the moderating role of gender. *International Journal of Environmental Research and Public Health*. 2020;**17**(16):5871, pp. 1-13
- [71] Son HG, Cho HJ, Jeong KH. The effects of Korean parents' smartphone addiction on Korean children's smartphone addiction: Moderating effects of children's gender and age. *International Journal of Environmental Research and Public Health*. 2021;**18**(13):6685, pp. 1-9
- [72] Kwak JY, Kim JY, Yoon YW. Effect of parental neglect on smartphone addiction in adolescents in South Korea. *Child Abuse and Neglect*. 2018;**77**:75-84
- [73] Kim HH, Chun J. Is the relationship between parental abuse and mobile phone dependency (MPD) contingent across neighborhood characteristics? A multilevel analysis of Korean children and youth panel survey. *PLoS One*. 2018;**13**(5):e0196824
- [74] Emirtekin E et al. The role of childhood emotional maltreatment and body image dissatisfaction in problematic smartphone use among adolescents. *Psychiatry Research*. 2019;**271**:634-639
- [75] Fontenele TMO et al. Smartphone addiction and postural alterations in the cervical region in adolescents. *Revista Paulista de Pediatria*. 2023;**42**:e2023051

- [76] Wang P et al. Peer relationship and adolescent smartphone addiction: The mediating role of self-esteem and the moderating role of the need to belong. *Journal of Behavioral Addictions*. 2017;**6**(4):708-717
- [77] Ihm J. Social implications of children's smartphone addiction: The role of support networks and social engagement. *Journal of Behavioral Addictions*. 2018;**7**(2):473-481
- [78] Canada S. Physical activity and screen time among Canadian children and youth, 2016 and 2017. *Health Fact Sheets*. 2019:Catalogue no.82-625-X. pp. 1-8. Available from: <https://www150.statcan.gc.ca/n1/pub/82-625-x/2019001/article/00003-eng.htm>
- [79] Panjeti-Madan VN, Ranganathan P. Impact of screen time on children's development: Cognitive, language, physical, and social and emotional domains. *Multimodal Technologies and Interaction*. 2023;**7**(5):52
- [80] Académie de la transformation numérique (ATN). *NETendances 2020 - Portrait numérique des foyers québécois*. Université Laval, Québec, Canada; 2020. pp. 1-20. Available from: <https://transformation-numerique.ulaval.ca/>
- [81] Casey BJ, Caudle K. The teenage brain: Self control. *Current Directions in Psychological Science*. 2013;**22**(2):82-87
- [82] Eoh Y, Lee E, Park SH. The relationship between children's school adaptation, academic achievement, happiness, and problematic smartphone usage: A multiple informant moderated mediating model. *Applied Research in Quality of Life*. 2022;**17**(6):3579-3593
- [83] Derevensky JL, Hayman V, Lynette G. Behavioral addictions: Excessive gambling, gaming, internet, and smartphone use among children and adolescents. *Pediatric Clinics of North America*. 2019;**66**(6):1163-1182
- [84] Tremblay T. L'utilisation des écrans en contexte scolaire et la santé des jeunes de moins de 25 ans : effets sur la cognition. I.n.d.s.p.d. Québec, Editor. 2023
- [85] Québec Gd. Plan d'action numérique en éducation et en enseignement supérieur. M.d.l.É.e.d.l.E. supérieur, Editor. 2018
- [86] Hair J et al. *Análise multivariada dos dados*. 6th ed. Porto Alegre: Bookman; 2009
- [87] Lopez-Fernandez O. Short version of the smartphone addiction scale adapted to Spanish and French: Towards a cross-cultural research in problematic mobile phone use. *Addictive Behaviors*. 2017;**64**:275-280
- [88] Maintier C, Alaphilippe D. Validation d'un questionnaire d'auto-évaluation de Soi destiné aux enfants. *L'Année Psychologique*. 2006;**106**(4):513-542
- [89] Vallieres EF, Vallerand RJ. Traduction et validation canadienne-française de l'échelle de l'estime de soi de Rosenberg. *International Journal of Psychology*. 1990;**25**(2):305-316
- [90] Bardi L et al. Translation and validation of a state-measure of body image satisfaction: The body image state scale. *Frontiers in Psychology*. 2021;**12**:724710
- [91] Morales Mestre N. Functional exercise capacities and lung function in children with Congenital Heart diseases : evaluation tools and clinical assessment. [Doctoral dissertation, Université Catholique de Louvain]. UCLouvain Research Repository. 2021.

Available from: <http://hdl.handle.net/2078.1/249143>

[92] Canadian Health Measures Survey (Cycle 6) - Household Questionnaire [ARCHIVED - HTML], S. Canada, Editor. 2019

[93] Ramasawmy S. Validation of the “French Depression Anxiety Stress Scales” (DASS-21) and predictors of depression in an adolescent Mauritian population. [Doctoral dissertation, Université Aix-Marseille]. Thèses.fr Repository. Available from: <https://theses.fr/2015AIXM3001>

[94] Institut de la statistique du Québec. Étude longitudinale du développement des enfants du Québec (ÉLDEQ). Phase 3, 2011-2015. Québec, Canada: Gouvernement du Québec; 2011. Available from: <https://www.jesuisjeserai.stat.gouv.qc.ca/default.htm>

Section 2

Health, Psychological and
Life-Course Consequences of
Sedentarism

Chapter 4

Physical Activity, Physical Fitness and Mental Health

Minseon Park

Abstract

Mental disorders, including major depressive disorder, along with lifestyle-related non-communicable diseases, are emerging as leading contributors to global health problems. According to the World Health Organization, the prevalence of mental disorders has risen sharply in recent decades, including in nonindustrialized nations. As psychological and lifestyle-related factors, many of these influences are not specific to any one disease but broadly contribute to physical and mental health problems. They adversely affect individuals' physical, psychological, and social functioning, as well as their overall quality of life. Given that most individuals today engage in sedentary occupations with limited opportunities for physical activity, incorporating regular physical activity or exercise is essential for maintaining both mental and physical health. Exercise, a specific form of physical activity, affects various biological and psychosocial mechanisms that are also involved in the pathophysiology of mental health, especially depression. This chapter emphasizes the role of physical activity and physical fitness in treating and preventing depression and presents underlying potential mechanisms of physical activity in terms of modulating neuroplasticity, inflammatory responses, oxidative stress, and social supports.

Keywords: mental health, depression, physical activity, physical fitness, prevention

1. Introduction

1.1 Physical activity and physical fitness

Mental disorders are one of the leading causes of disability as well as mortality [1].

In 2019, the global burden of mental disorders ranked as the seventh leading cause of disability, accounting for 970 million prevalent cases. Among them, depressive and anxiety disorders were the primary contributors to the overall burden. The association between mental disorders and mortality is complex because mental disorders are linked to adverse health behaviors, including smoking, substance abuse, physical inactivity, and poor nutrition [1].

Epidemiological studies have demonstrated an association between physical activity, physical fitness, and mental health [2, 3]. They supported the pivotal role of physical activity, nutrition, and fitness as valuable tools for prevention, treatment, or enhancement of mental disorder management in children, adolescents, and adults.

Fitness measures the body's capacity to transport and utilize oxygen, primarily influenced by training status and partially by genetic factors [3]. Physical activity (PA), on the other hand, is a behavioral trait encompassing the energy expended on both voluntary and involuntary activities throughout the day [4]. Assessments of physical activity usually rely on methods, such as self-reported questionnaires, motion sensors, and structured interviews. In contrast, physical fitness can be objectively measured with graded exercise tests, and it is influenced by regular daily PA levels as well as nutritional status and the functional capacity of organs such as the lung, heart, and hematologic system [3].

This chapter will present well-documented relationships between physical activity and fitness and mental health—especially depression and anxiety—along with emerging evidence supporting the role of physical activity and fitness in preventing and treating these conditions. It will also explore the potential pathophysiological mechanisms that may explain these relationships.

1.2 Physical activity and mental health by age group

1.2.1 Long-term physical activity interventions on mental health outcomes in young people

Changes in developmental processes from childhood through young adulthood are believed to heighten the risk of psychiatric disorders, as the nervous system is particularly vulnerable to psychosocial stress during this stage [5].

Numerous interventions for young people with mental disorders have been evaluated for effectiveness. Based on medical knowledge, antidepressants proved to be effective in treating depression in young people. Additionally, physical activity interventions also showed effectiveness for improving the physical and mental health of young people, and it is inexpensive and easy to apply [6]. Previous studies consistently reported significant improvements in depression and distress following extended physical activity interventions. Activities such as group jogging and aerobic dance were linked to reduced depressive symptoms in both healthy individuals [7] and those with depression among young adults [8]. In adolescent athletes, strength training led to improvements in mood [9], while dance movement therapy reduced emotional distress in adolescents with mild depression [10]. Overall, these findings suggest that physical activity interventions may help alleviate depressive symptoms and emotional distress in youth, aligning with the conclusions of a recent meta-analysis on depression [6].

With regular and ongoing participation, exercise may enhance psychological well-being and cognitive function, potentially producing a calming effect on the nervous system. Underlying neurobiological mechanisms have not been well established. Several neurobiological processes linked to physical activity—such as hippocampal neurogenesis, increased cerebral blood volume, elevated levels of brain-derived neurotrophic factor (BDNF), reduced cortisol levels, and changes in functional activation of the fronto-parietal network—have been recognized for their role in enhancing cognitive function [11]. However, these mechanisms have primarily been investigated in older adults, particularly in relation to the prevention and treatment of chronic and neurodegenerative conditions, rather than in younger populations. Findings from older populations are likely only useful to a limited extent for children, adolescents, and young adults, as the human brain undergoes substantial maturational development from childhood to young adulthood, including pruning of synapses and myelination of white matter tracts to increase neuronal efficiency [5]. Deterioration in brain

structure and function from mid to late adulthood further complicates a comparison [12]. Further research is needed.

1.2.2 Long-term physical activity interventions on mental health outcomes in adults

A notable example is the UK's National Institute for Health and Clinical Excellence (NICE), which has incorporated exercise interventions into its guidelines for treating and managing depression in adults. Their report evaluates existing clinical evidence and proposes exercise recommendations for individuals diagnosed with persistent mild to moderate depression, regardless of age. These individuals are advised to engage in exercise sessions lasting 45–60 minutes, 2–3 times per week, over a period of 10–14 weeks to reduce the severity of depressive symptoms. The recommended exercise should include both endurance and resistance training, aligning with WHO guidelines (see **Figure 1**). It is advised that these activities be supervised by health-care professionals, as supervised exercise has shown greater effectiveness compared to unsupervised programs in most studies. As for anxiety disorders, although the evidence is less consistent than for depression, some studies have shown that single sessions of moderate-intensity exercise can significantly reduce state anxiety [14].

The prevention of depression necessitates the implementation of effective strategies, including the modification of established risk factors. Accumulating evidence from narrative reviews suggests that physical activity serves as a protective factor against the development of depressive disorders. A meta-analysis of prospective cohort studies demonstrated that individuals engaging in higher levels of physical activity exhibited a 17% (95% CI: 12–21%) reduction in the likelihood of developing depression compared to those with lower activity levels. Similarly, a more comprehensive meta-analysis, synthesizing 106 effect sizes from 65 studies employing heterogeneous measures of physical activity exposure, reported a 21% (95% CI: 18–25%) reduction in depression risk among more physically active individuals.

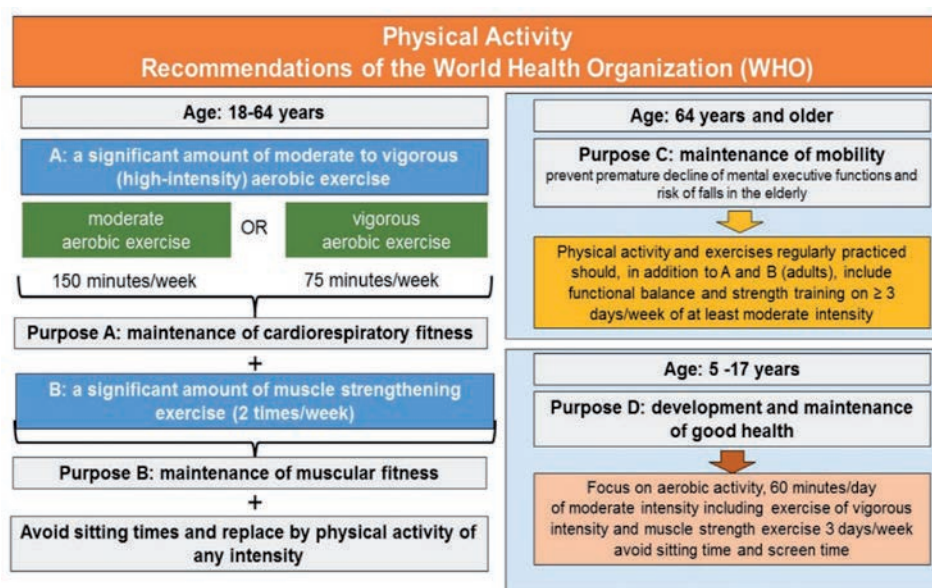


Figure 1.
 Physical activity and exercise recommendations by the World Health Organization according to age group [13].

1.3 Association between physical activity and risk of depression: Dose-response relationship

Based on recent meta-analysis, an inverse curvilinear relationship between physical activity and risk of depression has been identified, indicating that the most substantial reductions in depression risk occur when individuals transition from complete inactivity to engaging in even modest levels of physical activity. Specifically, accumulating a weekly activity volume equivalent to approximately 2.5 hours of brisk walking was associated with a 25% reduction in depression risk, while even half that amount was linked to an 18% lower risk compared to no physical activity. Beyond this threshold, additional increases in activity levels yielded only marginal improvements in risk reduction (**Figure 2**) [15].

Compared to individuals who reported no engagement in physical activity, adults who accumulated approximately half of the recommended volume (4.4 mMET-hours per week, half of minimum recommended level of physical activity, approximately 2.5 h/wk. of brisk walking) exhibited an 18% reduction in the risk of developing depression (95% CI: 13–23%). Those meeting the full recommended level of physical activity—equivalent to 8.8 mMET-hours per week, approximately 2.5 h/wk. of brisk walking of 3.5 marginal METs—demonstrated a 25% lower risk (95% CI: 18–32%). However, beyond this threshold, the additional benefits appeared to diminish, accompanied by increased variability and uncertainty in the observed effects (see **Table 1**). Population Impact Fraction (PIF) analyses, derived from the prevalence of physical activity and depression outcomes across the included cohorts, indicated that 11.5% (95% CI: 7.7–15.4%) of incident depression cases could have been prevented if all adults had engaged in at least 8.8 mMET-hours of physical activity per week (see **Table 1**). The estimated PIFs were approximately twice as large for elevated depressive symptoms compared to major depressive disorder at both the 8.8 and 17.5 mMET-hours per week thresholds, and nearly three times greater at the lower activity level of 4.4 mMET-hours per week [15].

1.4 Physical activity and depression and anxiety disorders: Assessment of causality

According to a recently published systematic review of four reviews (two for depression and two for anxiety disorders), individuals with high levels of physical activity presented to have a lower risk of incident depression (adjusted RR = 0.83,

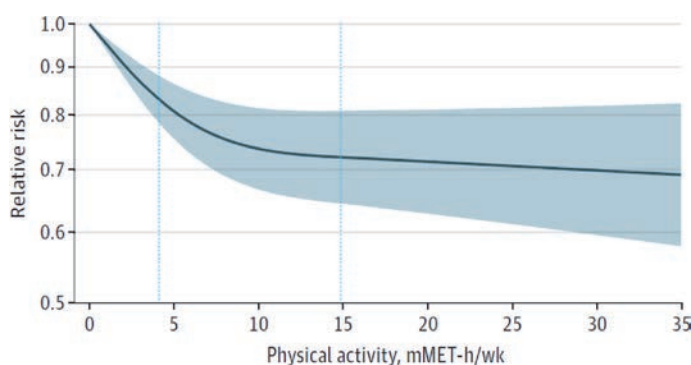


Figure 2.
Association between physical activity and incidence of depression [15].

	Risk association by activity volume [mMET-h/wk], RR (95% CI)			Population impact by activity volume [mMET-h/wk], PIF (95% CI), %		
	4.4	8.8	17.5	4.4	8.8	17.5
Depression	0.82 (0.77–0.87)	0.75 (0.68–0.82)	0.72 (0.64–0.81)	6.38 (4.25–8.63)	11.53 (7.69–15.43)	13.89 (8.44–19.25)
Major depression	0.83 (0.75–0.92)	0.75 (0.64–0.87)	0.74 (0.61–0.88)	2.97 (1.27–4.91)	7.28 (3.36–11.44)	8.04 (2.38–13.82)
Elevated depressive symptoms	0.80 (0.73–0.88)	0.73 (0.64–0.84)	0.70 (0.59–0.84)	9.45 (5.19–13.86)	14.44 (7.88–20.92)	17.01 (8.39–25.24)

Abbreviations: mMET, marginal metabolic equivalent of task; PIF, potential impact fraction; RR, relative risk.^aRisks are expressed relative to accumulating 0 mMET-h/wk.

Table 1.
Relative risk of potential impact factors of incident depression, major depression, and elevated depressive symptoms at three physical activity levels^a [15].

95% CI = 0.76, 0.90) and were less likely to develop anxiety (adjusted OR = 0.74, 95% CI = 0.62, 0.88) when compared to those with low levels of physical activity. This review suggests that physical activity is likely to have a causal relationship with both conditions [16]. As shown in **Figure 3**, exercise induces a range of interrelated neurobiological changes that create a brain environment protective against depression. Neurotrophins, such as VEGF, promote cellular processes like angiogenesis, leading to structural brain adaptations—particularly in regions implicated in depression, such as the hippocampus—that enhance stress regulation and cognitive function. Although our understanding of these mechanisms is advancing, the complex interactions among molecular pathways remain poorly understood. For instance, IL-6 has been shown to influence hippocampal morphology, suggesting shared biological mechanisms through which exercise may alleviate depressive symptoms [17].

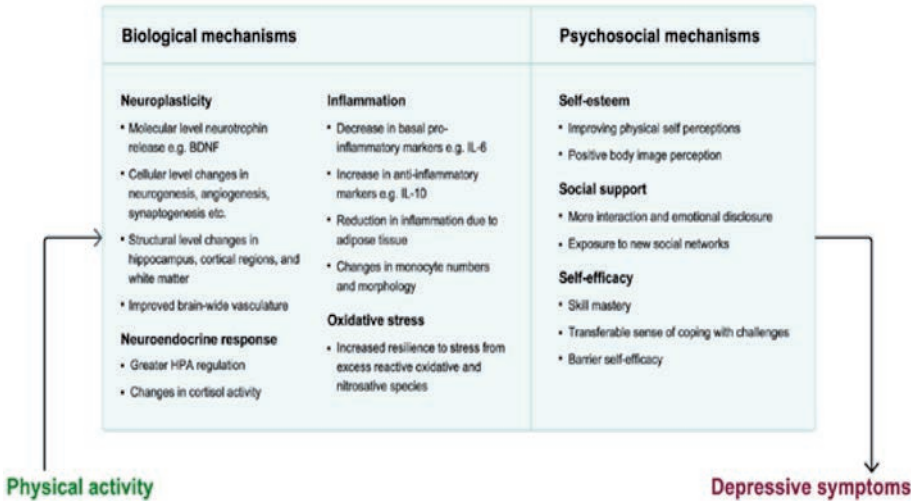


Figure 3.
Mechanisms of the relationship between physical activity and depressive symptoms [17].

Emerging evidence also indicates mechanistic overlaps between exercise and pharmacological treatments, with both influencing neurogenesis *via* similar pathways. Their combination may yield additive effects on depression-related outcomes. In parallel, psychosocial mechanisms—including improvements in self-esteem—may also contribute to the antidepressant effects of exercise, though these remain understudied [17]. The predominance of observational designs in this area limits causal inference due to reverse causality, and more interventional research is warranted.

2. Physical fitness and mental health

Higher levels of physical fitness have been linked to a reduced risk of all-cause and cardiovascular disease (CVD) mortality, and improvements in fitness have similarly been associated with decreased mortality risk. Additionally, numerous studies have demonstrated that greater fitness is correlated with a lower incidence of nonfatal conditions such as myocardial infarction, heart failure, and depression [18]. Based on a recently published study of Benjamin L et al., over 117,218 person-years of Medicare follow-up with generally healthy 17,989 participants (80.2% men) with a mean age of 50.0 years (SD = 8.7), a total of 2701 cases of diagnosed depression were observed. The incidence rate of depression was 22.2 per 1000 person-years in the high fitness group (1041 cases) and 26.2 in the moderate fitness group (1136 cases), compared to 30.7 in the low fitness group (524 cases) [18]. This study found that people with higher fitness levels in midlife had a lower risk of dying from heart disease, even if they later developed depression. Fitness can be improved in most people through aerobic exercise, which is generally simple and low-cost. However, surveys show that only about half of adults meet the recommended guidelines for aerobic activity, and even fewer meet both aerobic and muscle-strengthening exercise recommendations [18].

There are research findings on how much physical activity is needed to improve fitness. The amount may vary depending on factors such as age and gender.

In a study involving generally healthy adults aged 55 and older with normal functional status, the COACH program (n = 69)—utilizing a pedometer-based intervention over 9 months with a low to moderate recommended dose of physical activity—demonstrated that increasing physical activity by more than 35% led to improvements in both physical fitness and cognitive function compared to stretch program (n = 33). Since having both depression and heart disease leads to much higher healthcare costs and service use, early prevention through improving fitness may help reduce both health risks and medical expenses [19].

On the other hand, excessive and compulsive physical activity, especially in eating disorder patients, may worsen psychological outcomes. A review of 47 studies proposed the term “problematic use of physical activity (PPA)” and a new model explaining its development in anorexia nervosa. The issue as a whole emphasizes that nutrition and physical activity play key roles in promoting mental health and can support the treatment of mental illness [20].

3. Sedentary lifestyles and mental health

3.1 Long working hours on depression

The World Health Organization (WHO) and the International Labour Organization (ILO) are collaborating on the WHO/ILO Joint Estimates of the

Work-related Burden of Disease and Injury (WHO/ILO Joint Estimates) initiative [21]. This effort aims to calculate the number of deaths and disability-adjusted life years (DALYs) linked to specific occupational risk factors, including long working hours. In a recent systematic review by Ruguiles R. et al., 22 studies, composed of a total of 109,906 individuals, in comparison to working 35–40 hours per week, the impact of working longer hours on the risk of developing depression remains unclear. For those working 41–48 hours weekly, the pooled odds ratio (OR) is 1.05 (95% confidence interval [CI]: 0.86 to 1.29) based on eight studies involving 49,392 participants, with an I^2 of 46% and low-quality evidence. Similarly, working 49–54 hours per week yields an OR of 1.06 (95% CI: 0.93 to 1.21), also from eight studies with 49,392 participants (I^2 = 40%, low-quality evidence). For those working 55 hours or more weekly, the OR is 1.08 (95% CI: 0.94 to 1.24), derived from 17 studies with 91,142 participants (I^2 = 46%, low-quality evidence). Subgroup analyses did not show any statistically significant differences ($P < 0.05$) based on WHO region, gender, age group, or socioeconomic status [22]. On the other hand, three other systematic reviews [23–25] showed the association between long working hours and a modestly increased risk of depression. Based on the available evidence, there remains a high degree of uncertainty regarding the relationship between long working hours and the risks of experiencing, developing, or dying from depression. The current body of human data has been assessed as providing “inadequate evidence of harmfulness” for working hour categories of 41–48, 49–54, and ≥ 55 hours per week, when compared to the standard 35–40 hours per week [22].

4. Practical applications for mental health

For children and adolescents aged from 5 to 18 years, it is recommended to engage in at least 45 to 60 minutes of physical activity daily, including moderate to vigorous aerobic exercises from 3 to 5 days each week. School-based programs are likely to be more effective in achieving these activity levels. Moderate physical activities include running, dancing, swimming, and games involving catching and throwing, while vigorous activities often involve sports activities. Enjoyable activities are essential. Although an 8-week supervised physical activity program is generally recommended for depression or anxiety, even short-term exercise may be beneficial.

Adults aged 18–64 are recommended to engage in 150–300 minutes of moderate or 75–150 minutes of vigorous aerobic activity weekly, plus muscle-strengthening exercises on at least 2 days. Even lower levels of activity, such as 2.5 hours of brisk walking per week or half that amount and avoiding long sitting times, offer significant mental health benefits. Early identification and management of workplace psychosocial risks, alongside structural measures and promotion of physical activity, are essential for preventing mental health issues. Preventing suicidal ideation among workers requires multifaceted interventions, including legal regulations, overwork reporting systems, workplace sanctions, flexible schedules, and adequate staffing.

Adults aged 65 years and older should aim for at least 150 minutes per week of moderate-intensity aerobic activity—or an equivalent combination of moderate and vigorous activity—complemented by muscle-strengthening exercises on two or more days and balance training on three or more days weekly. These multicomponent physical activities yield substantial mental health benefits, including reductions in depressive symptoms and anxiety, alongside improved sleep, brain function, and fall prevention.

5. Conclusions

This chapter examined the impact of physical activity, physical fitness, and sedentary working hours on mental health, with a particular focus on depression and anxiety. Future research would benefit from more rigorously designed studies that consider potential variations in these associations based on occupation, age, and gender.

Conflict of interest

None.

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References

- [1] Network. Global Burden of Disease Collaborative. Global Burden of Disease Study 2019 (GBD 2019) Results. Seattle, WA: Institute for Health Metrics and Evaluation (IHME); 2020. Available from: <https://vizhub.healthdata.org/gbd-results/>
- [2] Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: An analysis from the global burden of disease study 2010. *PLoS One*. 2010;**2015**(10):e0116820
- [3] Mikkelsen K, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V. Exercise and mental health. *Maturitas*. 2017;**106**:48-56
- [4] Dvorak RV, Tchernof A, Starling RD, Ades PA, Di Pietro L, Poehlman ET. Respiratory fitness, free living physical activity, and cardiovascular disease risk in older individuals: A doubly labeled water study. *The Journal of Clinical Endocrinology and Metabolism*. 2000;**85**:957-963. DOI: 10.1210/jcem.85.3.6432
- [5] Keshavan MS, Giedd J, Lau JYF, Lewis DA, Paus T. Changes in the adolescent brain and the pathophysiology of psychotic disorders. *Lancet Psychiatry*. 2014;**1**:549-558. DOI: 10.1016/S2215-0366(14)00081-9
- [6] Bailey AP, Hetrick SE, Rosenbaum S, Purcell R, Parker AG. Treating depression with physical activity in adolescents and young adults: A systematic review and meta-analysis of randomised controlled trials. *Psychological Medicine*. 2018;**48**:1068-1083. DOI: 10.1017/S0033291717002653.2022
- [7] Gondoh Y, Sensui H, Kinomura S, Fukuda H, Fujimoto T, Masud M, et al. Effects of aerobic exercise training on brain structure and psychological well-being in young adults. *The Journal of Sports Medicine and Physical Fitness*. 2009;**49**:129-135
- [8] Nabkasorn C, Miyai N, Sootmongkol A, Junprasert S, Yamamoto H, Arita M, et al. Effects of physical exercise on depression, neuroendocrine stress hormones and physiological fitness in adolescent females with depressive symptoms. *European Journal of Public Health*. 2006;**16**:179-184. DOI: 10.1093/eurpub/cki159
- [9] Sarabia JM, Fernandez-Fernandez J, Juan-Recio C, Hernandez-Davo H, Urban T, Moya M. Mechanical, hormonal and psychological effects of a non-failure short-term strength training program in young tennis players. *Journal of Human Kinetics*. 2015;**5**:81-91. DOI: 10.1515/hukin-2015-0009
- [10] Jeong YJ, Hong SC, Lee MS, Park MC, Kim YK, Suh CM. Dance movement therapy improves emotional responses and modulates neurohormones in adolescents with mild depression. *The International Journal of Neuroscience*. 2005;**115**:1711-1720. DOI: 10.1080/00207450590958574
- [11] Hillman CH, Erickson KI, Kramer AF. Be smart, exercise your heart: Exercise effects on brain and cognition. *Nature Reviews. Neuroscience*. 2008;**9**:58-65. DOI: 10.1038/nrn2298
- [12] Bherer L, Erickson KI, Liu-Ambrose T. A review of the effects of physical activity and exercise on cognitive and brain functions

in older adults. *Journal of Aging Research*. 2013;**2013**:657508. DOI: 10.1155/2013/657508

[13] Herbert C. Enhancing mental health, well-being and active lifestyles of university students by means of physical activity and exercise research programs. *Frontiers in Public Health*. 2022;**10**:849093. DOI: 10.3389/fpubh.2022.849093 eCollection 2022

[14] National Institute for Health and Clinical Excellence. Depression: The Treatment and Management of Depression in Adults. 2009. Available from: <http://www.nice.org.uk/guidance/CG90>

[15] Pearce M, Barcia L, Strain T, Schuch FB, Golubic R, Kelly P, et al. Association between physical activity and risk of depression a systematic review and meta-analysis. *JAMA Psychiatry*. 2022;**79**(6):5r50-5r5559. DOI: 10.1001/jamapsychiatry.2022.0609

[16] Wanjau MN, Möller H, Haigh F, Milat A, Rema H, Lucas P, et al. Physical activity and depression and anxiety disorders: A systematic review of reviews and assessment of causality. *AJPM Focus*. 2023;**2**(2):100074. DOI: 10.1016/j.focus.2023.100074

[17] Kandola A, Ashdown-Franks G, Hendrikse J, Sabiston CM, Stubbs B. Physical activity and depression: Towards understanding the antidepressant mechanisms of physical activity. *Neuroscience and Biobehavioral Reviews*. 2019;**107**:525-539. DOI: 10.1016/j.neubiorev.2019.09.040

[18] Willis BL, Leonard D, Barlow CE, Martin SB, De Fina LF, Trivedi MH. Association of Midlife Cardiorespiratory Fitness with Incident Depression and Cardiovascular Death after Depression in later life. *JAMA Psychiatry*.

2018;**75**(9):911-917. DOI: 10.1001/jamapsychiatry.2018.1467

[19] Galle SA, Deijen JB, Milders MV, De Greef MHG, Scherder EJA, van Duijn CM, et al. The effects of moderate physical activity intervention on physical fitness and cognition in healthy elderly with low levels of physical activity: A randomized controlled trial. *Alzheimer's Research & Therapy*. 2023;**15**(1):12. DOI: 10.1186/s13195-022-01123-3

[20] Rizk M, Mattar L, Kern L, Berthoz S, Duclos J, Viltart O, et al. Physical activity in eating disorders: A systematic review. *Nutrients*. 2020;**12**:183. DOI: 10.3390/nu12010183

[21] Ryder G. Welcome Address from the Director General of the International Labour Organization. Singapore: XXI World Congress on Safety and Health at Work. Sands Expo and Convention Centre; 2017

[22] Rugulies R, Sørensen K, Di Tecco C, Bonafede M, Rondinone BM, Ahn S, et al. The effect of exposure to long working hours on depression: A systematic review and meta-analysis from the WHO/ILO joint estimates of the work-related burden of disease and injury. *Environment International*. 2021;**155**:106629. DOI: 10.1016/j.envint.2021.106629

[23] Theorell T, Hammarstrom A, Aronsson G, Traskman BL, Grape T, et al. A systematic review including meta-analysis of work environment and depressive symptoms. *BMC Public Health*. 2015;**15**:738. DOI: 10.1186/s12889-015-1954-4

[24] Virtanen M, Jokela M, Madsen IEH, Magnusson HLL, Lallukka T, Nyberg ST, et al. Long working hours and depressive symptoms: Systematic review and meta-analysis of published studies and

unpublished individual participant data. *Scandinavian Journal of Work, Environment & Health*. 2018;**44**:239-250. DOI: 10.5271/sjweh.3712

[25] Watanabe K, Imamura K, Kawakami N. Working hours and the onset of depressive disorder: A systematic review and meta-analysis. *Occupational and Environmental Medicine*. 2016;**73**:877-884. DOI: 10.1136/oemed-2016-103845

Emotional Intelligence and Ageing in a Sedentary World: Impacts on Quality of Life

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Abstract

Ageing is a multidimensional process shaped by biological decline, psychosocial adaptation, and shifting societal roles. While much of the focus in gerontology remains on physical, and cognitive deterioration, emotional intelligence (EI) emerges as a powerful yet underutilised resource that enhances resilience, self-regulation, and social functioning in later life. In parallel, sedentary lifestyles, characterised by prolonged physical inactivity, are on the rise globally, compounding risks of chronic illness, cognitive decline, depression, and reduced quality of life among older adults. This chapter explores how EI functions as a buffer against the emotional, and psychological toll of sedentarism by enabling older individuals to reframe challenges, maintain social connection, and engage in meaningful routines. Drawing on cross-cultural case studies from Zimbabwe, South Africa, and the United Kingdom, the chapter illustrates how socioeconomic, and cultural contexts shape the development and expression of EI, and influence ageing experiences. Community-based initiatives, such as faith-driven programmes, lifelong learning, and intergenerational activities, are shown to foster emotional resilience, and reduce social isolation. Institutional strategies and policy interventions are also discussed as mechanisms to promote EI and active ageing in diverse populations. Ultimately, the integration of EI, along with physical activity, into ageing policy, and practice is positioned as both a preventive, and empowering approach, one that offers a low-cost, scalable, and culturally adaptable means of enhancing quality of life in an increasingly sedentary world. By addressing both emotional and physical dimensions of ageing, interventions hold significant promise for creating more inclusive, sustainable, and emotionally intelligent frameworks for elder care.

Keywords: ageing, cross-cultural ageing, emotional intelligence, quality of life, sedentary lifestyle

1. Introduction

Globally, ageing populations are rising, placing increasing pressure on health-care systems, and social support structures [1]. While many studies focus on the

physical, and cognitive decline associated with ageing, emotional development, and particularly emotional intelligence (EI), tends to improve with age and remains underexplored in its role in physical inactivity [2]. Sedentary lifestyles, characterised by prolonged sitting or inactivity, are prevalent among older adults and are associated with poor health outcomes, and reduced quality of life, particularly in the physical domain, and social participation facets [3].

This chapter adopts a multidisciplinary perspective to examine how EI intersects with ageing, and sedentary behaviour, highlighting the psychological, social, and cultural dynamics that shape the lived experiences of older adults. With a growing number of elderly individuals living more sedentary lives, understanding how emotional skills like regulation, awareness, and resilience influence adaptation to these conditions is crucial. Emotional intelligence not only buffers the psychological impacts of physical inactivity, but also offers a potential pathway for enhancing engagement, social connectivity, and cognitive health in late life [4]. Drawing on examples from lower-middle (Zimbabwe), upper-middle (South Africa), and high-income (UK) contexts, this chapter explores how varying socioeconomic, and cultural landscapes affect the interplay between EI, sedentary behaviour, and ageing, ultimately influencing quality of life in diverse ways.

Traditional models of ageing have largely emphasised physical decline, and medical vulnerability, often overlooking the emotional and psychological resources that older adults develop over time [5]. Emotional intelligence, in contrast, provides a framework for understanding how older individuals manage stress, maintain social bonds, and find purpose despite increasing sedentary constraints [6]. In a world where older adults are simultaneously living longer, and moving less, investing in emotional competence may offer an accessible, low-cost means to counteract the adverse effects of physical inactivity. As such, the integration of emotional and behavioural health in active ageing policies is not just desirable, it is necessary for sustainable and inclusive health systems across economic contexts [7].

1.1 The sedentary lifestyle crisis in ageing populations

The rise in sedentary behaviour among older adults has emerged as a silent, yet potent public health challenge worldwide [8]. Sedentary behaviour refers to any waking activity that involves low energy expenditure, typically while sitting, reclining, or lying down. Importantly, a sedentary lifestyle is not simply the absence of physical activity; it is a distinct behavioural pattern linked to a wide range of adverse health outcomes [9]. For ageing populations, prolonged sedentarism is linked to many conditions such as frailty, loss of muscle mass, cardiovascular disease, Type 2 diabetes, cognitive decline, and premature mortality [10]. The health risks compound when sedentary habits co-occur with age-related physiological changes, such as reduced mobility, chronic illness, and declining metabolic efficiency [11].

The problem is particularly pervasive in high-income countries (HICs), where digital technology, urban infrastructure, and healthcare access promote indoor and inactive lifestyles among the elderly [12, 13]. However, it is equally concerning in low-income countries (LICs), and middle-income countries (MICs), where urbanisation, socioeconomic inequality, and safety concerns may limit opportunities for physical activity [14]. In Zimbabwe, for example, a study by Makore and Al-Maiyah [15] demonstrated that older adults in urban areas often experience social isolation, and poor infrastructure, while in South Africa, two studies' findings by Dube et al. [16] and Mlangeni et al. [17] concurred that increasing urbanisation has led to declines in

traditional forms of physical engagement. Hakwins et al.'s study about older people in the UK, asserts that sedentary behaviours are prevalent, even in well-resourced eldercare facilities, where organisational structures, management practices, and staff training significantly impact residents' physical movement patterns, and reinforce inactivity [18]. This evidence clearly shows that structural, social, and environmental conditions play a significant role in reinforcing inactivity and limiting opportunities for meaningful engagement among older adults. However, EI acts as a psychological resource that empowers older adults to sustain wellbeing and engagement, even when structural and environmental barriers cannot be immediately unchanged.

Beyond physical consequences, the sedentary lifestyle crisis also imposes psychological costs. Extended periods of inactivity contribute to social withdrawal, boredom, depressive symptoms, and diminished self-worth, all factors that can erode quality of life in older adults [19]. These effects are often compounded by a lack of meaningful engagement or emotional stimulation, especially among those who live in care institutions [20]. Notably, EI may serve as a key mitigating factor [21]. Emotional regulation, a psychological process of managing intensity and duration of responses to emotional stimuli by evaluating them as positive or negative in relation to personal goals [21]. Older adults with higher EI may possess the emotional awareness and regulation skills necessary to adapt more effectively, seek out engagement (including in physical activity), and reframe their experiences in positive ways despite physical limitations [22].

While regular physical activity offers significant physiological, psychological, and social benefits for older adults [23, 24], a more comprehensive strategy is necessary. Public health campaigns, policy interventions, and caregiving practices must consider the emotional motivations, and social environments of older adults to create sustainable behaviour change and increase engagement in physical activity [25]. In this context, EI emerges as both a protective factor, and a potential catalyst for breaking the cycle of inactivity and improving quality of life in ageing populations.

2. Emotional intelligence: A lifespan perspective

Emotional intelligence is broadly defined as the capacity to recognise, understand, and manage one's own emotions and the emotions of others. Emotional Intelligence comprises four key abilities: perceiving emotions, using emotions to facilitate thought, understanding emotions, and managing emotions [26].

2.1 Development of emotional intelligence across the lifespan

Emotional intelligence, encompassing the ability to perceive, understand, regulate, and express emotions, follows a distinct developmental trajectory across the human lifespan [27]. While cognitive domains, such as processing speed and memory, hallmarks of fluid intelligence, tend to decline with age [28], emotional capacities often demonstrate resilience, and even growth [29]. Studies suggest that older adults exhibit greater emotional regulation [30], and increased empathy, and enhanced perspective-taking [31]. These improvements may stem from accumulated life experiences, refined coping mechanisms, and a shift in motivational priorities [32].

This behavioural shift is comprehensively explained by socioemotional selectivity theory, which postulates that with increasing age and a corresponding perception of limited future time, individuals exhibit a motivational shift towards the prioritisation of

emotionally salient and meaningful experiences, as opposed to novel or future-oriented goals [33]. Consequently, EI becomes a crucial buffer against the psychosocial challenges associated with ageing [2], particularly in a sedentary world where opportunities for engagement may be limited [34, 35]. Despite its potential to support healthy ageing, further research is required to comprehensively investigate the benefits of EI in older adults, particularly its role in promoting physical activity engagement, and to inform the development of targeted, evidence-based interventions [2].

2.2 Emotional intelligence and emotional regulation in older adults

Older adults' enhanced emotional regulation is partly attributed to life experience and neural changes that support selective attention towards positive stimuli, a phenomenon known as the "positivity effect" [36]. This tendency allows them to focus more on emotionally rewarding experiences and disengage from negative information [37]. As a result, they are more resilient when facing common stressors of ageing, such as loss, illness, or reduced independence [38]. Neurobiologically, age-related changes in the prefrontal cortex, and amygdala interaction contribute to this improved emotional modulation [39]. Despite declines in some cognitive domains, these emotion-related processes remain relatively preserved [30], reinforcing the importance of targeted emotional engagement, especially those including physical activity, with positive activities in line with emotion-regulation goals, as a compensatory tool in later life [40].

In sedentary environments, where physical activity is limited, and social interaction may be reduced, EI becomes a critical asset for maintaining psychological and social well-being [41]. Higher EI enables older adults to reinterpret sedentary time not purely as limitation, but as an opportunity for introspection, creative engagement, or virtual socialisation [42]. Those with strong emotional regulation skills are better equipped to buffer the emotional toll of inactivity, and isolation, maintaining a sense of purpose, and connection even in constrained settings [43]. This underscores the need for interventions that cultivate EI in ageing populations, not only to support mental health, but also to mitigate the broader impacts of a sedentary lifestyle on overall quality of life.

3. Sedentary lifestyle, and its impact on ageing

Sedentary lifestyles pose a significant public health concern for older adults, not only for their physical health but also their psychological well-being [44]. Physical inactivity often contributes to sarcopenia, and cognitive impairment [45]. Less frequently addressed is its psychological impact, including reduced self-esteem, increased anxiety, and depressive symptoms [46].

3.1 Sedentarism and mental health

Sedentary behaviour has been consistently linked to poorer mental health outcomes in older adults [47]. Reduced physical activity in the elderly can lead to diminished cognitive stimulation, disrupted sleep patterns, and a decline in mood-regulating neurochemicals such as endorphins and serotonin [48, 49]. Moreover, physical inactivity often reduces opportunities for spontaneous social interaction, and engagement in meaningful activities, increasing the risk of loneliness, depressive symptoms, and

anxiety [50]. As older adults experience limitations in mobility, or chronic conditions that restrict activity, these mental health risks can become more pronounced, forming a bidirectional relationship between physical inactivity, and emotional decline [51].

However, EI emerges as a critical protective factor in this relationship. Older adults with high EI are more self-aware, capable of recognising early signs of emotional distress, have high self-regulation and are more skilled in managing negative effects through adaptive coping strategies [52]. For example, these individuals may proactively seek social contact through virtual platforms and/or physical activity, maintain routines that support psychological well-being [53]. Their ability to regulate emotions and maintain a sense of purpose can buffer the psychological consequences of sedentarism, suggesting that physical interventions targeting EI could be especially beneficial in promoting mental health among sedentary ageing populations.

3.2 Intersection of emotional intelligence and sedentary behaviour

The intersection of EI and sedentary behaviour presents a complex, but promising area for understanding how older adults navigate the challenges of physical inactivity. While sedentarism often correlates with poorer health outcomes, individuals with higher EI demonstrate a greater capacity to adapt both emotionally and behaviourally [54]. These individuals are more likely to recognise the psychological effects of reduced activity, such as low mood, apathy, or isolation, and respond with proactive coping strategies [55]. For example, they may maintain structured daily physical activity routines and seek out low-impact activities like stretching or chair exercises and they too reframe inactivity not as a personal failing but as a temporary manageable state.

Moreover, EI has been positively associated with greater participation in health-promoting behaviours, including physical activity, in both younger, and older populations [41]. This suggests that emotionally intelligent older adults may be more likely to overcome the psychological inertia that often accompanies a sedentary lifestyle. Importantly, EI also supports self-reflective practices, allowing individuals to reframe inactivity not as failure, but as a temporary state that can be managed, or improved [41]. In this way, EI becomes both a buffer against the emotional toll of sedentarism, and a potential catalyst for re-engagement with physical activity, and social life [41].

These dynamics highlight the importance of integrating EI development into interventions aimed at reducing sedentary behaviour among older adults. Programmes that build EI, through mindfulness training, emotional regulation exercises, or social-emotional learning, could empower older individuals to not only cope more effectively with inactivity, and improve health outcomes [56], but also find internal motivation to engage in healthier, more active lifestyles [57]. By targeting both the emotional and physical dimensions of ageing, such interventions provide a more holistic and integrated approach to enhancing overall quality of life in older adults.

4. Cross-cultural perspectives: Zimbabwe, South Africa, and the UK

4.1 Emotional intelligence and ageing in Zimbabwe: A lower-middle-income perspective

In Zimbabwe, the ageing experience is deeply embedded within traditional cultural structures, particularly extended family systems, and communal living

arrangements [58]. As a result of the nation-wide gaps in emotional and psychological assistance, these social frameworks often provide emotional support, and a sense of belonging for older adults, contributing positively to their EI, and overall quality of life [59]. Despite widespread economic challenges, and limited access to formal healthcare, or structured physical activity programmes, older individuals often find resilience through intergenerational relationships, community gatherings, and roles within the family that uphold their social value, and purpose [60].

Spiritual engagement also plays a significant role in emotional, and physical regulation, among Zimbabweans [61]. Religious participation, and cultural rituals, such as traditional games and dance, provide not only emotional grounding, but also opportunities for social interaction, and reflection, reinforcing emotional resilience even in the face of physical hardship, or sedentarism [16, 62]. While material resources may be scarce in countries like Zimbabwe, the reliance on communal support networks, and spiritual and cultural practices has shown to mitigate the psychological burden of ageing in low-resource settings, highlighting the adaptive power of culturally rooted EI [63].

4.2 Emotional intelligence and ageing in South Africa: An upper-middle-income perspective

South Africa's ageing population faces unique challenges as the country transitioned to an aged society in 2025 [64]. This demographic shift occurs amidst a complex socio-cultural landscape shaped by traditional values and modernising urban environments. Older South Africans navigate these changes through social, and spatial (im)mobilities, intergenerational relationships, and interdependencies [65]. The ageing experience varies significantly across different population groups, with socioeconomic disparities impacting perceived well-being [66]. Traditional family structures are evolving due to rural-urban migration, and industrialisation, necessitating a socio-theological gerontology approach to understand successful ageing in the region [67]. In urban centres, lifestyle shifts have led to increased sedentary behaviour among older adults, driven by limited walkable infrastructure, safety concerns, and reduced physical engagement [68]. However, in more traditional, or rural settings, the cultural emphasis on community, family care, and interdependence remains strong, offering emotional and social support that bolsters mental well-being [69].

This cultural duality creates significant variability in ageing experiences, where access to physical activity programmes, and healthcare services often depends on geographic and socioeconomic factors [70]. Public health campaigns promoting active ageing are in place, but frequently fail to reach underserved communities, limiting their impact. In a national population-based study of older adults conducted by Peltzer and Phaswana-Mafuya, findings show high prevalence of physical inactivity among older adults in South Africa and highlights the need for strategic interventions in the broader community [71]. Enhancing EI through targeted training programmes may offer a promising strategy for promoting physical activity and reducing sedentary behaviour [72]. Policy responses must address these multifaceted challenges, including enhancing awareness of ageing implications, and mainstreaming ageing concerns in public policy [64, 73].

4.3 Emotional intelligence and ageing in United Kingdom: A high-income perspective

The United Kingdom faces significant challenges in supporting its ageing population due to increasing healthcare demands, and resource constraints [74].

The growing proportion of elderly individuals has led to a surge in chronic diseases, and age-related conditions, necessitating specialised, and long-term care [1]. While the post-war ‘welfare generation’ has benefited from improved health and education, concerns have been raised about potential intergenerational conflicts over welfare resources [75].

Despite these structural advantages, many elderly experience high levels of loneliness, and social isolation, particularly those living alone, or in institutional care settings [76]. A sedentary lifestyle is prevalent, exacerbated by factors such as reduced mobility, inclement weather, and limited motivation for physical activity in later life [77–79]. This combination of physical inactivity and social disconnection poses significant risks to both mental and physical health, underscoring the need for holistic approaches to ageing that go beyond medical care.

In the United Kingdom, opportunities to cultivate EI are supported through various community initiatives, including social clubs, therapeutic services, and lifelong learning programmes aimed at cognitive, and emotional enrichment [6, 80]. Participation in these activities not only enhances self-awareness, and emotional regulation, but also fosters social engagement, and a sense of purpose [6, 80]. For many older adults, these emotionally intelligent coping strategies can counterbalance the effects of a sedentary lifestyle, leading to improved quality of life, and greater psychological resilience in a high-income country, but often emotionally disconnected environment [81, 82].

5. Emotional intelligence as a buffer against sedentarism

5.1 Enhancing resilience and adaptability

Emotional intelligence plays a pivotal role in enhancing resilience, and adaptability among older adults facing increasingly sedentary lifestyles. Favours, the process of attending to positive experiences, mediates the relationship between resiliency and mental health in older adults, supporting the Broaden and Build Theory of positive emotions [83]. By engaging in cognitive control, particularly mental set shifting, an EI-driven strategy that involves reinterpreting adverse situations in a more positive light, older adults can maintain a sense of control, and psychological balance [84]. This capacity to regulate emotions enables them to remain socially connected, pursue meaningful routines, and preserve mental health despite reduced physical engagement [85].

Moreover, structured programmes that foster EI, either through mindfulness exercise, reflective journaling, group discussions, or emotional literacy training, can promote adaptability by encouraging older adults to remain not just physically healthy, but also mentally flexible and optimistic [81, 86]. These interventions help individuals develop greater self-awareness and empathy, which in turn foster stronger interpersonal relationships, and a more positive outlook [81]. As a result, the physical and psychological burden of sedentarism is mitigated not by physical movement alone, but by enhanced emotional processing, and resilience.

5.2 Promoting active ageing through emotional intelligence-focused interventions

Emotional intelligence-focused interventions have shown significant promise in promoting active ageing by targeting both emotional well-being and physical

engagement. In this regard, research indicates that EI positively impacts psychological, social, and physical well-being in older adults [2]. Mindfulness-based programmes, for instance, teach older adults to become more aware of their bodily sensations, thoughts, and emotional states, foster self-regulation, and reduce stress [87]. Research has shown that regular mindfulness practice can enhance motivation, and self-efficacy, which in turn, may encourage older adults to adopt healthier behaviours, including more consistent engagement in physical activity [88]. By cultivating a deeper connection between mind and body, mindfulness supports both emotional balances, and reduced sedentarism [88, 89].

Group therapy, and peer-led support initiatives are also powerful tools for promoting EI, while indirectly encouraging movement [90]. These programmes offer emotionally safe spaces for older adults to share personal experiences, practice empathy, and build meaningful social connections [91]. The supportive group dynamics often inspire participation in joint activities, such as walking clubs, gardening projects, or gentle exercise routines [92]. The emotional reinforcement provided by these social bonds can help counteract the inertia associated with sedentary behaviour, making active lifestyles more sustainable, and enjoyable [93].

Arts-based activities, such as dance, music, drama, or painting, further integrate emotional and physical engagement [16]. These interventions not only stimulate creativity and emotional expression, but also often involve light physical movement, social interaction, and cognitive engagement [94]. Participating in a community choir, for example, enhances mood, and fosters a sense of belonging, while also promoting physical activity [95]. As a result, arts-based interventions function as a holistic approach to ageing, where EI, and physical activity reinforce one another, leading to improved overall well-being, and reduced sedentary time [96].

6. Strategies for promoting emotional intelligence in elderly populations

6.1 Community-level strategies for promoting emotional intelligence

Community-level interventions play a vital role in promoting EI among elderly populations by fostering social engagement, emotional expression, and lifelong learning [97]. In MICs like Zimbabwe, and South Africa, grassroots programmes, leveraging cultural, and religious traditions can foster EI, and mitigate the effects of sedentarism [98], including incorporating those programmes as used in Nigeria [99]. Initiatives like the UK's University of the Third Age (U3A), local senior centres, or faith-based organisations provide not only social outlets but also structured opportunities for older adults to develop self-awareness, and interpersonal skills, all of which are core components of EI [100]. These communal environments reduce isolation and empower older individuals to maintain a sense of purpose, belonging, and emotional vitality [101, 102]. These interventions also work through mechanisms, such as improved self-efficacy, outcome expectations, goal-setting, and institutional support [103]. Importantly, these group dynamics-based interventions have also shown effectiveness in increasing and sustaining physical activity levels over time [103].

To be effective, such interventions must be culturally sensitive and accessible, addressing barriers like mobility limitations, digital exclusion, and language differences [104, 105]. Incorporating low-cost, scalable activities, such as group-based physical activities, storytelling, mindfulness sessions, or emotional literacy discussions, can help reach diverse segments of the ageing population [106–108]. By

embedding EI-enhancing practices into the fabric of community life, these interventions contribute to healthier ageing, and greater psychological resilience, particularly in the face of sedentary living, and reduced physical independence.

6.2 Institutional and policy approaches for promoting emotional intelligence

Institutional and policy-level strategies play a pivotal role in embedding EI within ageing support systems, particularly in formal care environments, and public health planning [109]. In eldercare institutions, integrating EI-focused programming, such as emotion regulation workshops, caregiver communication training, and structured group therapy, can enhance the emotional well-being of both residents and staff [110]. Institutions that prioritise EI care practices, such as empathetic listening, autonomy-supportive environments, and opportunities for meaningful engagement, report better resident satisfaction, and reduced rates of depression, and social withdrawal [111]. For staff, EI training improves caregiver-patient relationships, reduces burnout, and fosters a more compassionate care culture [110, 112]. These interventions not only improve quality of life for older adults, but also create emotionally sustainable work environments in healthcare, and residential settings [110].

At the policy level, national ageing frameworks must go beyond physical health to include emotional and psychological dimensions of well-being [113]. Policies that support lifelong learning, community participation, and mental wellness, especially in low-, middle-, and even high-income countries, are essential for fostering EI across diverse ageing populations [114]. Government investment in intersectoral initiatives, such as linking health, education, housing, and social services, can ensure that older adults have equitable access to emotionally enriching environments [115]. For example, subsidising participation in arts-based programmes, mandating emotional competency training in eldercare certification, and promoting EI as a health determinant in national health guidelines can transform ageing policy [116]. By institutionalising EI through policy and practice, governments, and care organisations can more effectively address both the physical, and emotional challenges of sedentary ageing, while promoting holistic, person-centred care.

6.3 Physical activity as a catalyst for emotional intelligence

While physical activity is widely recognised for its benefits to cardiovascular, musculoskeletal, and cognitive health, its role in enhancing EI among older adults is increasingly acknowledged [117]. Structured physical activity, particularly aerobic, resistance, and combined training, can positively influence emotional regulation, stress tolerance, self-awareness, and mood stability, all of which are central dimensions of EI.

Aerobic training, such as walking, swimming, or cycling, has been shown to stimulate endorphin release, reduce cortisol levels, and improve overall affective states [118, 119]. These physiological changes can enhance an individual's capacity for emotional self-regulation, and resilience, even following acute exercise [120]. Regular aerobic activity also promotes better sleep, and cognitive clarity [121], which in turn, contributes to more mindful emotional responses, and less impulsivity [122, 123].

Resistance training, including weightlifting, bodyweight exercises, and resistance bands, not only improves health outcomes, such as injury prevention, and disease prevention in the elderly [124], it also supports EI development through its focus on discipline, self-mastery, and goal-setting, although this has only been explored in youth [125].

These resistance training activities often improve confidence, and self-efficacy in older adults [126], key components of intrapersonal EI. For many older adults, successfully completing resistance training fosters a sense of control, and achievement that can buffer against emotional volatility, and helplessness associated with physical decline, and are also important for long-term physical activity adherence [127].

Combined exercise training programmes, those that integrate both aerobic, and resistance modalities, appear especially effective in improving both physiological [128–130] and psychological well-being [130]. Emerging research suggests these multi-modal routines, especially when combined with cognitive training, may enhance executive function, and emotional regulation capacity, creating a neurobiological environment more conducive to developing empathy, perspective-taking, and impulse control [131].

Moreover, group-based physical activity offers additional social-emotional benefits. Participating in community exercise classes, walking groups, or dance therapy not only promotes movement, but also strengthens social bonds, reduces loneliness, and provides opportunities for emotional expression, and empathy development in a communal setting [132].

Designing physical activity programmes with emotional goals in mind, such as stress relief, social interaction, and confidence building, can transform traditional exercise into a platform for both holistic physical and emotional growth [133]. Healthcare providers, caregivers, and policymakers should view physical activity not only as a medical prescription for ageing bodies, but as a powerful tool for fostering EI, and enhancing quality of life in later years [134].

7. Practical applications

As the global ageing population rapidly increases, it has become coherent to apply EI in more concrete practical ways. The intentional use of strategies to enhance EI has the potential to improve older adults' quality of life, social connections, cognitive health, resilience, and overall well-being, while also supporting caregiving and informing community and policy initiatives [110, 112, 135–138]. **Figure 1** shows a cyclical model demonstrating how EI empowers self-regulation, resilience, and social awareness in older adults, helping them reframe challenges and enhance their quality of life.

Integrating lifelong training programmes may offer a practical holistic approach to health ageing. Programmes that can be hosted at community centres, libraries, or online platforms such short courses and workshops can be developed to teach adults skills such as.

- Emotional recognition, a fundamental for self-awareness and empathy [110, 135]. Incorporating guided exercises that use images, role plays, emotion daily recording and reflection, and real-life stories that can facilitate an older adult's ability to identify emotions in self and others. This can enhance greater self-awareness and empathy through better recognition of others' emotions.
- Stress management and regulation can help older adults cope with age-related stress such as health challenges and coping with grief of someone or something important [136]. Mindfulness games and emotional regulation activities such as breathing exercises, and cognitive reappraisal can be effective to cope with



Figure 1.

A cyclical model of emotional intelligence (EI) as a pathway to improved quality of life in older adults. The challenge—This phase illustrates an older adult in a sedentary state, accompanied by icons that depict physical decline and social isolation. The emotional intelligence (EI) intervention hub—a central hub representing EI, which includes key components such as self-regulation, emotional resilience, and social awareness. The behavioural shift—extension from the EI hub to various positive actions, including reframing challenges, maintaining social connections, and engaging in meaningful routines. The outcome—signs of an improved quality of life, reflecting better physical and mental health.

health and life challenges by reducing anxiety, depression and improving resilience to old-age stressors.

- The ability to adapt to social skills is crucial to this population. Training in communicating effectively and tailored guidance on maintaining and creating new social connections, problems and conflicts resolution and role-play for revolving family dynamics can build stronger relationships and improve life satisfaction [52].
- Social engagement and intergenerational programmes, such as peer support groups, collaborative problem-solving tasks, art and music activities, storytelling, life skills sharing [136, 138], EI exercises, and memory games where young people support older adults with digital skills, are effective in fostering connections between generations [139]. These activities promote active listening, mentorship, empathy,

perspective-taking, and meaningful relationships. They also help reduce loneliness and isolation, build supportive networks, and strengthen community bonds that contribute to healthier, more connected ageing.

- Emotional intelligence (EI) training can be an important tool in caregiver support programmes, focusing on empathy, burnout prevention and communication [136, 137], which in turn benefits the older adults in their daily care.
- Caregiving training programmes that include identifying non-verbal cues, role-playing in challenging scenarios, and engaging in reflective sessions may enhance carers' empathy by helping them recognise their own emotional responses as well as those of the older adults they support, especially when communication is difficult [85]. Such approaches can lead to stronger caregiver-older adult relationships and foster more compassionate, personalised care.
- Burnout prevention is crucial. Emotional intelligence (EI) training for professional and family caregivers should equip them with self-regulation strategies to manage emotional fatigue [112]. Activities focused on stress management, self-care planning, and mindfulness, such as meditation and deep breathing, can promote relaxation and mental clarity, thereby reducing stress and frustration, enhancing job satisfaction, and building greater resilience in emotionally demanding situations.
- Improving communication ensures a more positive care environment by promoting empathy driven, clear and respectful interactions [83]. Importantly, active listening, validation and reframing communication, engaging in handling difficult conversations, and collaborative team discussions reduce misunderstandings and conflicts in care settings, and improve trust and rapport between caregivers, older adults, their families and their communities.
- Health professionals can integrate EI principles into chronic disease management by assisting older adult patients to cope with psychological strain of living with long-term illness [137]. Activities that include decoding emotions, and mindfulness and stress reduction workshops, daily emotional and gratitude recording, and role playing—coping strategies practice and difficult conversation scenarios have potential of reducing fear, stress, and sadness improving treatment adherence, building resilience in case of health challenges.
- Group therapy and peer-support initiatives play a vital role in embedding EI into clinical care [81]. Participating in structured discussions, empathy circles and mindfulness practices, older adults can share lived experiences, strengthening emotional skills in a supportive environment. Such intervention reduces social isolation, symptoms of anxiety and depression, enhancing self-esteem and belonging, and mental health outcomes.
- Emotional intelligence-based cognitive rehabilitation links emotional processing to cognitive health [138]. Engaging in activities such as empathy-driven problem solving, reading verbal and non-verbal social cues, and storytelling improves memory, attention and cognitive flexibility, reinforcing social engagement. By combining cognitive and emotional strategies, older adults gain improved capacity to manage their daily challenges and maintain stronger interpersonal connections.

8. Conclusion

Emotional intelligence (EI) is a crucial yet often underutilised resource that contributes to the well-being and quality of life of older adults, especially in the context of sedentary lifestyles [81]. Across various cultural and socioeconomic backgrounds, EI consistently serves as a buffer against the psychological and social challenges associated with ageing by enhancing emotional regulation, resilience, and connectedness. Whether through community traditions in Zimbabwe, changing family structures in South Africa, or organised programmes in the UK, EI helps older adults reframe their limitations, maintain meaningful relationships, and find purpose.

Looking ahead, research should focus not only on documenting the associations of EI but also on testing scalable, context-sensitive interventions that combine EI with physical activity, social engagement, and caregiving. Policy and practice must recognise EI as not just an individual trait but as a modifiable resource that can be cultivated through lifelong learning, intergenerational exchange, and institutional training. By incorporating EI into public health frameworks and community initiatives, societies can promote healthier, more connected, and emotionally resilient ageing across diverse populations.

Conflict of interest

The authors declare no conflict of interest.

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References

- [1] Osareme J, Ogugua MM, Maduka CP, Olorunsogo TO, Omotayo O. Demographic shifts and healthcare: A review of aging populations and systemic challenges. *International Journal of Science and Research Archive*. 2024;**11**(01):383-395. DOI: 10.30574/ijrsra.2024.11.1.0067
- [2] Cé R, Goedert AR. The influence of emotional intelligence on healthy aging. *International Journal of Clinical Case Reports and Reviews*. 2025;**22**(3):1-10
- [3] Meneguci J, Sasaki JE, Santos A, Scatena LM, Damião R. Sitting time and quality of life in older adults: A population-based study. *Journal of Physical Activity and Health*. 2015;**12**(11):1513-15139. DOI: 10.1123/jpah.2014-0233
- [4] Matz-Costa C, Carr DC, McNamara TK, James JB. Physical, cognitive, social, and emotional mediators of activity involvement and health in later life. *Research on Aging*. 2016;**38**(7):791-815. DOI: 10.1177/0164027515606182
- [5] Bowling A. Aspirations for older age in the 21st century: What is successful aging? *The International Journal of Aging and Human Development*. 2007;**64**(3):263-297. DOI: 10.2190/L0K1-87W4-9R01-7127
- [6] Chen Y, Peng Y, Fang P. Emotional intelligence mediates the relationship between age and subjective well-being. *The International Journal of Aging and Human Development*. 2016;**83**(2):91-107. DOI: 10.1177/0091415016648705
- [7] Lak A, Rashidghalam P, Myint PK, Baradaran HR. Comprehensive 5P framework for active aging using the ecological approach: An iterative systematic review. *BMC Public Health*. 2020;**20**(1):33. DOI: 10.1186/s12889-019-8136-8
- [8] Wullems JA, Verschueren SM, Degens H, Morse CI, Onambélé GL. A review of the assessment and prevalence of sedentarism in older adults, its physiology/health impact and non-exercise mobility counter-measures. *Biogerontology*. 2016;**17**(3):547-565. DOI: 10.1007/s10522-016-9640-1
- [9] Jochem C, Schmid D, Leitzmann MF. Introduction to sedentary behaviour epidemiology. In: *Sedentary Behaviour Epidemiology*. Cham: Springer International Publishing; 2017. pp. 3-29. DOI: 10.1007/978-3-319-61552-3_1
- [10] Goyal J, Rakhra G. Sedentarism and chronic health problems. *Korean Journal of Family Medicine*. 2024;**45**(5):239. DOI: 10.4082/kjfm.24.0099
- [11] Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition, and Metabolism*. 2010;**35**(6):725-740. DOI: 10.1139/H10-079
- [12] Cleland C, Reis R, Hino A, Hunter R, Fermino R, de Paiva HK, et al. Built environment correlates of physical activity and sedentary behaviour in older adults: A comparative review between high and low-middle income countries. *Health and Place*. 2019;**57**:277-304. DOI: 10.1016/j.healthplace.2019.05.007
- [13] Mello GT, Lopes MV, Minatto G, Costa RM, Matias TS, Guerra PH, et al. Clustering of physical activity, diet and sedentary behavior among

youth from low-, middle-, and high-income countries: A scoping review. *International Journal of Environmental Research and Public Health*. 2021;**18**(20):10924. DOI: 10.3390/ijerph182010924

[14] Gaskin CJ, Orellana L. Factors associated with physical activity and sedentary behavior in older adults from six low-and middle-income countries. *International Journal of Environmental Research and Public Health*. 2018;**15**(5):908. DOI: 10.3390/ijerph15050908

[15] Makore BC, Al-Maiyah S. Moving from the margins: Towards an inclusive urban representation of older people in Zimbabwe's policy discourse. *Societies*. 2021;**11**(1):7. DOI: 10.3390/soc11010007

[16] Dube A, Shaw I, Mathunjwa ML, Shaw BS. Impact of traditional dance and games on cardiovascular health: A scoping review of outcomes across diverse low-and middle-income countries. *International Journal of Environmental Research and Public Health*. 2025;**22**(3):440. DOI: 10.3390/ijerph22030440

[17] Mlangeni L, Makola L, Naidoo I, Chibi B, Sokhela Z, Silimfe Z, et al. Factors associated with physical activity in South Africa: Evidence from a national population-based survey. *The Open Public Health Journal*. 2018;**11**(1):516-525. DOI: 10.2174/1874944501811010516

[18] Hawkins RJ, Prashar A, Lusambili A, Ellard DR, Godfrey M. 'If they don't use it, they lose it': How organisational structures and practices shape residents' physical movement in care home settings. *Ageing and Society*. 2018;**38**(9):1817-1842. DOI: 10.1017/S0144686X17000290

[19] Dolenc P, Petrič M. Psychological benefits of exercise and physical activity

in older adults. *Annales Kinesiologiae*. 2019;**9**(2):121-134. DOI: 10.35469/ak.2018.167

[20] van Beek AP, Frijters DH, Wagner C, Groenewegen PP, Ribbe MW. Social engagement and depressive symptoms of elderly residents with dementia: A cross-sectional study of 37 long-term care units. *International Psychogeriatrics*. 2011;**23**(4):625-633. DOI: 10.1017/S1041610210002061

[21] Lloyd SJ, Malek-Ahmadi M, Barclay K, Fernandez MR, Chartrand MS. Emotional intelligence (EI) as a predictor of depression status in older adults. *Archives of Gerontology and Geriatrics*. 2012;**55**(3):570-573. DOI: 10.1016/j.archger.2012.06.004

[22] Goleman D. Emotional intelligence. Why it can matter more than IQ. *Learning*. 1996;**24**(6):49-50

[23] Archer E, Paluch AE, Shook RP, Blair SN. Physical activity and the science of successful aging. *Kinesiology Review*. 2013;**2**(1):29-38. DOI: 10.1123/krj.2.1.29

[24] Nahand MS, Najafabadi MG, Naghdi N, Sheikh M, Shaw BS. Effect of combined aquatic and cognitive training on quality of life, fall self-efficacy, and motor performance in aged with varying cognitive status: A proof-of-concept study. *Journal of Exercise Rehabilitation*. 2020;**16**(2):148. DOI: 10.12965/jer.2040076.038

[25] Shaw I, Mathunjwa ML, Shaw BS. Physical activity and health promotion: A public health imperative. In: *Health Promotion-Principles and Approaches*. London, UK: IntechOpen; 2023. DOI: 10.5772/intechopen.111927

[26] Mayer JD, Salovey P. What is emotional intelligence? In: Sluyter DJ, editor. *Emotional Development and*

- Emotional Intelligence: Educational Implications. New York, NY: Basic Books; 1997
- [27] Petrides KV, Mikolajczak M, Mavroveli S, Sanchez-Ruiz MJ, Furnham A, Pérez-González JC. Developments in trait emotional intelligence research. *Emotion Review*. 2016;**8**(4):335-341. DOI: 10.1177/1754073916650493
- [28] Li SC, Lindenberger U, Hommel B, Aschersleben G, Prinz W, Baltes PB. Transformations in the couplings among intellectual abilities and constituent cognitive processes across the life span. *Psychological Science*. 2004;**15**(3):155-563. DOI: 10.1111/j.0956-7976.2004.01503003.x
- [29] Carstensen LL, Mikels JA. At the intersection of emotion and cognition: Aging and the positivity effect. *Current Directions in Psychological Science*. 2005;**14**(3):117-121. DOI: 10.1111/j.0963-7214.2005.00348.x
- [30] Urry HL, Gross JJ. Emotion regulation in older age. *Current Directions in Psychological Science*. 2010;**19**(6):352-357. DOI: 10.1177/0963721410388395
- [31] O'Brien E, Konrath SH, Gröhn D, Hagen AL. Empathic concern and perspective taking: Linear and quadratic effects of age across the adult life span. *Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*. 2013;**68**(2):168-175. DOI: 10.1093/geronb/gbs055
- [32] Zhang X, Fung HH, Stanley JT, Isaacowitz DM, Ho MY. Perspective taking in older age revisited: A motivational perspective. *Developmental Psychology*. 2013;**49**(10):1848. DOI: 10.1037/a0031211
- [33] Shavit Y, Carstensen L. Age associated with preference for more and emotionally meaningful information in time-use decisions. *Innovation in Aging*. 2020;**4**(Suppl. 1):502. DOI: 10.1093/geroni/igaa057.1621
- [34] Billson JH, Cilliers JF, Pieterse JJ, Shaw BS, Shaw I, Toriola AL. Comparison of home-and gymnasium-based resistance training on flexibility in the elderly. *South African Journal for Research in Sport Physical Education and Recreation*. 2011;**33**(3):1-9
- [35] Rosso AL, Taylor JA, Tabb LP, Michael YL. Mobility, disability, and social engagement in older adults. *Journal of Aging and Health*. 2013;**25**(4):617-637. DOI: 10.1177/0898264313482489
- [36] Sasse LK, Gamer M, Buechel C, Brassen S. Selective control of attention supports the positivity effect in aging. *PLoS ONE*. 2014;**9**(8):e104180. DOI: 10.1371/journal.pone.0104180
- [37] Mather M, Carstensen LL. Socioemotional selectivity theory. *Trends in Cognitive Sciences*. 2005;**9**(10):496-502
- [38] Glicklen MD. Learning from Resilient People: Lessons We can apply to Counselling and Psychotherapy. Vol. 3. Thousand Oaks, California: Sage; 2006. DOI: 10.4135/9781452232539.n9
- [39] Roalf DR, Pruis TA, Stevens AA, Janowsky JS. More is less: Emotion induced prefrontal cortex activity habituates in aging. *Neurobiology of Aging*. 2011;**32**(9):1634-1650. DOI: 10.1016/j.neurobiolaging.2009.10.007
- [40] Hess TM, Hertzog C. Activity selection and engagement in old age: Motivational and goal-based influences. *Innovation in Aging*. 2019;**3**(Supp 1):

S811-S812. DOI: 10.1093/geroni/igz038.2991

[41] Zysberg L, Hemmel R. Emotional intelligence and physical activity. *Journal of Physical Activity and Health*. 2018;**15**(1):53-56. DOI: 10.1123/jpah.2016-0654

[42] Mcewan T, Tam-Seto L, Dogra S. Perceptions of sedentary behavior among socially engaged older adults. *The Gerontologist*. 2017;**57**(4):735-744. DOI: 10.1093/geront/gnv689

[43] Harp NR, Neta M. Tendency to share positive emotions buffers loneliness-related negativity in the context of shared adversity. *Journal of Research in Personality*. 2023;**102**:104333. DOI: 10.1016/j.jrp.2022.104333

[44] Shaw BS, Brown GA, Shaw I. Importance of Resistance Training in the Management of Cardiovascular Disease Risk. London, UK: IntechOpen; 2022. DOI: 10.5772/intechopen.99710

[45] Peng TC, Chen WL, Wu LW, Chang YW, Kao TW. Sarcopenia and cognitive impairment: A systematic review and meta-analysis. *Clinical Nutrition*. 2020;**39**(9):2695-2701. DOI: 10.1016/j.clnu.2019.12.014

[46] Hiles SA, Lamers F, Milaneschi Y, Penninx BW. Sit, step, sweat; longitudinal associations between physical activity patterns, anxiety and depression. *Psychological Medicine*. 2017;**47**(8):1466-1477. DOI: 10.1017/S0033291716003548

[47] Hong C, Liu Z, Liu Y, Jin Y, Luo Y. The role of smoking, obesity, and physical inactivity in cognitive performance and decline: A multicohort study. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*. 2024;**79**(2):glad232. DOI: 10.1093/gerona/glad232

[48] Stanley N. The physiology of sleep and the impact of ageing. *European Urology Supplements*. 2005;**3**(6):17-23. DOI: 10.1016/S1569-9056(05)80003-X

[49] Vance DE, Wadley VG, Ball KK, Roenker DL, Rizzo M. The effects of physical activity and sedentary behavior on cognitive health in older adults. *Journal of Aging and Physical Activity*. 2005;**13**(3):294-313. DOI: 10.1123/japa.13.3.294

[50] Netz Y, Goldsmith R, Shimony T, Arnon M, Zeev A. Loneliness is associated with an increased risk of sedentary life in older Israelis. *Aging and Mental Health*. 2013;**17**(1):40-47. DOI: 10.1080/13607863.2012.715140

[51] Milaneschi Y, Penninx WJH, B. Depression in older persons with mobility limitations. *Current Pharmaceutical Design*. 2014;**20**(19):3114-3118. DOI: 10.2174/13816128113196660060

[52] Meléndez JC, Delhom I, Bueno-Pacheco A, Reyes MF, Satorres E. Emotional intelligence predicting ego integrity in healthy older adults. *Aging and Mental Health*. 2023;**27**(4):838-843. DOI: 10.1080/13607863.2022.2068125

[53] Greenwood-Hickman MA, Dahlquist J, Cooper J, Holden E, McClure JB, Mettert KD, et al. "They're going to zoom it": A qualitative investigation of impacts and coping strategies during the COVID-19 pandemic among older adults. *Frontiers in Public Health*. 2021;**9**:679976. DOI: 10.3389/fpubh.2021.679976

[54] Megías A, Gutiérrez-Cobo MJ, Gómez-Leal R, Cabello R, Fernández-Berrocal P. Performance on emotional tasks engaging cognitive control depends on emotional intelligence abilities: An ERP study. *Scientific*

Reports. 2017;7(1):16446. DOI: 10.1038/s41598-017-16657-y

[55] Petrides KV, Furnham A. Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality*. 2003;17(1):39-57. DOI: 10.1002/per.466

[56] Mathunjwa M, Shaw I, Moran J, Sandercock GR, Brown GA, Shaw BS. Implementation of a community-based mind–body (Tae-Bo) physical activity programme on health-related physical fitness in rural black overweight and obese women with manifest risk factors for multimorbidity. *International Journal of Environmental Research and Public Health*. 2023;20(15):6463. DOI: 10.3390/ijerph20156463

[57] Hmwe NT, Chan CM, Shayamalie TG. Older people's experiences of participation in mindfulness-based intervention programmes: A qualitative systematic review. *International Journal of Mental Health Nursing*. 2024;33(5):1272-1288. DOI: 10.1111/inm.13350

[58] Kimuna SR. Living arrangements and conditions of older people in Zimbabwe. *African Population Studies*. 2005;20(2):143-163. DOI: 10.11564/20-2-398

[59] Jothikaran TAJ, Meershoek A, Ashok L, Krumeich A. Older adults in traditional and modern living arrangements in southern India: The importance of maintaining a sense of belonging and positive intergenerational exchanges. *Journal of Aging Studies*. 2020;54:100867. DOI: 10.1016/j.jaging.2020.100867

[60] Wagner-Gutiérrez N, Gonzalez SA, Rubio MA, Sánchez-Franco S, Palencia-Pérez L, Blanco M, et al. Quality of life,

mental health and social relationships among older adults participating in the Recreovia physical activity community program. *International Journal for Equity in Health*. 2025;24(1):145. DOI: 10.1186/s12939-025-02476-5

[61] Machinga M. Religion, health, and healing in the traditional Shona culture of Zimbabwe. *Practical Matters*. 2011;4:1-8

[62] Williams L. Building an ecology of resilience through religious practice and community in northern Uganda. *Civil Wars*. 2022;24(2-3):305-327. DOI: 10.1080/13698249.2022.2092685

[63] Thundiparampil SJ. Empowerment of emotional and spiritual intelligence of the middle aged in coping mid-life transitions to promote active aging. *Asian Journal of Nursing Education and Research*. 2024;14(4):288-294. DOI: 10.52711/2349-2996.2024.00056

[64] Goodrick W, Pelser A. The greying of a rainbow nation: Policy responses to the implications of population ageing in South Africa. *African Population Studies*. 2014;28(1):648-660. DOI: 10.11564/28-0-522-648-660

[65] McQuaid K, Esson J, Gough KV, Wignall R. Navigating old age and the urban terrain: Geographies of ageing from Africa. *Progress in Human Geography*. 2021;45(4):814-833. DOI: 10.1177/0309132520948956

[66] Møller V, Ferreira M. Successful ageing in South Africa: Opportunity structures and subjective wellbeing. *Southern African Journal of Gerontology*. 1992;1(1):5-8. DOI: 10.21504/sajg.v1i1.10

[67] Madigele TJ. Socioeconomic determinants of successful aging in southern Africa: Socio-theological gerontology. *Religion*

and Development. 2024;**3**:34-60.
 DOI: 10.30965/27507955-20230033

[68] Kolbe-Alexander TL, Pacheco K, Tomaz SA, Karpul D, Lambert EV. The relationship between the built environment and habitual levels of physical activity in south African older adults: A pilot study. *BMC Public Health*. 2015;**15**(1):518. DOI: 10.1186/s12889-015-1853-8

[69] Pretorius E, Moonsamy S. Culture and mental health in South Africa. In: *The Routledge International Handbook of Race, Culture and Mental Health*. London, UK: Routledge; 2020. pp. 470-481

[70] Kelly G, Mrengqwa L, Geffen L. "They don't care about us": Older people's experiences of primary healthcare in Cape Town, South Africa. *BMC Geriatrics*. 2019;**19**(1):98. DOI: 10.1186/s12877-019-1116-0

[71] Peltzer K, Phaswana-Mafuya N. Physical inactivity and associated factors in older adults in South Africa: Geriatrics. *African Journal for Physical Health Education, Recreation and Dance*. 2012;**18**(3):447-460. Available from: <https://hdl.handle.net/20.500.11910/3312>

[72] Dev RD, Ismail IA, Omar-Fauzee MS, Abdullah MC, Soh KG. Emotional intelligence as a potential underlying mechanism for physical activity among Malaysian adults. *American Journal of Health Sciences*. 2012;**3**(3):211. DOI: 10.19030/ajhs.v3i3.7140

[73] Kelly G, Black R. The potential value of a geographic information system for public service planning for older people in the African region. *International Journal of Care and Caring*. 2023;**7**(2):364-372. DOI: 10.1332/239788221X16655372907511

[74] Stevenson E, Mutebi N. Healthy Ageing and Care for Older Populations. 2024. Available from: <https://post.parliament.uk/healthy-ageing-and-care-for-older-populations/> [Accessed: July 10, 2025]

[75] Higgs P, Gilleard C. Generational conflict, consumption and the ageing welfare state in the United Kingdom. *Ageing and Society*. 2010;**30**(8):1439-1451. DOI: 10.1017/S0144686X10000425

[76] Nyqvist F, Cattani M, Andersson L, Forsman AK, Gustafson Y. Social capital and loneliness among the very old living at home and in institutional settings: A comparative study. *Journal of Aging and Health*. 2013;**25**(6):1013-1035. DOI: 10.1177/0898264313497508

[77] Ikpeme M, Pang D, Hoveling L. Physical activity determinants in older people: An analysis of the UK understanding society wave 2. *European Journal of Public Health*. 2021;**31**(Suppl. 3):ckab164.370. DOI: 10.1093/eurpub/ckab164.370

[78] Sartini C, Morris RW, Whincup PH, Wannamethee SG, Ash S, Lennon L, et al. Association of maximum temperature with sedentary time in older British men. *Journal of Physical Activity and Health*. 2017;**14**(4):265-269. DOI: 10.1123/jpah.2016-0468

[79] Wu YT, Luben R, Wareham N, Griffin S, Jones AP. Weather, day length and physical activity in older adults: Cross-sectional results from the European Prospective Investigation into Cancer and Nutrition (EPIC) Norfolk Cohort. *PLoS ONE*. 2017;**12**(5):e0177767. DOI: 10.1371/journal.pone.0177767

[80] Narushima M, Liu J, Diestelkamp N. Lifelong learning in active ageing discourse: Its conserving effect on wellbeing, health and vulnerability.

- Ageing and Society. 2018;**38**(4):651-675. DOI: 10.1017/S0144686X16001136
- [81] Delhom I, Satorres E, Meléndez JC. Emotional intelligence intervention in older adults to improve adaptation and reduce negative mood. *International Psychogeriatrics*. 2022;**34**(1):79-89. DOI: 10.1017/S1041610220003579
- [82] O’Doherty M, Cunningham C, Neill RD, Tully MA. The association of resilience and physical activity in older adults: Cross-sectional analyses from the NICOLA study. *Journal of Public Health*. 2024;1-8. DOI: 10.1007/s10389-024-02274-3
- [83] Wilson CA, Saklofske DH. The relationship between trait emotional intelligence, resiliency, and mental health in older adults: The mediating role of savouring. *Aging and Mental Health*. 2018;**22**(5):646-654. DOI: 10.1080/13607863.2017.1292207
- [84] Liang Y, Huo M, Kennison R, Zhou R. The role of cognitive control in older adult cognitive reappraisal: Detached and positive reappraisal. *Frontiers in Behavioral Neuroscience*. 2017;**11**:27. DOI: 10.3389/fnbeh.2017.00027
- [85] Nashiro K, Sakaki M, Mather M. Age differences in brain activity during emotion processing: Reflections of age-related decline or increased emotion regulation. *Gerontology*. 2012;**58**(2):156-163. DOI: 10.1159/000328465
- [86] Fourie M, Gildenhuis GM, Shaw I, Shaw BS, Toriola AL, Goon DT. Effects of a mat Pilates program on flexibility in elderly women. *Medicina dello Sport*. 2013;**66**(4):545-543
- [87] Hazlett-Stevens H, Singer J, Chong A. Mindfulness-based stress reduction and mindfulness-based cognitive therapy with older adults: A qualitative review of randomized controlled outcome research. *Clinical Gerontologist*. 2019;**42**(4):347-358. DOI: 10.1080/07317115.2018.1518282
- [88] Robin N, Toussaint L, Sinnapah S, Hue O, Coudeville GR. Beneficial influence of mindfulness training promoted by text messages on self-reported aerobic physical activity in older adults: A randomized controlled study. *Journal of Aging and Physical Activity*. 2019;**28**(3):406-414. DOI: 10.1123/japa.2019-0002
- [89] Parra DC, Wetherell JL, Van Zandt A, Brownson RC, Abhishek J, Lenze EJ. A qualitative study of older adults’ perspectives on initiating exercise and mindfulness practice. *BMC Geriatrics*. 2019;**19**(1):354. DOI: 10.1186/s12877-019-1375-9
- [90] Lafrance Robinson A, McCague EA, Whissell C. “That chair work thing was great”: A pilot study of group-based emotion-focused therapy for anxiety and depression. *Person-Centered & Experiential Psychotherapies*. 2014;**13**(4):263-277. DOI: 10.1080/14779757.2014.910131
- [91] Yeo YTT, Chow JYA, Goh YS. Exploring the experiences of community-dwelling older adults participating in group interaction programs: A qualitative Meta-synthesis. *Journal of Clinical Nursing*. 2024;1-23. DOI: 10.1111/jocn.17563
- [92] Doughty K. Walking together: The embodied and mobile production of a therapeutic landscape. *Health and Place*. 2013;**24**:140-166. DOI: 10.1016/j.healthplace.2013.08.009
- [93] Izumi BT, Schulz AJ, Mentz G, Israel BA, Sand SL, Reyes AG, et al. Leader behaviors, group cohesion, and participation in a walking group

program. *American Journal of Preventive Medicine*. 2015;**49**(1):41-49. DOI: 10.1016/j.amepre.2015.01.019

[94] Fong ZH, Tan SH, Mahendran R, Kua EH, Chee TT. Arts-based interventions to improve cognition in older persons with mild cognitive impairment: A systematic review of randomized controlled trials. *Aging and Mental Health*. 2021;**25**(9):1605-1617. DOI: 10.1080/13607863.2020.1786802

[95] Pearce E. Participants' perspectives on the social bonding and well-being effects of creative arts adult education classes. *Arts & Health*. 2017;**9**(1):42-59. DOI: 10.1080/17533015.2016.1193550

[96] Watson B, Das A, Maguire S, Fleet G, Punamiya A. The little intervention that could: Creative aging implies healthy aging among Canadian seniors. *Aging and Mental Health*. 2024;**28**(2):307-318. DOI: 10.1080/13607863.2023.2246416

[97] Merriam SB, Kee Y. Promoting community wellbeing: The case for lifelong learning for older adults. *Adult Education Quarterly*. 2014;**64**(2):128-144. DOI: 10.1177/0741713613513633

[98] Ige-Elegbede J, Pilkington P, Gray S, Powell J. Barriers and facilitators of physical activity among adults and older adults from Black and Minority Ethnic groups in the UK: A systematic review of qualitative studies. *Preventive Medicine Reports*. 2019;**15**:100952. DOI: 10.1016/j.pmedr.2019.100952

[99] Odukoya OO, Odediran OO, Rogers CR, Ogunsola F, Okuyemi KS. Exploring the barriers and facilitators towards physical activity among church members in Lagos, Nigeria: A qualitative study. *African Health Sciences*. 2023;**23**(2):572-581. DOI: 10.4314/ahs.v23i2.66

[100] Casanova G, Weil J, Cerqueira M. The evolution of universities of the third age around the world: A historical review. *Gerontology and Geriatrics Education*. 2024;**45**(3):483-498. DOI: 10.1080/02701960.2023.2231375

[101] Fortune D, Butler B. Keeping isolation and loneliness at bay: How community centres can support belonging as we age. *Leisure/Loisir*. 2025;**49**(1):1-24. DOI: 10.1080/14927713.2023.2271949

[102] Portacolone E, Johnson JK, Halpern J, Kotwal A. Seeking a sense of belonging. *Generations*. 2020;**44**(3):1-8

[103] Estabrooks PA, Smith-Ray RL, Almeida FA, Hill J, Gonzales M, Schreiner P, et al. Move more: Translating an efficacious group dynamics physical activity intervention into effective clinical practice. *International Journal of Sport and Exercise Psychology*. 2011;**9**(1):4-18. DOI: 10.1080/1612197X.2011.563123

[104] Opia FN, Kayode A. Culturally sensitive interventions for mental health in vulnerable populations: Bridging gaps in care. *International Journal of Research Publication and Reviews*. 2025;**6**(1):2984-2997. DOI: 10.55248/gengpi.6.0125.0507

[105] Shaw BS, Shaw I, Brown GA. Self-reported dietary intake following endurance, resistance and concurrent endurance and resistance training. *Journal of Sports Science and Medicine*. 2008;**7**(2):255-259

[106] Klainin-Yobas P, Kowitlawakul Y, Lopez V, Tang CT, Hoek KE, Gan GL, et al. The effects of mindfulness and health education programs on the emotional state and cognitive function of elderly individuals with mild cognitive impairment: A randomized controlled

- trial. *Journal of Clinical Neuroscience*. 2019;**68**:211-217. DOI: 10.1016/j.jocn.2019.05.031
- [107] Stewart AL, Grossman M, Bera N, Gillis DE, Sperber N, Castrillo M, et al. Multilevel perspectives on diffusing a physical activity promotion program to reach diverse older adults. *Journal of Aging and Physical Activity*. 2006;**14**(3):270-287. DOI: 10.1123/japa.14.3.270
- [108] Shaw I, Cronje M, Shaw BS. Group-based exercise as a therapeutic strategy for the improvement of mental outcomes in mild to moderate Alzheimer's patients in low resource care facilities. *Asian Journal of Sports Medicine*. 2021;**12**(1):1-6. DOI: 10.5812/asjms.106593
- [109] Hunter RH, Sykes K, Lowman SG, Duncan R, Satariano WA, Belza B. Environmental and policy change to support healthy aging. *Journal of Aging & Social Policy*. 2011;**23**(4):354-371. DOI: DOI. 10.1080/08959420.2011.605642
- [110] Karimi L, Leggat SG, Bartram T, Rada J. The effects of emotional intelligence training on the job performance of Australian aged care workers. *Health Care Management Review*. 2020;**45**(1):41-51. DOI: 10.1097/HMR.0000000000000200
- [111] Kemp CL, Bender AA, Ciofi J, Craft Morgan J, Burgess EO, Duong S, et al. Meaningful engagement among assisted living residents with dementia: Successful approaches. *Journal of Applied Gerontology*. 2021;**40**(12):1751-1757. DOI: 10.1177/0733464821996866
- [112] Arnone R, Cascio MI, Parenti I. The role of emotional intelligence in health care professionals burnout. *European Journal of Public Health*. 2019;**29**(Suppl. 4):ckz186-553. DOI: 10.1093/eurpub/ckz186.553
- [113] Kumari RB. Determinants of elderly well-being in Europe and Asia: A multidimensional review. *International Journal of Innovative Science and Research Technology*. 2025;**10**(4):3507-3514. DOI: 10.38124/ijisrt/25apr1737
- [114] Suyono H. Integrating the elderly in society with lifelong learning programmes: Indonesian experiences. In: *Education for the Elderly in the Asia Pacific*. Singapore: Springer Nature Singapore; 2021. pp. 205-217
- [115] Galvez-Hernandez P, Shankardass K, Puts M, Tourangeau A, Gonzalez-de Paz L, Gonzalez-Viana A, et al. Mobilizing community health assets through intersectoral collaboration for social connection: Associations with social support and well-being in a nationwide population-based study in Catalonia. *PLoS ONE*. 2025;**20**(3):e0320317. DOI: 10.1371/journal.pone.0320317
- [116] Hanna GP, Noelker LS, Bienvenu B. The arts, health, and aging in America: 2005-2015. *The Gerontologist*. 2015;**55**(2):271-277. DOI: 10.1093/geront/gnu183
- [117] De Figueiredo Queiros MM, Fernández-Berrocal P, Extrema N, Queirós PS. Actividad física en la tercera edad: Análisis de sus relaciones con la Inteligencia Emocional Percibida y los estilos de respuesta A la depresión. *Ansiedad Y Estrés*. 2006;**12**:293-303
- [118] Dubnov G, Berry EM. Physical activity and mood. The endocrine connection. In: *Endocrinology of Physical Activity and Sport*. 2nd ed. Totowa, NJ: Humana Press; 2013. pp. 405-415

- [119] Guskowska M, Guskowska M. Wpływ ćwiczeń fizycznych na poziom leku i depresji oraz stany nastroju [Effects of exercise on anxiety, depression and mood]. *Psychiatria Polska*. 2004;**38**(4):611-620
- [120] Bernstein EE, McNally RJ. Acute aerobic exercise helps overcome emotion regulation deficits. *Cognition and Emotion*. 2017;**31**(4):834-843. DOI: 10.1080/02699931.2016.1168284
- [121] Ali HS, Khanmohammadi R, Arabameri E, Shaw I, Shaw BS. Effect of Baduanjin Qigong and transcranial direct current stimulation on quality of sleep and disease impact in elderly patients with fibromyalgia: A randomised, sham-controlled study. *Clinical and Experimental Rheumatology*. 2025;**43**:1040-1048. DOI: 10.55563/clinxprheumatol/4e5i45
- [122] Talley G, Shelley-Tremblay J. The relationship between mindfulness and sleep quality is mediated by emotion regulation. *Psychiatry International*. 2020;**1**(2):42-66. DOI: 10.3390/psychiatryint1020007
- [123] Tashjian SM, Goldenberg D, Galván A. Neural connectivity moderates the association between sleep and impulsivity in adolescents. *Developmental Cognitive Neuroscience*. 2017;**27**:35-44. DOI: 10.1016/j.dcn.2017.07.006
- [124] Shaw I, Shaw B, Brown G, Shariat A. Review of the role of resistance training and musculoskeletal injury prevention and rehabilitation. *International Journal of Clinical and Experimental Medicine*. 2016;**2016**:1-5
- [125] Collins H, Booth JN, Duncan A, Fawknor S, Niven A. The effect of resistance training interventions on 'The Self' in Youth: A systematic review and meta-analysis. *Sports Medicine - Open*. 2019;**5**(1):29. DOI: 10.1186/s40798-019-0205-0
- [126] Dionigi R. Resistance training and older adults' beliefs about psychological benefits: The importance of self-efficacy and social interaction. *Journal of Sport and Exercise Psychology*. 2007;**29**(6):723-746. DOI: DOI.org/10.1123/jsep.29.6.723
- [127] Jette AM, Rooks D, Lachman M, Lin TH, Levenson C, Heislein D, et al. Home-based resistance training: Predictors of participation and adherence. *The Gerontologist*. 1998;**38**(4):412-421. DOI: 10.1093/geront/38.4.412
- [128] Shaw I, Shaw BS, Brown GA. Concurrent training and pulmonary function in smokers. *International Journal of Sports Medicine*. 2011;**32**(10):776-780. DOI: 10.1055/s-00031-1277214
- [129] Shaw BS, Shaw I, Mamen A. Contrasting effects in anthropometric measures of total fatness and abdominal fat mass following endurance and concurrent. *Journal of Sports Medicine and Physical Fitness*. 2010;**50**(2):207-213
- [130] Fahmi PR, Parhan P, Alieffirdho ZM, Arief SM. Psychological impact of aerobic and resistance exercise in patients with heart disease. *Competitor: Jurnal Pendidikan Keolahragaan*. 2024;**16**(3):992-997. DOI: 10.26858/cjpkov16i3.67936
- [131] Schonert-Reichl KA, Oberle E, Lawlor MS, Abbott D, Thomson K, Oberlander TF, et al. Enhancing cognitive and social-emotional development through a simple-to-administer mindfulness-based school program for elementary school children: A randomized controlled

trial. *Developmental Psychology*. 2015;**51**(1):52-66. DOI: 10.1037/a0038454

[132] Barragan C. Social relationships and the importance of community-based fitness programs (CBFP). *Journal of Women & Aging*. 2021;**33**(4):428-441. DOI: 10.1080/08952841.2021.1915685

[133] Slavin M. Towards growth-focused physical activity: Qualitative evaluation of a better future. *Journal of Clinical Exercise Physiology*. 2024;**13**(s1):16. DOI: 10.31189/2165-7629-13-s1.16

[134] Shandu NM, Mathunjwa ML, Shaw I, Shaw BS. Exercise effects on health-related quality of life (HRQOL), muscular function, cardiorespiratory function, and body composition in smokers: A narrative review. *International Journal of Environmental Research and Public Health*. 2023;**20**(19):6813. DOI: 10.3390/ijerph20196813

[135] Rusch A. Artificial emotional intelligence's potential in improving social wellness of older adults. *Proceedings of the AAAI Symposium Series*. 2025;**5**(1):293-295. DOI: 10.1609/aaaiss.v5i1.35603

[136] Sampedro-Piquero P, Alvarez-Suarez P, Begega A. Coping with stress during aging: The importance of a resilient brain. *Current Neuropharmacology*. 2018;**16**(3):284-296. DOI: 10.2174/1570159X15666170915141610

[137] Joo JH, Bone L, Forte J, Kirley E, Lynch T, Aboumatar H. The benefits and challenges of established peer support programmes for patients, informal caregivers, and healthcare providers. *Family Practice*. 2022;**39**(5):903-912. DOI: 10.1093/fampra/cmac004

[138] Fernández-Berrocal P, Checa P. Editorial: Emotional intelligence and cognitive abilities. *Frontiers in Psychology*. 2016;**7**:955. DOI: 10.3389/fpsyg.2016.00955

[139] Morgan SP, Lengacher CA, Seo Y. A systematic review of breathing exercise interventions: An integrative complementary approach for anxiety and stress in adult populations. *Journal of Holistic Nursing: Official Journal of the American Holistic Nurses' Association*. 2024;8980101241273860. DOI: 10.1177/08980101241273860

Causal Structure of Healthy Longevity by Sedentary Behaviors in Elderly Residents in Japan

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Abstract

This research aims to clarify the causal structure of healthy longevity as influenced by sedentary behaviors among elderly residents. In September 2001, 16,462 elderly residents of suburban Tokyo were surveyed by mail using a self-administered questionnaire. The cohort survey was conducted three times over 6 years, tracking the survival of 8162 individuals from the third year onward to confirm the death dates of 278 men and 160 women up to 6 years later. Their bedridden status was verified 3 years later. Sedentary status was defined as going out less frequently and interacting less with neighbors. Less frequent outings and reduced communication with neighbors likely led to fewer days of survival and a greater need for long-term care. In other words, healthy longevity has declined after 3 years. Sedentary behaviors are also influenced by mental and physical health, which are shaped by lifestyle habits, including diet, and supported by socioeconomic status. The fundamental factors for healthy longevity include a favorable socioeconomic status. To reduce sedentary lifestyles and promote long-term healthy longevity, we must consider the underlying socioeconomic status while providing health support that encourages positive lifestyle habits and enhances mental and physical well-being.

Keywords: sedentary behaviors, healthy longevity, socioeconomic status, lifestyle habits, aged people

1. Introduction

Considerable attention should be directed toward healthy longevity in a rapidly aging country like Japan. Healthy longevity alleviates the burden of long-term care and helps stabilize medical and long-term care costs. Most importantly, individuals must maintain a high quality of life and live comfortably [1]. In response to these challenges, Japan announced the Health Japan Plan 21 for healthy longevity in 2000 [2]. This plan outlines strategies to promote oral hygiene, encourage a balanced diet, and implement measures to support healthy lifestyle habits, including smoking cessation.

Various factors have been reported to relate to survival or the prevention of the need for long-term care [3–15]. Follow-up surveys have shown that lifestyle habits

are essential in determining future survival prognosis [3, 4]. BAD (basic activities of daily living) and LIADL (instrumental activities of daily living) have been identified as physical health determinants of survival prognosis [5, 6]. Another factor that affects survival prognosis is mental health, often referred to as subjective health or life satisfaction. Research indicates that the more one maintains a subjective sense of health and life satisfaction based on their personal judgment of their health status, the more likely they are to sustain subsequent survival [7, 8].

This study examines social health, focusing on how often individuals go outside to engage with their neighbors and the implications of sedentary behaviors. In this paper, sedentary behaviors and the frequency of going outside to interact with neighbors, both relevant to social health, represent the same concept.

It has been reported that favorable social health contributes to maintaining survival later [9, 10]. Socioeconomic factors are also crucial for sustaining good health. The annual income of older adults is influenced by their educational achievements from nearly 50 years ago. In a follow-up study of older adults that we conducted, we found that higher annual income significantly correlated with a longer number of survival days [11].

Even if sedentary behaviors are prevented and survival continues, the causal structure, associated socioeconomic status, lifestyle habits, and three health factors remain unclear. The importance of preventing sedentary behaviors for healthy longevity may be evaluated by considering socioeconomic status and the potential for a causal relationship connected to positive lifestyle habits.

This study aims to clarify the structural relationship between sedentary behaviors and socioeconomic status, as well as the physical, mental, and social health and lifestyle of older individuals living in suburban areas of Tokyo. Ultimately, it also elucidates the causal structure of healthy longevity as a dependent latent variable correlated with bedridden status after 3 years and the number of survival days over the following 3 years, categorized by sex. If the hypothesis of this research is validated, it is expected that the importance of preventing sedentary status, a controllable factor, will be emphasized.

At the same time, it is expected to be valuable for providing adequate health support aimed at preventing sedentary conditions, considering the relationship with relevant socioeconomic factors, lifestyle, and mental and physical health.

2. Materials and methods

2.1 Research subject

In September 2001, we conducted a questionnaire survey among all elderly individuals aged 65 and older living at home in suburban Tokyo, specifically in Tama City, Japan. Of the 16,462 eligible elderly individuals, 13,066 (79.4% response rate) provided informed consent to participate in the study and returned the self-administered questionnaire by mail. In September 2004, we mailed an identical second questionnaire to the respondents. A total of 8558 participants responded (505 had moved, 914 were deceased, and 4089 did not respond). We followed up with all participants until August 31, 2007. We analyzed 8162 subjects, including 3851 males and 4311 females aged 65 to 84 during the first survey, who were able to determine their need for long-term care 3 years later. After these 3 years, from 2004 to 2007, we confirmed the survival days and death dates of 278 men and 160 women through the municipal resident registry.

2.2 Research area

The city chosen for this study developed in part as a commuter town to accommodate the growing number of workers and their families in the metropolitan Tokyo area from the 1970s to the 1990s—an era marked by significant economic growth in Japan. Most residents were middle class, and the city's total population was 145,862 as of 2000, with 11.1 percent of the population aged 65 or older.

2.3 The questionnaire and measures

Standardized questions were validated in these surveys to assess health status and lifestyle. In 2001, socioeconomic status was evaluated based on the education level and annual income. Educational attainment was classified into three categories: high school graduates, junior college graduates, those with degrees beyond college, and those who chose not to respond. Annual marital income levels were divided into four categories: less than one million Japanese yen (equivalent to less than US\$6667, with 1 US\$ = 150 yen), less than three million yen, less than seven million yen, and more than seven million yen in 2001.

We included educational background, annual marital income, age, and height as additional variables to analyze socioeconomic status. A certain degree of height growth indicates a prosperous and healthy childhood experience. Height has been reported to be a highly valid indicator of survival prognosis after about half a century [12, 13].

According to Jousilahti et al. [12], a follow-up research involving 31,199 adult residents in Eastern Finland tracked participants for 15 years, indicating that shorter height was associated with a higher overall mortality rate. Similarly, the survival duration of 13,460 older adults in our country's suburbs is being monitored over a three-year period. Consequently, it was reported that the mortality rate of males with a BMI of less than 19 and females shorter than 150 cm was significantly higher than that of the taller group [13].

Healthy lifestyle factors were identified as beneficial habits when significantly associated with the number of survival days over 6 years. Our analyses indicated that the habits linked to increased survival days included daily alcohol consumption, never smoking (even in the past), sleeping less than 9 hours per night, exercising more than once a week, and maintaining a BMI greater than 20. We assessed these healthy lifestyle habits on a scale from 0 to 5, with higher scores indicating a more advisable lifestyle [3].

Our analyses identified healthy dietary habits as follows: consuming meat, eggs, and blue-backed fish 1 to 4 days per week; eating soy foods, dairy products, and fruits more than 3 days a week; consuming vegetables more than 5 days a week; and having breakfast every day. Lastly, we calculated a dietary health score based on the consumption of the four recognized healthy food categories (three points for each type), ranging from 0 to 12, where a higher score indicates healthier nutritional habits [4].

The three health-related dimensions examined in our study included physical, mental, and social health components. Physical health parameters consisted of the basic activities of daily living (BADL) [5] and the instrumental activities of daily living (IADL) [6]. Three questions assessed the BADL score: "Can you go to the toilet by yourself?" "Can you take a bath by yourself?" and "Can you walk outside?" Individuals received one point for each function they could perform, with overall scores ranging from 0 to 3, where higher scores indicated a greater level of basic activity competence. The IADL score was measured through five questions related to instrumental activities: "Can you buy daily necessities by yourself?" "Can you cook daily meals by yourself?" "Can you deposit and

withdraw money in a bank account?” “Can you complete documents related to insurance and pensions?” and “Can you read books and newspapers?” [6]. Since the IADL was scored similarly to the BADL, total scores ranged from 0 to 5, with higher scores indicating a greater capability in instrumental activities.

Mental health was self-reported as a subjective health measure in 2001. The question was, “Do you think you are healthy?” There were four choices: very healthy, moderately healthy, not so healthy, and not healthy [7]. The life satisfaction question was, “Are you satisfied with your daily life?” There were three choices: very satisfied, moderately satisfied, and unsatisfied. Scores ranged from 1 to 3 [8].

Social health was evaluated using factors such as going outside and communicating with the neighborhood. The question investigated the frequency of going outside: “How often do you go outside, including around your neighborhood?” Responses ranged from less than once a month to more than 3 to 4 times a week [9]. Communication within the neighborhood was assessed by asking, “How often do you communicate with your friends or neighbors?” Scores varied from seldom and once a month to 3 to 4 times a week and almost every day, utilizing a scale from 1 to 4 [10].

The number of survival days for the dependent variable was evaluated over 3 years, beginning in 2004, while taking into account the stability of the survival rate. The level of bedridden status was employed to assess the health conditions of the elderly 3 years later. This assessment used a public tool developed by the Japanese Ministry of Health, Labour, and Welfare. The tool features six levels, ranging from the least severe (requiring mild support) to the most severe (requiring comprehensive care). In our analysis, a respondent who received no care scored zero, a respondent assigned to the least severe level scored one, and a respondent assigned to the most severe level scored six. The independent variable, “healthy longevity” (denoted by a latent variable), was defined as a latent variable that utilized the number of survival days after 3 years over the next 6 years and the bedridden status after 3 years as observational variables.

2.4 Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) and AMOS Version 28.0 software (IBM, New York, USA). The relationships between categories were determined using the chi-square test or the Kendall τ test, and quantitative comparisons were performed using a one-way analysis of variance. To clarify the causal structure of the hypothetical model with latent variables, covariance structure analysis [16, 17] was employed. The latent variables used in the model were identified through exploratory factor analysis conducted with the varimax rotation method and the maximum likelihood estimation approach. In the causal structure analysis, the goodness-of-fit indices of the model included NFI (Normed Fit Index), IFI (Incremental Fit Index), and RMSEA (root mean square error of approximation) [16, 17]. All estimates were standardized constants, and the statistically significant difference was set at 5% or less.

3. Results

3.1 Connection between the frequency of going out, communication with neighbors, survival, and the level of care needed

The table position shows the survey subjects by gender and age (Table 1).

	65–69	70–74	75–79	80–84	Total
Men	1858	1097	604	292	3851
	48.2%	28.5%	15.7%	7.6%	100.0%
Women	1823	1186	872	430	4311
	42.3%	27.5%	20.2%	10.0%	100.0%
Total	3681	2283	1476	722	8162
	45.1%	28.0%	18.1%	8.8%	100.0%

Table 1.
Total subjects by age and sex.

It was shown that more frequent outings are characterized as non-sedentary behavior, which improves the level of care needed after 3 years, while at the same time, longer survival days post-three years are observed (Table 2). Additionally, the frequency of communication with neighbors was similar to that of going outside (Table 2). Therefore, the frequency of going outside and communicating with neighbors serve as strong health indicators that can predict essential survival outcomes and the necessary level of care.

3.2 The relationship between sedentary behaviors and explanatory factors

The relationship among the frequency of going outside, the frequency of communication with neighbors, and the explanatory factors used in this survey was nearly universally significant, indicating a strong association (Tables 2 and 3).

The only factor that did not show a statistically significant association with the frequency of going out was the annual marital income of men. The factors that were not significantly associated with the frequency of interaction with neighbors were men's educational attainment and BADL. In women, there was a statistically significant association among all explanatory variables concerning both the frequency of going out and the frequency of interaction with neighbors, which are related to sedentary behavior. Both the significance test for categories and the one-way analysis of variance for continuous variables indicated similar significance test results.

In this way, while sedentary behaviors is statistically significantly associated with healthy longevity and other explanatory factors, its causal structure remains unclear. Therefore, we used covariance structure analysis to examine the causal relationships of sedentary behaviors and the factors influencing healthy longevity.

3.3 Causal structure with various factors for healthy longevity

3.3.1 Latent variables for covariance structure analysis through factor analysis

This analysis utilized the maximum likelihood method and Promax oblique rotation to conduct an exploratory factor analysis (Figure 1).

The factor analysis indicated that the first factor included IADL, BADL, and bedridden status. The number of survival days and the bedridden status was identified as "Healthy Longevity" as dependent latent variables. The observed variables BADL and IADL acted as latent variables for physical health.

	Men				Women			
	Going outside				Going outside			
	Less than once a month	More than once a month	Three to four times a week		Less than once a month	More than once a month	Three to four times a week	
Survival days	976.0 (223.5)	1013.6 (183.2)	1034.7 (132.7)		1025.5 (161.1)	1040.5 (121.5)	1045.7 (110.5)	
Bedridden status	35 (26.9%)	32 (13.7%)	114 (3.5%)		57 (34.5%)	51 (17.0%)	195 (5.7%)	
Non-bed ridden status	95 (73.1%)	202 (86.3%)	3163 (96.5%)		108 (65.5%)	249 (83.0%)	3245 (94.3%)	
Educational background								
Graduated from senior high school	44 (36.7%)	66 (29.7%)	753 (23.7%)		89 (58.9%)	184 (63.4%)	1621 (49.6%)	
Graduated from vocational school	42 (35.0%)	85 (38.3%)	1033 (32.5%)		48 (31.8%)	94 (32.4%)	1440 (44.0%)	
Graduated from college	34 (28.3%)	71 (32.0%)	1389 (43.7%)		14 (9.3%)	12 (4.1%)	209 (6.4%)	
Yearly income								
< 1 million yen	6 (5.1%)	9 (4.1%)	59 (1.9%)		28 (20.7%)	49 (18.5%)	322 (10.4%)	
1 million-3 million yen	61 (52.1%)	103 (46.8%)	998 (31.7%)	P < 0.01	63 (46.7%)	140 (52.8%)	1392 (44.9%)	P < 0.01
3 million-7 million yen	45 (38.5%)	97 (44.1%)	1709 (54.35)		39 (28.9%)	66 (24.9%)	1188 (38.3%)	
> 7 million yen	5 (4.3%)	11 (5.0%)	384 (12.2%)		5 (3.7%)	10 (3.8%)	200 (6.4%)	
Subjective health								
Unhealthy	35 (26.7%)	10 (4.2%)	100 (3.0%)		46 (27.2%)	37 (11.8%)	113 (3.2%)	
Not so healthy	29 (22.1%)	53 (22.2%)	329 (9.8%)	P < 0.01	52 (30.8%)	74 (23.6%)	471 (13.3%)	P < 0.01
Almost healthy	58 (44.3%)	148 (61.9%)	2291 (68.4%)		62 (36.7%)	178 (56.9%)	2438 (68.8%)	
Very healthy	9 (6.9%)	28 (11.7%)	628 (18.8%)		9 (5.3%)	24 (7.7%)	520 (14.7%)	

	Men				Women			
	Going outside				Going outside			
	Less than once a month	More than once a month	Three to four times a week		Less than once a month	More than once a month	Three to four times a week	
Life satisfaction								
Unsatisfied	34 (26.4%)	37 (15.5%)	280 (8.4%)		29 (17.2%)	47 (15.4%)	233 (6.6%)	
Moderately satisfied	43 (33.3%)	71 (29.8%)	665 (20.0%)	P < 0.01	72 (42.6%)	97 (31.8%)	778 (22.1%)	P < 0.01
Very unsatisfied	52 (40.3%)	130 (54.6)	2374 (71.5%)		68 (40.2%)	161 (52.8%)	2508 (71.3%)	
Height (cm)	163.6 (6.6)	164.2 (5.5)	163.8 (6.7)	P < 0.01	150.5 (7.5)	151.1 (5.4)	151.5 (6.0)	P < 0.01
Age	71.1 (5.2)	70.5 (4.8)	71.0 (4.8)	P < 0.01	72.5 (5.6)	71.5 (5.1)	71.1 (4.9)	P < 0.01
Basic activities daily living	2.9 (0.4)	3.0 (0.2)	2.9 (0.2)	P < 0.01	2.8 (0.5)	2.9 (0.3)	2.9 (0.3)	P < 0.01
Instrumental activities daily living	4.5 (1.1)	4.8 (0.6)	4.8 (0.5)	P < 0.01	4.4 (1.3)	4.8 (0.7)	4.9 (0.5)	P < 0.01
Lifestyle scores	2.6 (1.1)	2.9 (1.1)	3.1 (1.1)	P < 0.01	2.5 (1.0)	2.8 (1.0)	3.0 (1.0)	P < 0.01
Diet scores	3.8 (2.5)	3.9 (2.3)	4.0 (2.3)	P < 0.01	4.2 (2.4)	4.4 (2.2)	4.6 (2.3)	P < 0.01
() indicates standard deviation.								

Table 2.
Correlational factors by going outside by sex.

	Men					Women				
	Communication with neighbors					Communication with neighbors				
	Seldom	Once a month	Three to four times a week	Almost every day		Seldom	Once a month	Three to four times a week	Almost every day	
Survival days	1014.9(174.2)	1042.0(115.4)	1034.5(133.0)	1050.1(85.8)	P < 0.01	1033.2(141.3)	1050.1(95.1)	1045.6(112.4)	1048.6(99.0)	P < 0.01
Bed ridden status	102(8.7%)	26(2.9%)	40(3.7%)	8(1.7%)	P < 0.01	136(15.8%)	58(7.3%)	85(5.2%)	29(4.9%)	P < 0.01
Non of bed ridden status	1066(91.3%)	872(97.1%)	1029(96.3%)	461(98.3)		727(84.2%)	733(92.7%)	1540(94.8%)	563(95.1%)	
Educational Background										
Graduated from senior high school	299(26.4%)	170(19.3%)	251(24.6%)	133(29.4%)		454(56.1%)	394(52.1%)	754(48.3%)	278(50.0%)	
Graduated from vocational school	405(35.7%)	295(33.5%)	287(28.2%)	160(35.4%)	P < 0.01	310(38.3%)	320(42.3%)	703(45.0%)	241(43.3%)	P < 0.01
Graduated from college	429(37.9%)	415(47.2%)	481(47.2%)	159(35.2%)		45(5.6%)	42(5.6%)	105(6.7%)	37(6.7%)	
Yealy income										
<1 million yen	34(3.0%)	18(2.1%)	12(1.2%)	11(2.5%)		109(14.4%)	87(12.0%)	144(9.7%)	54(10.3%)	
1 million-3 milion yen	437(39.2%)	252(29.1%)	321(31.4%)	137(30.6%)		381(50.3%)	324(44.8%)	636(43.0%)	250(47.6%)	
3 milion-7 milion yen	552(49.5%)	505(58.2%)	580(56.8%)	203(45.4%)	P < 0.01	234(30.9%)	278(38.5%)	588(39.8%)	187(35.6%)	P < 0.01
>7 million yen	93(8.3%)	92(10.6%)	108(10.6%)	96(21.5%)		33(4.4%)	34(4.7%)	110(7.4%)	34(6.5%)	
Subjective health										
Unhealthy	95(7.0%)	31(3.4%)	12(1.1%)	7(1.5%)		108(12.1%)	30(3.7%)	47(2.8%)	10(1.7%)	
Not so healthy	191(15.9%)	103(11.1%)	88(8.1%)	26(5.5%)	P < 0.01	194(21.7%)	134(16.5%)	206(12.3%)	55(9.1%)	P < 0.01

Men						Women				
Communication with neighbors						Communication with neighbors				
	Seldom	Once a month	Three to four times a week	Almost every day		Seldom	Once a month	Three to four times a week	Almost every day	
Almost healthy	788(65.7%)	646(69.8%)	743(68.7%)	295(62.2%)		523(58.4%)	573(70.4%)	1185(70.7%)	381(63.3%)	
Very healthy	126(10.5%)	145(15.7%)	238(22.0%)	146(30.8%)		71(7.9%)	77(9.5%)	239(14.3%)	156(25.9%)	
Life satisfaction										
Unsatisfied	190(16.0%)	69(7.5%)	65(6.0%)	28(6.0%)		131(14.7%)	64(8.0%)	82(4.9%)	28(4.7%)	
Moderately satisfied	332(27.9%)	210(22.9%)	173(16.1%)	61(13.0%)	P < 0.01	309(34.8%)	226(28.3%)	320(19.2%)	89(14.8%)	P < 0.01
Very unsatisfied	667(56.1%)	638(69.6%)	837(77.9%)	379(81.0%)		449(50.5%)	510(63.8%)	1267(75.9%)	485(80.6%)	
Height(cm)	163.4(6.6)	1626(5.9)	163.9(6.7)	163.8(6.6)	P < 0.01	149.1(10.3)	150.1(5.8)	151.1(6.3)	151.0(6.5)	P < 0.01
Age	72.1(5.7)	71.4(5.6)	70.8(4.8)	70.9(4.9)	P < 0.01	74.2(5.7)	72.9(5.8)	71.3(4.9)	71.5(5.1)	P < 0.01
Basic activities daily living	2.6(0.9)	2.9(0.3)	2.9(0.3)	2.9(0.3)	P < 0.01	2.6(0.7)	2.9(0.4)	2.9(0.3)	2.9(0.4)	P < 0.01
Instrumental activities daily living	3.4(2.0)	4.4(1.2)	4.8(0.6)	4.7(0.8)	P < 0.01	3.4(1.8)	4.3(1.4)	4.9(0.6)	4.8(0.8)	P < 0.01
Lifestyle scores	2.0(1.1)	2.5(1.2)	2.9(1.1)	2.9(1.1)	P < 0.01	2.3(0.99)	2.5(0.98)	2.9(1.0)	2.9(1.0)	P < 0.01
Diet scores	2.9(1.1)	3.4(2.5)	3.6(2.7)	4.0(2.3)	P < 0.01	4.0(2.6)	4.1(2.3)	4.6(2.3)	4.5(2.3)	P < 0.01
() means standard deviation.										

() means standard deviation.

Table 3.
 Correlational factors by communication with neighbors by sex.

	Physical Health	Socioeconomic Status	Mental Health	Life Style	Sedentary Factor
IADL	.691	.056	.140	.204	.199
Bedridden Status	-.629	-.033	-.080	-.291	-.061
BADL	.466	.030	.037	-.008	.046
Educational Background	.006	.717	-.042	.121	.019
Height(cm)	.087	.587	-.001	-.105	-.057
Marital Yearly Income	.005	.433	.189	.066	.080
Age Groups	-.077	-.376	.147	-.370	-.050
Life Satisfaction	.072	.036	.653	.050	.113
Subjective Health	.243	.123	.441	.219	.128
Lifestyle Scores	.067	.099	.157	.401	.127
Survival Days	.110	.018	.031	.269	.001
Diet Scores	.021	-.056	.126	.149	.049
Going Outside	.296	.097	.105	.031	.552
Communication with the Neighbors	.025	-.063	.240	.245	.395

Figure 1.
Results of exploratory factor analysis.

The second factor represents “Socioeconomic Status” and encompasses educational background, yearly marital income, age, and height, classifying it as a latent variable. Subjective health and life satisfaction were defined as “Mental Health.” Lifestyle and diet scores were described as “Lifestyle and Diet Scores.” Communication with the neighborhood and going outside were defined as “Social Health” or “Sedentary Behaviors.”

The cumulative sum of squared loads for the three factors mentioned was 32.5%, and the Cronbach’s Alpha Confidence Coefficient of the “Three Health Factors” was 0.59. However, the “Socioeconomic Status” is notably low at 0.15, and the “Lifestyle scores and Diet Scores” is also low at 0.18.

3.3.2 Structure relationship for healthy longevity

From the hypothetical models inferred using the latent variables obtained through exploratory factor analysis, we identified the model with the highest goodness of fit based on a modified index [16, 17]. Survey items, excluding “Healthy Longevity,” including “Socioeconomic Status,” “Lifestyle Diet Scores,” and the “Three Health Factors,” were surveyed simultaneously. Consequently, each survey item may serve as both a cause and an effect. We examined the direction and strength of cause-and-effect relationships in all possible combinations to clarify causality. Therefore, we analyzed the causal relationships of all combinations and selected the one with the largest standardized estimate. As a result, we positioned “Healthy Longevity” as a dependent latent variable 3 years later, using “Socioeconomic Status,” “Three Health Factors,” and “Lifestyle and Diet Scores” as explanatory latent variables (**Figure 1**).

The goodness-of-fit indices were NFI = 0.791, IFI = 0.797, and RMSEA = 0.040. This approach demonstrated high conformity and was adopted as the final relevant structural diagram based on the literature [16, 17]. Standardized coefficients significantly determined the effects on all of the latent variables. Additionally, the total direct and indirect effects were assessed together. Furthermore, all relationships between latent and observed variables were found to be significant in the Wald test.

3.3.3 Causal structure of explanatory factors on the “Healthy Longevity”

In the comprehensive analysis shown in **Figure 2**, the most effective standardized total impact on “Healthy Longevity” was achieved through the recommended combination of “Three Health Factors” and “Lifestyle and Diet Scores,” based on “Socioeconomic Status.” Furthermore, the standardized direct effect of the “Three Health Factors” on “Healthy Longevity” is 0.80, accounting for 66% of the coefficient of determination for “Healthy Longevity” (**Figure 2**).

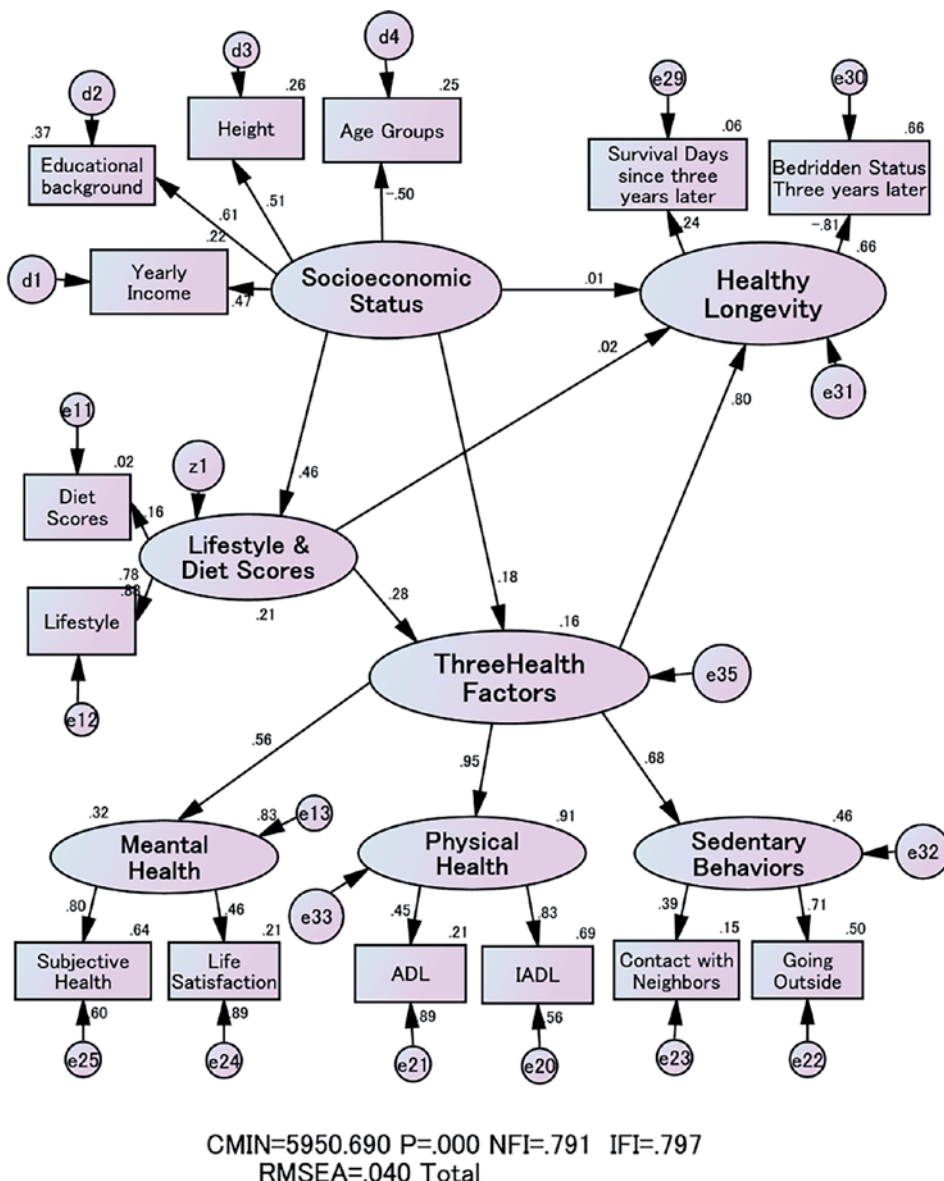


Figure 2.
 The causal structure of “Healthy Longevity,” “Three Health Factors,” “Socioeconomic Status,” “Life Style and Diet Scores,” and “Sedentary Behaviors.”

The analysis of (**Figure 3**) indicates that only 19% of “Healthy Longevity” can be explained by “Sedentary behaviors” alone. Therefore, the final research suggests that healthy longevity depends on a balanced diet, lifestyle habits, and mental, physical, and social health, all of which are influenced by socioeconomic factors, which are essential elements that support health.

3.3.4 Causal structure of the “Lifestyle and Diet Scores” on “Healthy Longevity”

The direct effect of “Socioeconomic Status” on “Lifestyle and Diet Scores” was 0.46, accounting for 21% of the coefficient of determination of “Lifestyle and Diet Scores.” The direct effect on “Healthy Longevity” was 0.02 from the “Lifestyle and Dietary scores.” Finally, the total effect of the “Lifestyle and Diet Scores” on “Healthy Longevity” was the third largest, measured at 0.25 (**Table 4**).

It was clarified that “Socioeconomic Status” and “Lifestyle and Diet Scores” do not directly determine “Healthy Longevity”; instead, they indirectly promote “Three Health Factors” on the path to “Healthy Longevity.” Thus, this study presents a novel research finding: lifestyle habits, including eating habits, do not directly determine healthy life expectancy.

3.3.5. Total effects of explanatory factors on “Healthy Longevity”

The “Three Health Factors” total effect on “Healthy Longevity” was the most significant, measuring 0.80. The “Lifestyle and Diet Scores” total effect on “Healthy Longevity” was recorded at 0.25. Similarly, the total effect of “Socioeconomic Status” was 0.27 (**Table 4**).

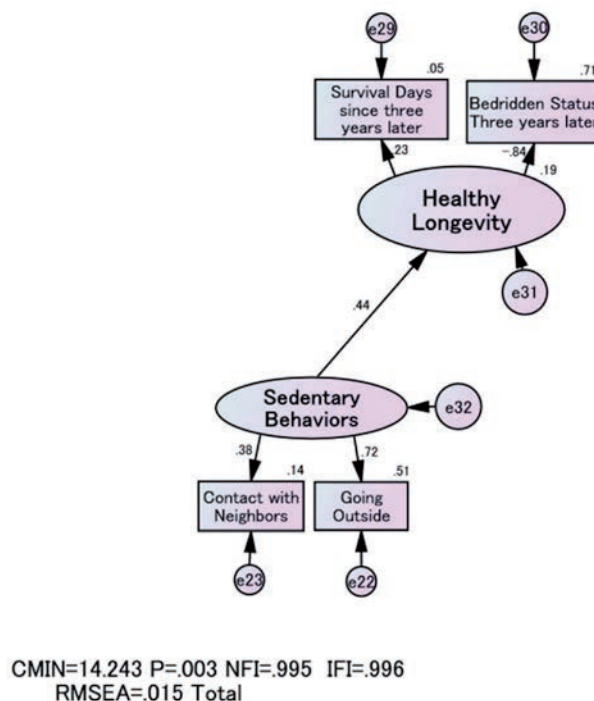


Figure 3.
The Causal Structure of “Healthy Longevity” by the “Sedentary Behavior”.

		Men	Women	Total
Standardized direct effect	“Socioeconomic Status”⇒“Health Longevity”	0.01	0.02	0.02
	“Socioeconomic Status”⇒“Three Health Factors”	0.07	0.18	0.18
	“Socioeconomic Status”⇒“Lifestyle and Diet Scores”	0.38	0.63	0.46
	“Lifestyle and Diet Score”⇒“Health Longevity”	0.04	0.03	0.02
	“Lifestyle and Diet Scores”⇒“Three Health Factors”	0.42	0.36	0.28
	“Three Health Factors”⇒“Healthy Longevity”	0.85	0.75	0.80
Standardized total effect	“Socioeconomic Status”⇒⇒“Healthy Longevity”	0.22	0.34	0.27
	“Lifestyle and Diet scores”⇒⇒“Healthy Longevity”	0.40	0.30	0.25
	“Three Health Factors”⇒⇒“Healthy Longevity”	0.85	0.75	0.80

Table 4.
 Direct and Total Effect on the “Healthy Longevity” by “Three Health Factors”, “Socioeconomic Status” by Sexes.

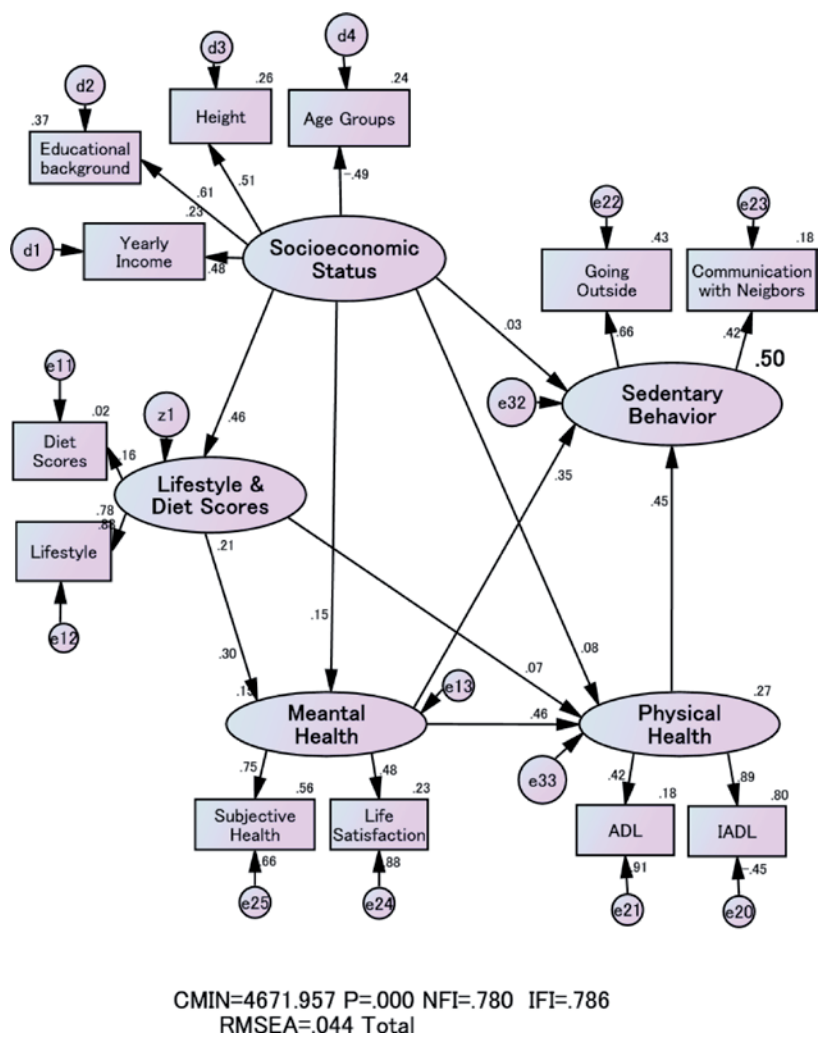


Figure 4.
 The causal structure of “Sedentary behaviors,” “Mental Health,” “Physical Health,” and “Socioeconomic Status.”

The indirect effect of “Socioeconomic Status” on the “Three Health Factors” through “Lifestyle and Dietary Scores” was 0.13 (0.46×0.28). Around 16% of the “Three Health Factors” was explained (**Table 4**).

3.3.6 Total effects of explanatory factors on “Sedentary Behaviors”

In the model analysis of sedentary behaviors, that is, social health, as a dependent latent variable, the relevant structures supported by favorable “Mental Health,” “Physical Health,” and “Lifestyle and Diet Scores” based on “Socioeconomic Status” were consistent and well-fitted. The model in **Figure 4** explains 50% of sedentary behavior.

4. Discussion

4.1 The causal effect of sedentary behaviors on healthy longevity

The study shows that sedentary behaviors, as well as social health, determine healthy life expectancy 3 years later. However, for the first time globally, it has been revealed that the essence of determining healthy life expectancy is indirectly influenced by outstanding mental, physical, and social health. This includes minimizing sedentary behaviors and adopting lifestyle habits supported by favorable socioeconomic factors. The coefficient of determination for healthy longevity was 68%. In contrast, the coefficient of determination specifically for analyzing social health (sedentary behaviors) and healthy longevity was only 19% (**Figure 3**).

Socioeconomic factors form the basis for determining healthy longevity. The causal structure of this determination has been clarified, demonstrating that social health, which encompasses connections with society, is maintained through positive lifestyle habits and related mental and physical elements.

The scientific justification for health support activities that consider socioeconomic factors, lifestyle habits such as diet, and the maintenance of mental and physical health has been clearly established to reduce sedentary behaviors and enhance healthy life expectancy. Ensuring reproducibility is essential.

4.2 The importance of three health factors for overall healthy longevity

The “Three Health Factors” had the most significant overall effect on “Healthy Longevity,” with a total effect of 0.80. This was followed by “Lifestyle and Diet Scores,” which had a total effect of 0.25. The total effect on “Healthy Longevity” from “Socioeconomic Status” is also 0.27. Therefore, this indicates that the effect on “Healthy Longevity” is not directly influenced by “Socioeconomic Status,” but is positioned as a fundamental foundation when considered alongside the results of a previous study [14].

It confirms that the desirability of educational background, a socioeconomic factor, contributes to marital income and the ability to maintain a daily lifestyle while enhancing three health factors, ultimately helping to prevent required care. This suggests a related structure linked to promoting healthy longevity.

In our follow-up study of older adults, we found that higher annual income supported by education correlated with more days of survival. However, a threshold existed in this relationship. Specifically, when the annual income of an elderly couple reached up to 4.5 million yen, the number of days of survival increased as income also increased, but no further correlation was observed beyond that point.

The income threshold for elderly individuals living in rural areas was 2.5 million yen. Among the four economic factors essential for healthy longevity, only annual income can be actively managed [11, 14]. Therefore, reproducibility, along with additional testing, is necessary.

4.3 Recommendations based on research results

Based on the findings of this study, to reduce sedentary lifestyles and increase healthy life expectancy, it is essential to provide health support that enhances both mental and physical well-being, encouraging a positive lifestyle. Additionally, as a foundation for these efforts, health support measures considering socioeconomic status should be systematically and continuously promoted. The following outlines specific measures for this purpose.

4.3.1 Strategies to decrease social isolation and physical inactivity

In this study, we clarified how having fun, setting goals, and feeling satisfied in each person's life lead to physical activity, which supports maintaining ongoing social activities and ultimately promotes healthy longevity. Therefore, systematic and continuous efforts to improve enjoyment and quality of life are necessary. It is expected that individuals taking initiative will encourage voluntary group activities to prevent social isolation and ensure their continuation.

4.3.2 Public responsibility and public health

If we emphasize the significance of individual lifestyle choices as a way to promote healthy longevity, we rely on the concept of personal responsibility for health. Public institutions should primarily support community activities where people can actively engage. This is because there is a public duty to protect the right of people, as guaranteed by the Constitution, to be healthy.

In Japan, the term public health, which has been used by national public institutions since the 2000s, has almost disappeared. Similar trends are spreading among prefectures and local governments. This reflects a shift toward emphasizing self-responsibility rather than public responsibility. Japan's average life expectancy has remained the highest in the world for both men and women, about 80 years after World War II. However, the latest rankings show that the average life expectancy for men continues to decline, dropping to sixth place. Based on the results of this study, we want to confirm that, although lifestyle habits, including individual dietary habits, are essential in maintaining healthy longevity, socioeconomic factors also play a foundational role. Therefore, health support activities involving collaboration between public institutions and residents' organizations are crucial. It is expected that public institutions will systematically implement and sustain such support efforts.

4.4 Future research issues

This survey can only discuss the causal structural effects on "Healthy Longevity" after 3 years. The survey timeframe of the "Three Health Factors," "Socioeconomic Status," and "Life Scores and Diet Scores" was at the same time.

The next step is to clarify the causal structure through follow-up surveys conducted over various research years for all latent variables. Verifying reproducibility

with representative subjects through random sampling and enhancing external validity are significant research challenges. This study's difficulties involve individual self-reports about explanatory factors, except for survival days and the bedridden status. This should be a focus for future research. Additionally, the following study should evaluate the causal structure of healthy longevity after clarifying the objective indices obtained from medical examinations.

The results of this study were made to clarify, through cohort studies, the relationship between sedentary behavior and healthy longevity, as well as the connections among socioeconomic factors, lifestyle habits, and both mental and physical health that contribute to sedentary behavior. Consequently, it was not possible to determine healthy longevity based on the effects of the intervention intended to make sedentary behavior more favorable. Furthermore, no intervention studies focusing on sedentary behavior to elucidate the outcomes related to healthy longevity have been reported in the domestic and international literature.

Additionally, after identifying objective indicators obtained from health checkups, future studies may clarify the causal structure of healthy longevity and its effects through randomized intervention studies aimed at preventing a sedentary lifestyle.

5. Conclusions

To reduce sedentary lifestyles and promote health longevity, we should consider underlying socioeconomic status when providing health support that encourages positive habits and improves mental and physical well-being.

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Author contributions

The author performed all aspects of conceptualization, methodology, validation, formal analysis, review and editing, and funding acquisition. Nakayama and Kubo, who co-authored the paper, contributed to the analysis and writing the paper.

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Conflicts of interest

The authors declare no conflict of interest. The funders had no role in the study's design, data analysis, or interpretation.

Institutional review board statement

The Tama City local government and Tokyo Metropolitan University signed an agreement to protect privacy and confidentiality. Mutual secrecy is strictly enforced. All analysis data are identified by ID only. The survey was conducted on September 16, 2000, with the consent of the Tokyo Metropolitan University Graduate School of Ethics Committee.

Informed consent statement

Informed consent was obtained from the parents of all subjects involved in the study.

Data availability statement

The follow-up data and survey questionnaire in Japan used in this study are available at the address of the first author, T.Hoshi (star@onyx.dti.ne.jp). At the same time, the survey data are registered with UMIN and are available. <https://www.umin.ac.jp/upload/>

Abbreviations

The following abbreviations are used in this manuscript:

BADL	basic activities of daily living
IADL	instrumental activities of daily living
QOL	quality of life
NFI	normed fit index
IFI	incremental fit index
RMSEA	root mean square error of approximation

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References

- [1] Labor Statistics Association. Trends in national hygiene 65 (2018/2019): 82-84. Available from: <https://ndlsearch.ndl.go.jp/books/R000000004-I032347714>
- [2] Sakurai N, Hoshi T. The aim of health Japan 21. *Hokennokagaku*. 2003;**45**:525-557. Available from: <https://ndlsearch.ndl.go.jp/books/R000000004-I6665573>
- [3] Berkman LF, Syme SL. Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*. 1979;**109**:186-204. DOI: 10.1093/oxfordjournals.aje.a112674
- [4] Kodama S, Hoshi T, Kurimori S. Decline in independence after three years and its association with dietary patterns and IADL-related factors in community-dwelling older people: An analysis by age stage and sex. *BMC Geriatrics*. 2021;**21**:1-17. DOI: 10.1186/s12877-021-02332-5
- [5] Branch LG, Katz S, Knipmann K, et al. A prospective study of functional status among community elders. *American Journal of Public Health*. 1984;**74**:266-268. DOI: 10.2105/ajph.74.3.266
- [6] Koyano W, Shibata H, Nakazato K, et al. Measurement of competence. Liability and validity of the TMIG index of competence. *Archives of Gerontology and Geriatrics*. 1991;**13**:103-116. DOI: 10.1016/0167-4943(91)90053-s
- [7] Kaplan GA, Camacho T. Perceived health and mortality: A nine-year follow-up of the human population laboratory cohort. *Journal of Epidemiology*. 1983;**117**:292-304. DOI: 10.1093/oxfordjournals.aje.a113541
- [8] Laura CR, Longdi F, Emmalin B, et al. Death and chronic disease risk associated with poor life satisfaction: A population-based cohort study. *Journal of Epidemiology*. 2019;**188**:323-331. DOI: 10.1093/aje/kwy245
- [9] Seeman TE, Kaplan GA, Knudsen L, et al. Social network ties and mortality among the elderly in the Alameda County study. *Journal of Epidemiology*. 1987;**126**:714-723. DOI: 10.1093/oxfordjournals.aje.a114711
- [10] Breslow L. Health and ways of living. In: *Health and Ways of Living: The Alameda County Study*. New York: Oxford University Press; 1983. Available from: https://openlibrary.org/books/OL3488287M/Health_and_ways_of_living
- [11] Hoshi T. Causal Structure for the Healthy Longevity Based on the Socioeconomic Status, Healthy Diet and Lifestyle, and Three Health Dimensions, in Japan. London: Intechopen; 2024. pp. 49-67. DOI: 10.5772/intechopen.111910
- [12] Jousilahti P, Tuomilehto J, Vartiainen E, et al. Relation of adult height to cause-specific and total mortality: A prospective follow-up study of 31,199 middle-aged men and women in Finland. *American Journal of Epidemiology*. 2000;**151**:1112-1120. DOI: 10.1093/oxfordjournals.aje.a010155
- [13] Hoshi T, Nakayama N, Takagi T, et al. Relationship between height and BMI classification of elderly people living at home in urban suburbs. *Journal of Japan Society of Health Education (in Japanese)*. 2010;**18**:268-277. DOI: 10.11260/kenkokyoiku.18.268

[14] Hoshi T. SES, dietary and lifestyle habits, three health-related dimensions, and healthy survival days. In: Hoshi T, Kodama S, editors. *The Structure of Healthy Life Determinants: Lessons from the Japanese Aging Cohort Studies*. Singapore: Springer; 2018. pp. 134-189

[15] Yuan W, Eric Y, Fai W, Ivy L, et al. The association between trajectories of risk factors and risk of cardiovascular disease or mortality among patients with diabetes or hypertension: A systematic review. *PLoS One*. 2022;**17**(1):e0262885. DOI: 10.1371/journal.pone.0262885

[16] Finkel SE. *Causal Analysis with Panel Data*. California: Sage Publications; 1995. pp. 41-56

[17] Bentler PM, Dudgeon P. Covariance structure analysis: Statistical practice, theory, and directions. *Annual Review of Psychology*. 1996;**47**:563-592. DOI: 10.1146/annurev.psych.47.1.563

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Sedentary behavior has become one of the most pressing public health and societal challenges of modern life. Rapid technological change, urbanization, digitalization, and population ageing have reshaped how people learn, work, and interact, often at the cost of movement and active living. *Sedentary Lifestyle – A Multidisciplinary Perspective* offers a comprehensive and timely exploration of this global phenomenon, examining its determinants, consequences, and solutions across the life course. Bringing together insights from public health, behavioral science, psychology, gerontology, and social sciences, this volume addresses sedentary lifestyle as a complex, multidimensional issue shaped by socio-cultural environments, digital habits, mental health, emotional resources, and structural conditions. Key themes include physical inactivity, screen-related behaviors, mental well-being, emotional intelligence, healthy ageing, socio-cultural influences, and intersectoral strategies for prevention and intervention. The book moves beyond individual responsibility to highlight the importance of systems thinking, culturally sensitive approaches, and integrated policies that promote active lifestyles in diverse populations. By connecting scientific evidence with practical and policy-oriented perspectives, it provides a holistic framework for understanding and reducing sedentary behavior in contemporary societies. This volume is an essential resource for researchers, healthcare professionals, educators, policymakers, and students seeking an interdisciplinary understanding of physical inactivity and its broader implications. Its multidisciplinary scope, life-course perspective, and focus on actionable solutions make it a valuable reference for advancing research, informing interventions, and supporting healthier, more active communities in an increasingly sedentary world.

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