PIONEER
ACADEMIC PUBLISHING LIMITED

Studies in Sports Science and Physical Education
ISSN 2959-5274
www.pioneerpublisher.com/ssspe
Volume 1 Number 1 June 2023

Objective Light-Intensity Physical Activity Associations with Rated Health in Older Adults

Chenying Zhang[1]

[1] Hebei Sport University, Hebei, China
Correspondence: Chenying Zhang, Hebei Sport University, Hebei, China.

doi:10.56397/SSSPE.2023.06.02

Abstract

This comprehensive review aims to synthesize the current literature on the association between objective measurement of light physical activity and overall health assessment in older adults. With the increasing global elderly population, the growing aging population poses significant challenges to healthcare systems worldwide. As individuals age, the risk of chronic diseases, functional decline, and reduced quality of life escalates. Therefore, understanding the relationship between objective measurement of light physical activity and overall health assessment in older adults becomes crucial for promoting healthy aging and designing effective interventions.

Keywords: light physical activity, objective measurement, older adults, overall health assessment, chronic diseases, functional decline, quality of life, healthy aging, interventions

1. Introduction

1.1 Background and Significance of the Study

The global population is currently experiencing a significant increase in the number of older adults, presenting substantial challenges for healthcare systems worldwide. With aging comes an elevated risk of chronic diseases, functional decline, and reduced quality of life. Consequently, there is a growing need to understand the factors that promote health and well-being in older adults. While physical activity has long been recognized as a key determinant of health, the focus has primarily been on moderate to vigorous-intensity activities. However, in recent years, there has been a growing interest in exploring the associations between light-intensity physical activity and rated health in older adults.

1.2 Aging Population and Its Impact on Health

The demographic shift toward an aging population has profound implications for public health. The physiological and functional changes that occur with aging can lead to a higher susceptibility to chronic diseases and a decline in overall health. As a result, promoting healthy aging and maintaining functional independence have become crucial goals for healthcare systems worldwide. Understanding the role of physical activity, including light-intensity physical activity, in promoting health and well-being in older adults is essential for addressing these challenges.

1.3 The Role of Physical Activity in Promoting Health in Older Adults

Physical activity has been extensively studied and shown to have numerous benefits for older

adults. Engaging in regular physical activity has been associated with improved cardiovascular health, maintenance of muscle mass and strength, enhanced mental well-being, and reduced risk of chronic conditions such as hypertension, diabetes, and osteoporosis. However, most research has primarily focused on moderate to vigorous-intensity activities, while the potential health benefits of light-intensity physical activity have received less attention.

1.4 Purpose and Objectives of the Review

The purpose of this comprehensive review is to synthesize the current literature on the associations between objective light-intensity physical activity and rated health in older adults. By examining existing studies, this review aims to provide a deeper understanding of the measurement methods used to assess light-intensity physical activity and its impact on overall rated health and specific health domains. Furthermore, this review aims to identify potential physiological and psychological mechanisms underlying these associations and explore the factors that may influence the relationship between light-intensity physical activity and health outcomes. Additionally, the review will examine intervention strategies aimed at promoting light-intensity physical activity in older adults and evaluate their effectiveness. Methodological considerations in studying light-intensity physical activity associations with rated health in older adults will also be discussed, and recommendations for future research and implications for public health and clinical practice will be provided.

2. Measurement of Light-Intensity Physical Activity

2.1 Definition and Characteristics of Light-Intensity Physical Activity

Light-intensity physical activity refers to activities that require minimal effort and result in a slight increase in heart rate and breathing. These activities are typically part of daily living tasks and include slow walking, light housework, gardening, and other activities that do not significantly elevate heart rate. Light-intensity physical activity is distinct from sedentary behavior, which involves activities characterized by low energy expenditure while in a sitting or reclining posture, and also differs from moderate to vigorous-intensity physical activity, which involves activities that significantly raise heart rate and cause noticeable sweating and increased breathing.

2.2 Objective Measures of Light-Intensity Physical Activity

Table 1. Objective Measurement Methods for Light-Intensity Physical Activity in Older Adults

Measurement Method	Description	Advantages	Limitations
Accelerometers	Devices worn on the body that measure movement and provide information on duration, frequency, and intensity of physical activity.	Provides detailed and objective data on physical activity levels. Captures different dimensions of physical activity. Can be worn for extended periods.	Requires calibration and data processing. May be affected by device placement and wear compliance. Can be expensive and require technical expertise for data analysis.
Pedometers	Devices that count steps taken by an individual.	Simple and cost-effective tool. Easy to use and interpret. Provides a measure of overall physical activity.	Does not capture information on activity intensity or other dimensions of physical activity. Accuracy may be affected by device placement and calibration. May underestimate non-walking activities.
Wearable Devices	Devices worn on the body that track	Offers continuous monitoring of physical	Accuracy may vary across different devices and brands.

	various parameters, including physical activity.	activity. Provides additional features such as heart rate monitoring and sleep tracking. User-friendly and convenient.	Cost and accessibility may be a barrier for some individuals. Data interpretation and analysis may require technical expertise.
Smartphone Apps	Applications installed on smartphones that utilize built-in sensors to track physical activity.	Widely accessible and convenient. Cost-effective option for physical activity monitoring. Can provide real-time feedback and motivation.	Accuracy and reliability may vary across different apps and smartphone models. Battery consumption and phone usage may limit continuous monitoring. Data privacy and security concerns.

Objective measures, such as accelerometers and pedometers, have been widely used to assess light-intensity physical activity in older adults. Accelerometers are small electronic devices worn on the body that detect and record movement patterns. They provide detailed information about the duration, frequency, and intensity of physical activity. Accelerometers can capture different dimensions of physical activity, including step counts, sedentary time, and light-intensity physical activity. On the other hand, pedometers are simple devices that count the number of steps taken and provide a basic measure of physical activity by focusing solely on step counts. Other emerging technologies, such as wearable devices and smartphone applications, also show promise in objectively capturing light-intensity physical activity. These technologies often incorporate accelerometers and other sensors to track movement and provide real-time feedback to users.

2.3 Advantages and Limitations of Objective Measurement Methods

Objective measurement methods offer several advantages when assessing light-intensity physical activity in older adults. They provide detailed and objective data on physical activity patterns, allowing for a comprehensive understanding of an individual's activity levels. Accelerometers, for example, can capture not only light-intensity physical activity but also sedentary time and moderate to vigorous-intensity physical activity, providing a more complete picture of an individual's activity profile. Objective measures also enable researchers to assess activity patterns over extended periods, offering insights into habitual physical activity behaviors. Furthermore, these methods can capture different dimensions of physical activity, such as duration, frequency, and intensity, allowing for a more nuanced analysis.

However, objective measurement methods also have limitations that need to be considered. One limitation is the accuracy of the measurements. While accelerometers and pedometers are generally reliable, they may have inherent errors and variability in their measurements. Additionally, compliance with wearing the devices and following the measurement protocols can vary among participants, which may affect the accuracy and representativeness of the data collected. Furthermore, the interpretation of objective physical activity data can be challenging, and appropriate cut-points or thresholds for defining light-intensity physical activity need to be established. These considerations are essential when interpreting the associations between light-intensity physical activity and rated health outcomes in older adults.

3. Rated Health Outcomes

3.1 Definition and Assessment of Rated Health in Older Adults

Rated health is a subjective assessment of an individual's overall health status. It is typically measured using self-report questionnaires or scales that capture an individual's perception of their own health. Commonly used instruments for assessing rated health in older adults include the SF-36 (Short Form-36), EQ-5D (EuroQol-5

Dimensions), and the self-rated health question, which asks individuals to rate their health as excellent, very good, good, fair, or poor. Rated health serves as a valuable measure of health-related quality of life and provides insight into an individual's well-being beyond the presence or absence of specific diseases or conditions.

3.2 Association between Light-Intensity Physical Activity and Overall Rated Health

Several studies have examined the associations between light-intensity physical activity and overall rated health in older adults. These studies have consistently shown that higher levels of light-intensity physical activity are associated with better self-rated health. Older adults who engage in more light-intensity physical activity tend to report higher levels of perceived well-being and overall satisfaction with their health status. This positive association between light-intensity physical activity and overall rated health suggests that even small increases in daily activity levels can have a significant impact on how individuals perceive their own health.

3.3 Effects of Light-Intensity Physical Activity on Specific Health Domains

In addition to its association with overall rated health, light-intensity physical activity has been found to have positive effects on specific health domains in older adults. Numerous studies have demonstrated associations between light-intensity physical activity and improved cardiovascular health, musculoskeletal health, and mental health outcomes. Engaging in light-intensity physical activity can contribute to better cardiovascular function, maintenance of bone density and muscle strength, reduced risk of falls, and improved cognitive function and mood. These findings highlight the importance of considering the specific health domains when examining the associations between light-intensity physical activity and health outcomes in older adults.

4. Potential Mechanisms

4.1 Physiological Mechanisms Linking Light-Intensity Physical Activity to Health Outcomes

Engaging in light-intensity physical activity can have various physiological benefits that contribute to improved health outcomes in older adults. Light-intensity physical activity can help maintain aerobic capacity by promoting blood flow and oxygen delivery to the muscles without causing excessive fatigue. It also supports cardiovascular health by reducing resting heart rate and blood pressure. Additionally, light-intensity physical activity, such as walking or gardening, involves weight-bearing movements that stimulate bone remodeling and help maintain bone density. Regular engagement in light-intensity physical activity also supports musculoskeletal health by preserving muscle mass and strength, which is crucial for maintaining mobility and independence.

4.2 Psychological Mechanisms, Including Mood, Cognitive Function, and Social Engagement

Light-intensity physical activity has been associated with various psychological benefits in older adults. Regular engagement in light-intensity physical activity can improve mood, reduce symptoms of depression and anxiety, and enhance overall psychological well-being. Physical activity stimulates the release of endorphins, which are known as "feel-good" hormones that promote positive affect and reduce feelings of stress and sadness. Light-intensity physical activity also improves cognitive function, including memory, attention, and executive function. The increased blood flow and oxygen supply to the brain during physical activity contribute to these cognitive enhancements. Furthermore, light-intensity physical activity often takes place in social settings, providing opportunities for social interactions and reducing feelings of loneliness and isolation in older adults. Social engagement and connectedness have been linked to improved mental health and overall well-being.

4.3 The Role of Light-Intensity Physical Activity in Reducing Sedentary Behavior

Sedentary behavior, characterized by prolonged periods of sitting or reclining with low energy expenditure, is highly prevalent among older adults and is associated with adverse health outcomes. Light-intensity physical activity can play a crucial role in reducing sedentary behavior. By incorporating light-intensity physical activity into daily routines, older adults can break up prolonged periods of sitting and minimize the negative effects of sedentary behavior on health. Simple activities such as standing up and moving around the house, taking short walks, or performing light chores

can effectively reduce sedentary time and improve overall health. Encouraging older adults to replace sedentary behaviors with light-intensity physical activity is an important strategy for promoting health and well-being.

5. Factors Influencing Associations

5.1 Age, Gender, and Sociodemographic Factors

Age, gender, and sociodemographic factors can influence the associations between light-intensity physical activity and health outcomes in older adults. Older age is often associated with lower levels of physical activity, including light-intensity physical activity. Female gender has also been linked to lower activity levels compared to males. Sociodemographic factors such as socioeconomic status, education level, and living arrangements can impact activity levels and health outcomes. Understanding these factors is essential for designing interventions and promoting equitable participation in light-intensity physical activity among diverse older adult populations.

5.2 Environmental and Contextual Factors

Environmental and contextual factors play a significant role in determining older adults' engagement in light-intensity physical activity. Features of the physical environment, such as neighborhood walkability, access to parks and recreational facilities, and the presence of safe and well-maintained walking paths, can influence activity levels. Social support from family, friends, or community organizations also plays a crucial role in encouraging and facilitating light-intensity physical activity. Creating supportive environments that promote and facilitate light-intensity physical activity is essential for optimizing older adults' overall health and well-being.

5.3 Comorbidities and Chronic Conditions

The presence of comorbidities and chronic conditions may affect the ability of older adults to engage in physical activity and influence the associations between light-intensity physical activity and health outcomes. Certain health conditions, such as arthritis, cardiovascular diseases, or respiratory disorders, may pose challenges or limitations to physical activity participation. Understanding the interactions between light-intensity physical activity, comorbidities, and chronic conditions is crucial for developing tailored interventions that consider individual health needs and promote safe and effective participation in physical activity.

6. Intervention Strategies

6.1 Interventions Targeting Light-Intensity Physical Activity in Older Adults

Various intervention approaches have been implemented to increase light-intensity physical activity levels in older adults. These interventions aim to promote behavior change, modify the environment, and utilize technology to encourage and support engagement in light-intensity physical activity. Examples of intervention strategies include:

1) Behavioral change techniques: These interventions focus on promoting self-efficacy, goal-setting, and self-monitoring of physical activity levels. They may involve educational sessions, counseling, or the use of behavior change techniques such as motivational interviewing.

2) Environmental modifications: Interventions targeting the physical environment aim to create age-friendly communities that support and encourage light-intensity physical activity. This may involve improving neighborhood walkability, providing accessible and well-maintained recreational spaces, and implementing policies that support active transportation.

3) Technology-based interventions: The use of wearable devices, smartphone applications, or online platforms can provide real-time feedback, personalized activity recommendations, and social support. These technologies can enhance motivation and self-management of physical activity.

6.2 Effectiveness of Different Intervention Approaches

Evaluating the effectiveness of intervention strategies is essential for developing evidence-based recommendations. Studies have shown positive effects of light-intensity physical activity interventions on health outcomes in older adults. For example, walking programs have been found to increase daily step counts and improve cardiovascular fitness. Environmental modifications, such as the creation of walking trails or the installation of public exercise equipment, have also been effective in promoting light-intensity physical activity. Technology-based interventions,

including smartphone apps and activity trackers, have shown promise in increasing physical activity levels and promoting behavior change.

However, further research is needed to determine the most effective intervention approaches, their long-term sustainability, and their impact on various health outcomes. Factors such as intervention duration, intensity, mode of delivery, and participant characteristics may influence intervention effectiveness. Tailoring interventions to individual needs and preferences and considering cultural and social contexts are also important for optimizing intervention outcomes.

6.3 Implications for Public Health and Clinical Practice

Promoting light-intensity physical activity in older adults has important implications for public health and clinical practice. Public health initiatives should focus on creating age-friendly environments that support and facilitate light-intensity physical activity. This includes improving community infrastructure, providing access to safe and enjoyable recreational spaces, and promoting active transportation options.

In clinical practice, healthcare professionals should incorporate discussions on light-intensity physical activity into routine assessments and conversations with older adults. Assessing physical activity levels, providing education on the benefits of light-intensity physical activity, and offering tailored recommendations can empower older adults to engage in regular physical activity. Collaborating with other healthcare providers, community organizations, and policymakers can further enhance the integration of light-intensity physical activity promotion into healthcare systems and community-based programs.

7. Methodological Considerations

7.1 Challenges and Considerations in Studying Light-Intensity Physical Activity in Older Adults

Studying the associations between light-intensity physical activity and health outcomes in older adults presents several challenges. These include selecting appropriate study designs, choosing relevant outcome measures, dealing with potential confounding factors, and addressing issues related to data analysis and interpretation.

Longitudinal studies are needed to establish causality and examine the long-term effects of light-intensity physical activity on health outcomes in older adults. Randomized controlled trials and prospective cohort studies can provide valuable insights into the effects of interventions and changes in light-intensity physical activity over time. However, these studies often require substantial resources and long-term follow-up, which can present logistical and practical challenges.

7.2 Future Directions for Research, including Study Design and Statistical Approaches

Future research should focus on addressing methodological limitations and expanding our understanding of the associations between light-intensity physical activity and health outcomes in older adults. Several areas warrant further investigation:

1) Longitudinal studies: Conducting long-term studies that follow individuals over extended periods can help establish causal relationships between light-intensity physical activity and health outcomes. Such studies can also provide insights into the dose-response relationship and the persistence of health benefits.

2) Advanced statistical approaches: Utilizing advanced statistical techniques, such as trajectory analyses or latent class analyses, can uncover patterns of light-intensity physical activity and their associations with health outcomes. These approaches can account for individual variability in activity patterns and help identify subgroups that may benefit most from specific intervention strategies.

3) Objective measurement validation: Further validation studies are needed to ensure the accuracy and reliability of objective measures, such as accelerometers and pedometers, in capturing light-intensity physical activity in older adults. Comparisons with gold-standard measures, such as direct observation or energy expenditure assessment, can enhance measurement precision.

4) Mixed-methods research: Combining quantitative measures with qualitative approaches, such as interviews or focus groups, can provide a more comprehensive understanding of the experiences, preferences, and barriers related to light-intensity physical activity in older adults. This approach can inform the development of culturally sensitive and context-specific interventions.

By addressing these methodological considerations and expanding research efforts, we can further elucidate the role of light-intensity physical activity in promoting health and well-being in older adults.

7.3 Dissemination of Findings and Knowledge Translation

Disseminating research findings and translating knowledge into practice are crucial for maximizing the impact of studies on light-intensity physical activity in older adults. It is important to communicate research findings effectively to various stakeholders, including healthcare professionals, policymakers, community organizations, and older adults themselves. Some strategies for dissemination and knowledge translation include:

1) Scientific publications: Publishing research findings in peer-reviewed journals ensures that they reach the scientific community and contribute to the existing knowledge base. Researchers can target journals that focus on gerontology, public health, or physical activity to reach relevant audiences.

2) Conferences and presentations: Presenting research findings at conferences and scientific meetings provides an opportunity to engage with researchers, practitioners, and policymakers. These platforms facilitate knowledge exchange, networking, and collaboration, allowing for the dissemination of findings and discussion of implications.

3) Policy briefs and reports: Summarizing research findings in concise policy briefs or reports can make them accessible to policymakers and guide evidence-based decision-making. These documents should highlight the potential health benefits of light-intensity physical activity and provide recommendations for policy development and implementation.

4) Educational materials: Developing educational materials, such as brochures, fact sheets, or online resources, can inform healthcare professionals and older adults about the importance of light-intensity physical activity. These materials should provide practical tips, guidelines, and resources for integrating light-intensity physical activity into daily routines.

5) Public awareness campaigns: Collaborating with public health organizations and community groups can help raise awareness about the benefits of light-intensity physical activity in older adults. Public awareness campaigns can use various media platforms, such as television, radio, social media, and community events, to reach a wide audience and promote behavior change.

6) Partnerships and collaborations: Building partnerships and collaborations with stakeholders, including healthcare providers, community organizations, and policymakers, can facilitate the implementation of evidence-based strategies to promote light-intensity physical activity. These collaborations can help bridge the gap between research and practice and ensure that interventions are tailored to the needs of older adults.

In summary, disseminating research findings and translating knowledge into practice are essential for maximizing the impact of studies on light-intensity physical activity in older adults. By employing various strategies to reach different stakeholders, we can promote the adoption of evidence-based recommendations and ultimately improve the health and well-being of older adults.

8. Conclusion

In conclusion, this comprehensive review has highlighted the importance of understanding the associations between objective light-intensity physical activity and rated health in older adults. With the global population aging rapidly, promoting health and well-being in older adults has become a critical area of research and public health focus. While the benefits of moderate to vigorous-intensity physical activity are well-established, the potential health benefits of light-intensity physical activity have received less attention until recent years.

The measurement of light-intensity physical activity using objective methods, such as accelerometers and pedometers, provides valuable insights into the patterns and levels of activity in older adults. These tools offer advantages in capturing detailed and objective data, but they also come with limitations that should be considered when interpreting research findings.

The associations between light-intensity physical activity and rated health outcomes in older adults have been investigated in several studies. Higher levels of light-intensity physical

activity have been associated with better overall rated health and positive effects on specific health domains, including cardiovascular health, musculoskeletal health, and mental health. These findings suggest that light-intensity physical activity plays a significant role in promoting health and well-being in older adults.

Potential physiological mechanisms linking light-intensity physical activity to health outcomes include improvements in cardiovascular function, metabolic parameters, and musculoskeletal health. Psychological mechanisms, such as mood enhancement, cognitive function improvement, and social engagement, also contribute to the positive effects of light-intensity physical activity. Furthermore, light-intensity physical activity can help reduce sedentary behavior, which is a common concern among older adults.

Several factors influence the associations between light-intensity physical activity and health outcomes in older adults. Age, gender, sociodemographic factors, environmental factors, and the presence of comorbidities all play a role in determining activity levels and health outcomes. Understanding these factors is crucial for tailoring interventions and promoting equitable health benefits.

Intervention strategies targeting light-intensity physical activity in older adults have shown promising results. Behavior change techniques, environmental modifications, and technology-based interventions have been effective in increasing light-intensity physical activity levels. However, further research is needed to determine the most effective approaches and their long-term sustainability.

Methodological considerations, including study design, outcome measures, confounding factors, and data analysis approaches, should be carefully addressed in future research to advance the field. Longitudinal studies and advanced statistical methods can provide a deeper understanding of activity patterns and their associations with health outcomes.

In conclusion, the associations between objective light-intensity physical activity and rated health in older adults are an emerging area of research with significant implications for public health and clinical practice. By promoting light-intensity physical activity and understanding its potential health benefits, we can contribute to healthy aging, enhance quality of life, and reduce the burden of chronic diseases in the aging population.

References

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports (Washington, D.C.: 1974)*, *100*(2), 126–131.

Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., Salem, G. J., & Skinner, J. S. (2009). American College of Sports Medicine position stand. Exercise and physical activity for older adults. *Medicine and science in sports and exercise*, *41*(7), 1510–1530. https://doi.org/10.1249/MSS.0b013e3181a0c95c.

Hekler, E. B., Buman, M. P., Haskell, W. L., Conway, T. L., Cain, K. L., Sallis, J. F., Saelens, B. E., Frank, L. D., Kerr, J., & King, A. C. (2012). Reliability and validity of CHAMPS self-reported sedentary-to-vigorous intensity physical activity in older adults. *Journal of physical activity & health*, *9*(2), 225–236. https://doi.org/10.1123/jpah.9.2.225.

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., & Lancet Physical Activity Series Working Group (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet (London, England)*, *380*(9838), 219–229. https://doi.org/10.1016/S0140-6736(12)61031-9.

Owen, N., Sparling, P. B., Healy, G. N., Dunstan, D. W., & Matthews, C. E. (2010). Sedentary behavior: emerging evidence for a new health risk. *Mayo Clinic proceedings*, *85*(12), 1138–1141. https://doi.org/10.4065/mcp.2010.0444.

Paterson, D. H., & Warburton, D. E. (2010). Physical activity and functional limitations in older adults: a systematic review related to Canada's Physical Activity Guidelines. *The international journal of behavioral nutrition and physical activity*, *7*, 38. https://doi.org/10.1186/1479-5868-7-38.

Paterson, D. H., Jones, G. R., & Rice, C. L. (2007). Ageing and physical activity: evidence to

develop exercise recommendations for older adults. *Canadian journal of public health*, *98*(Suppl 2), S69–S108.

Taylor D. (2014). Physical activity is medicine for older adults. *Postgraduate medical journal*, *90*(1059), 26–32. https://doi.org/10.1136/postgradmedj-2012-131366.

Troiano, R. P., Berrigan, D., Dodd, K. W., Mâsse, L. C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and science in sports and exercise*, *40*(1), 181–188. https://doi.org/10.1249/mss.0b013e31815a51b3.

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *CMA, 174*(6), 801–809. https://doi.org/10.1503/cmaj.051351.

World Health Organization. (2020). Global recommendations on physical activity for health. World Health Organization. https://www.who.int/publications/i/item/9789240015128.