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Social and Environmental Determinants of Physical Activity among Elderly in Yogyakarta City

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ABSTRACT

The elderly population is increasing globally and is bringing various impacts, such as economic, psychological, and health-related challenges linked to insufficient physical activity. Physical inactivity among the elderly can be attributed to several factors, including limited social support and restricted access to safe and age-friendly environments. Given the limited research in this area, it is essential to examine the relationship between social and environmental factors and physical activity among older adults in Yogyakarta City. This study aims to explore in greater depth how social and environmental factors contribute to the level of physical activity among the elderly. A cross-sectional study was conducted among individuals aged over 60 years, with a total sample of 297 elderly participants selected using purposive sampling based on defined inclusion and exclusion criteria. The research took place in Yogyakarta City between August 2024 and February 2025. Data were collected using a structured questionnaire that included demographic characteristics and social factors. Statistical analysis was performed using chi-square tests with SPSS version 22.0. It showed that 57.9% of the elderly participants were physically active. Bivariate analysis revealed a significant association between social and environmental factors and physical activity ($p < 0.005$). Social factors are more influential on the physical activity among elderly. Support from family, community and elderly-friendly facilities needs to be improved. Further research is recommended to explore effective social support.

Keywords: *Elderly; Chronic Diseases; Physical Activity; Social Factors; Active Lifestyle*

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INTRODUCTION

The growing population of older adults continues to be a major concern in the field of public health. Older individuals undergo significant biological, psychological, and social changes, which require special attention to maintain their quality of life. In Indonesia, the elderly population is projected to reach 65.8 million by 2045, up from 30.9 million in 2023, accounting for approximately 11.1% of the total population, according to the Central Statistics Agency (*Badan Pusat Statistik, BPS*). (1) The highest proportion of older adults is found in the Special Region of Yogyakarta (DIY), comprising 17% of the population.(2) As individuals age, they face numerous challenges, particularly in health-related aspects, such as hypertension, diabetes, cardiovascular diseases, and osteoporosis. Data show that hypertension is the leading cause of cardiovascular mortality in Africa, with the highest prevalence found among the elderly population. The combined prevalence of hypertension is estimated to be around 30.8% in Africa and between 30.0% and 31.1% in Sub-Saharan Africa.(3) In Indonesia, data from the Basic Health Research (Riskesdas) in 2013 and 2018 indicate an increasing proportion of the population engaging in insufficient physical activity–from 26.10% in 2013 to 33.50% in 2018. Insufficient physical activity among older adults can lead to a decline in functional capacity, an increased risk of falls, and an overall reduction in quality of life.(4)

Social and physical environmental factors are key determinants in supporting physical activity among older adults.(5) Family support plays a significant role in the lives of older adults and is considered an essential element in helping individuals cope with challenges.(6) Likewise, friendships are regarded as a form of clinical therapy that can assist individuals undergoing healing or recovery processes, with peer support often inspiring older adults to maintain their quality of life.(7) Therefore, both family and friends can be said to play a motivational role in encouraging physical activity among the elderly. Older adults with strong social support tend to be more physically active than those experiencing social isolation.(8) Research has shown that positive social

interactions can enhance older adults' participation in physical activities, including light exercise and community-based activities. Preliminary studies in this area have identified several barriers, including limited access to sports facilities, elderly-unfriendly road conditions, and insufficient attention from family members to the physical needs of older adults.(9)

In Indonesia, the "Healthy Living Community Movement" (*Gerakan Masyarakat Hidup Sehat or GERMAS*) has been implemented to encourage elderly individuals to become more active through simple physical activities such as walking, cycling, and group exercise. In Yogyakarta City, older adults face various challenges in engaging in physical activity. The Health Office Department of Yogyakarta (Dinas Kesehatan DIY) launched the "Exercise with the Elderly" program to increase participation in physical activity among older adults through regular activities such as senior fitness sessions held at various posyandu (integrated health posts). However, the effectiveness of this program still requires further evaluation, particularly regarding the participation of elderly individuals living in areas with limited access to sports facilities. This study aims to examine the relationship between social factors, physical environmental factors, and physical activity among older adults in Yogyakarta.

METHODS

This study employed a quantitative approach with a cross-sectional design and was conducted in Wirogunan Mergangsan, Yogyakarta City, during January–February 2025. A purposive sampling technique was used to select participants, resulting in a total of 297 older adults who met the inclusion criteria: aged 60 years or older, having adequate communication abilities, and providing informed consent to participate in the study. Data were analyzed using the Chi-square test with a significance level of $p < 0.05$ and logistic regression analysis. Data collection was carried out using a structured questionnaire comprising three main sections: (1) respondent characteristics; (2) social factors (family and peer support), assessed through 11 items. The validity of each

instrument item was tested by comparing the corrected item-total correlation with the r-table value at df = N − 2 and α = 0.05. With 30 respondents in the pilot study, the r-table value was 0.361. The questionnaire was considered valid when the corrected item-total correlation exceeded the r-table value. Reliability testing showed a Cronbach's Alpha of 0.914, indicating that the questionnaire was reliable (α > 0.60); (3) Physical environmental factors (access to sports facilities, availability of green open spaces, road conditions, and neighbourhoods safety), assessed through 17 items. The validity test followed the same procedure, with the r-table value of 0.361 based on 30 respondents. The reliability test produced a Cronbach's Alpha value of 0.954, indicating strong internal consistency (α > 0.60). Prior to its use in the study, the questionnaire underwent ethical eligibility review and received certification under No. 4140/KEP-UNISA/I/2025.

RESULT

This study employed univariate analysis to examine the elderly population in Wirogunan Mergangsan, Yogyakarta City, consisting of 297 respondents. The respondents provided informed consent to participate, agreeing to complete the demographic data and the questionnaire provided. The study observed respondent characteristics including gender, age, occupation, education, medical history, as well as physical and social environmental factors affecting the elderly in Yogyakarta City.

Table 1.
Results Based on Elderly Physical Activity n (%)

Physical Activity	n	%
Less Active	125	42,1
Active	172	57,9
Total	297	100,0

Source : Primary Data, 2025

The frequency distribution of physical activity shows that the proportion of inactive elderly is more than 40%.

Table 2.
Results Based on Types of Activities

Types of Activities	n	%
- Watching TV	87	29,29%
- Leisure Walking	58	19,53%
- Exercise	53	17,85%
- Household Chores	34	11,45%
- Brisk Walking	33	11,11%
- Gardening	32	10,77%
Total	**297**	**100%**

Source : Primary Data, 2025

The most common activity performed by elderly was watching television, followed by light physical activities such as leisurely walking and exercise (Table 2).

As shown in Table 3 below, the distribution of respondents based on the characteristics of the elderly population from 297 respondents indicates that the largest age group is 60-74 years, with 281 respondents (94.6%). The majority of respondents are female, with 234 respondents (78.8%). In terms of education, the highest frequency is found in the group with elementary school education (SD), consisting of 140 respondents (47.1%), while the lowest frequency is in the group with a bachelor's degree (S1), with only 11 respondents (3.7%). Regarding occupation, the highest frequency is found in the group of non-working individuals, comprising 168 respondents (56.6%), while the lowest frequency is in the group of traders, with 60 respondents (20.2%). In terms of medical history, the most common condition is hypertension, reported by 112 respondents (37.7%), while only 4 respondents (1.3%) have a history of diabetes.

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Table 3.
Respondents Characteristics, n (%)

Characteristic	n	(%)
Age:		
- 60-74 years	281	94,6
- 75-90 years	16	5.4
Gender:		
- Male	63	21,2
- Female	234	78,8
Education:		
- No schooling	57	19,2
- Elementary School (SD)	140	47,1
- Junior High School (SMP)	62	20,9
- Senior High School (SMA)	27	9,1
- Bachelor's Degree (S1)	11	3,7
Occupation:		
- Not working	168	56,6
- Trader	60	20,2
- Entrepreneur	69	23,2
Medical History:		
- None	135	45,5
- Hypertension	112	37,7
- Gout	40	13,5
- Cholesterol	6	2,0
- Diabetes	4	1,3
Total	**297**	**100,0**

Source : Primary Data, 2025

Based on Table 4, the distribution of respondents according to social factors shows that the majority of elderly individuals received support, with 264 respondents (88.9%). In contrast, the majority did not receive support regarding environmental factors, with 202 respondents (68.0%).

Table 4.
Results Based on Social and Environmental Factors

Variables	n	(%)
Social Factors:		
- Not Supportive	33	11.1
- Supportive	264	88.9
Environmental Factors:		
- Not Supportive	202	68.0
- Supportive	95	32.0
Total	**297**	**100**

Source : Primary Data, 2025

The analysis using the Chi-square test indicates that social factors and environmental factors has significant with physical activity, (P value of 0.000 and 0.000, respectively) (<0.05)). Table 5).

Table 5.
Analysis of Relationship between Social, Environmental Factors and Physical Activity

Variables	Less Active		Active		Total	P *value*
Social Factors:	F	%	F	%		
- Not Supportive	32	10.77	1	0.34	33	
- Supportive	93	31.31	171	57.58	264	0.000*
Environmental Factors:						
- Not Supportive	101	34.01	101	34.01	202	0.000*
- Supportive	24	8.08	71	23.09	95	
Total	125	84.17	172	115.02	297	

Source : Primary Data, 2025

Regression Analysis showed in Table 6 that social factors were the most significant determinant of physical activity in the elderly, which are 62x more likely to be active Odds Ratio (OR) value of 62.876 (95% CI: 8.192-482.570; p=0.000).

Table 6.

Regression Analysis of Social and Environmental Factors

Variables	Odds Ratio	df	95% CI	P Value
Social Factors	62.876	1	8.192-482.570	0.000*
Environmental Factors	1.812	1	0.988-3.322	0.000*

Source : Primary Data, 2025

The results of the multivariate analysis in Table 6 show that the most influential factor on physical activity in the elderly is the social factor, with an Odds Ratio of 62.876, df = 1 (95% CI: 8.192–482.570), and a p-value of 0.000. Thus, the social factor is the most significant determinant of physical activity in the elderly.

Discussion

Physical Activity and Characteristic Factors

Physical activity among the elderly in Wirogunan Subdistrict, as shown by the study, demonstrates a significant variation. Approximately 57.9% of the elderly are classified as physically active, while 42.1% are categorized as inactive. The active elderly tend to engage in activities such as walking, gardening, and household chores with high frequency in the past week. In contrast, the inactive elderly spend more time on light activities or prolonged sitting. However, the results in Table 1 indicate that the awareness of the elderly regarding the importance of physical activity for health is a contributing factor to the high proportion of physically active elderly individuals. The group that is less active is at risk of experiencing health issues if they do not increase their physical activity. A study by (Yusrini 2023) in the Baiturrahman sub-district, Banda Aceh, showed that 67.8% of elderly individuals remain physically active, supported by participation in village exercise programs as well as household tasks such as cooking and cleaning. Pranata (2020) also mentioned that the people of Banda Aceh are enthusiastic about exercising, especially through activities such as Car Free Day and regular exercises at Blang Padang, even since the COVID-19 pandemic. WHO data (2024) estimates that about 31% of the global adult population, or 1.8 billion people, do not meet the recommended levels of physical activity. In Nigeria, Bosu, William Kofi (2019) reported

that 50 million people are not sufficiently active, with an inactivity prevalence of 58%. In Europe, Biernet et al. (2020) found that more than 21% of the population does not engage in any physical exercise during their leisure time, while nearly 40% are unaware of the physical activity dosage recommended by WHO.

Globally, the World Health Organization (WHO) consistently recommends that older adults engage in at least 150 minutes of moderate-intensity aerobic physical activity per week, or 75 minutes of high-intensity activity, along with muscle-strengthening activities twice a week to achieve optimal health benefits.(11, 12) However, global data indicates a significant gap, with 80% of adolescents and 31% of adults overall failing to meet these recommendations.(13) This phenomenon of physical inactivity is also strongly reflected in Indonesia. A study by Setiati et al. (2023) shows that 21.1% of older adults in Indonesia have a sedentary lifestyle, with variations in prevalence across ethnic groups.(14) In this study indicating that 42.1% of older adults are physically inactive, with nearly a third predominantly watching television, suggests that sedentary behavior is a critical issue that needs to be addressed in Yogyakarta. This aligns with research by Tey et al. (2022), which found that prolonged sitting (sedentary behavior) is a significant problem among older adults in Southeast Asia and is associated with poorer health outcomes.(15)

The demographic characteristics of inactive older adults in this study–mostly women, with low education levels, and not working–reinforce findings from previous studies. Older women often face more barriers to physical activity participation than men, including gender roles, cultural norms, and limited access.(16) Low educational attainment may be correlated with a lack of understanding about the importance of physical activity or limited access to information and programs. Unemployment status may reduce daily structure and incentives to move, and potentially influence socioeconomic conditions that limit access to physical activity facilities or programs.(17) Additionally, health conditions such as hypertension, although manageable through

appropriate physical activity, are often perceived as physical barriers to activity among older adults.(18) Therefore, interventions targeting older adults need to consider these demographic and health conditions to ensure the relevance and acceptability of the program.

Given the challenges of physical inactivity and sedentary behavior prevalence, efforts to increase physical activity among older adults in Yogyakarta require a holistic and integrated approach. Health promotion programs should be designed according to the physical capabilities of the elderly, emphasizing activities that are easily accessible and familiar in daily life, such as walking or gardening. This approach can be enriched with informative education and strong social support from family and community, as social factors have been proven to be significant determinants of physical activity among the elderly.(19) Models such as the "Klasikal-Ya" program in Bantul, Yogyakarta, which successfully integrates physical activities (organic waste management, backyard farming) with social and productive activities, offer an effective example of comprehensively improving physical activity and well-being among the elderly.(20) Similar models, rooted in the local community context, have the potential to serve as a foundation for the development of sustainable and effective interventions to improve the quality of life of the elderly in Yogyakarta.

Additionally, health conditions such as hypertension, although manageable through appropriate physical activity, are often perceived as physical barriers to activity among older adults.(21) A lack of physical activity increases the risk of non-communicable diseases and mortality by 20-30% compared to active individuals.(22) Therefore, interventions targeting older adults need to consider these demographic and health conditions to ensure the relevance and acceptability of the program.

The Relationship Between Social Factors and Physical Activity Among the Elderly

Seniors who receive socials support from family, friends, or relatives tend to have a higher desire for a healthy life. Based on this study, physical active is associated with

social factors (p-value of 0.000) and the results of the multivariate analysis underscore the dominant role of social factors as the most significant predictor of physical activity among older adults in Yogyakarta City, with an odds ratio (OR) of 62.876 (95% CI: 8.192–482.570; p = 0.000). This finding clearly indicates that older adults who have adequate social support—whether from family, peers, or their community—are 62 times more likely to maintain an active lifestyle compared to those who receive less support.

Social support enhances older adults' self-efficacy to participate in physical activities, reduces psychological barriers such as fear or lack of interest, and provides essential external motivation.(23) A person's physical, mental, and social well-being is influenced by social support, which can come in the form of love, care, and assistance from family, friends, or neighbors. Seniors become more active and confident with instrumental support, such as help and companionship. Social interactions that trigger laughter and humor also increase the production of endorphins, which help lower blood pressure. Thus, high social factors contribute to increased physical activity among seniors. It is hoped that continued support from family and friends will be provided to maintain the health of elderly.(24)

In the Indonesian cultural context, particularly in Yogyakarta with its community-oriented society (*guyub*), strong social bonds can serve as a natural foundation for this support, encouraging older adults to participate in group physical activities.(25) This phenomenon is also evident in data on barriers to physical activity among the elderly, where “social support” is a significant barrier, and when this barrier is overcome, the likelihood of the elderly becoming active increases dramatically.

Various programs and interventions have demonstrated effectiveness in leveraging social factors to promote physical activity among the elderly. At the community level, initiatives that facilitate the formation of peer-group physical activity programs have proven effective. For example, programs where older adults encourage

and motivate each other to walk together, exercise, or engage in gardening activities have successfully increased participation and retention rates.(26)

Governments or non-profit organizations can support the formation and sustainability of these groups through training for elderly facilitators and providing simple infrastructure. In Indonesia, the Posyandu Lansia (Elderly Health Post) is an ideal platform for implementing these social-based interventions, where health workers and volunteers can facilitate group physical activities and build social networks.(27) Furthermore, interventions involving family support, such as encouraging older adults to participate in family physical activities or providing emotional support, are also crucial. A study by Chiu Y et al. (2021) highlights that instrumental support (e.g., rides to exercise facilities) and emotional support from family members are significantly associated with higher levels of physical activity.(28) Therefore, educating families about the importance of this support can be an integral part of strategies to promote physical activity among the elderly.

The Relationship Between Environmental Factors and Physical Activity Among the Elderly

The results of the multivariate analysis underscore the dominant role of social factors as the most significant predictor of physical activity among older adults in Yogyakarta City, with an odds ratio (OR) of 62.876 (95% CI: 8.192–482.570; p = 0.000). This finding clearly indicates that older adults who have adequate social support–whether from family, peers, or their community–a re 62 times more likely to maintain an active lifestyle compared to those who receive less support. The consistency of these findings with Albert Bandura's Social Cognitive Theory (SCT) is evident, where the reciprocal interaction between personal factors, behavior, and the environment is key. Social support enhances older adults' self-efficacy to participate in physical activities, reduces psychological barriers such as fear or lack of interest, and provides essential external motivation.(29) In the Indonesian cultural context, particularly in Yogyakarta

with its community-oriented society (guyub), strong social bonds can serve as a natural foundation for this support, encouraging older adults to participate in group physical activities. This phenomenon is also evident in data on barriers to physical activity among the elderly, where "social support" is a significant barrier, and when this barrier is overcome, the likelihood of the elderly becoming active increases dramatically.

Various programs and interventions have demonstrated effectiveness in leveraging social factors to promote physical activity among the elderly. At the community level, initiatives that facilitate the formation of peer-group physical activity programs have proven effective. For example, programs where older adults encourage and motivate each other to walk together, exercise, or engage in gardening activities have successfully increased participation and retention rates.(30) Furthermore, interventions involving family support, such as encouraging older adults to participate in family physical activities or providing emotional support, are also crucial. Therefore, educating families about the importance of this support can be an integral part of strategies to promote physical activity among the elderly.

In addition to social factors, this study also identified that environmental factors have a statistically significant association with older adults' physical activity, as indicated by an OR value of 1.812 (95% CI: 0.988–3.322; p = 0.000). These results suggest that a supportive physical environment–such as the availability of safe green open spaces, easily accessible sports facilities, and adequate environmental safety conditions–can nearly double the likelihood of older adults engaging in physical activity. These findings strongly support the Ecological Health Model, which emphasizes that healthy behavior is influenced by various layers of the environment, including the physical environment that provides opportunities and facilitates activities. An adequate environment not only removes access barriers but also directly encourages physical activity by providing attractive and safe places for walking or exercising. Numerous studies in global and national urban settings have confirmed the importance of the availability and quality of

infrastructure such as well-maintained sidewalks, urban parks, and safe recreational areas as drivers of physical activity among older adults.(31)

To leverage environmental factors, local governments and communities need to invest in the development and maintenance of infrastructure that supports physical activity among the elderly. This includes constructing flat and wide sidewalks, adequate lighting at night, adding benches along walking paths, and developing green open spaces such as city parks equipped with simple exercise facilities that are elderly-friendly.(32) Government programs such as "Senior-Friendly Cities" or "Smart City" initiatives can integrate urban planning focused on improving accessibility and safety for seniors to engage in physical activity. Additionally, efforts can be made to enhance environmental safety, such as through regular patrols or community participation in maintaining security, so that seniors feel safe to engage in activities outside their homes.(33) Research also highlights that the availability of public facilities such as parks and sports fields near where older adults live is positively correlated with their level of physical activity.(34) Thus, investment in improving the physical environment is crucial to creating an ecosystem that enables older adults to remain active.

CONCLUSION

This study shows that social factors play as dominant role than physical environmental factors in influencing the physical activity of older adults. Social support from family and community has been shown to encourage older adults to participate in activities that are beneficial to their health. Therefore, community-based interventions involving families and the surrounding environment need to be strengthened, accompanied by the provision of elderly-friendly public facilities and ongoing education. The government is also expected to play an active role, particularly in reaching out to elderly people with low levels of education. Further research is needed to identify the most effective forms of social support and differences in influence between regions.

BIBLIOGRAPHY

1. Badan Pusat Statistik/ BPS. Statistik Penduduk Lanjut Usia 2023. Cited, 2025 April, 24. Available from: https://www.bps.go.id/id/publication/2023/12/29/5d308763ac29278dd5860fad/statistik-penduduk-lanjut-usia-2023.html
2. Alfana MAF, Laudiansyah R, Fauziyanti NU, Sadali MI, Ismayuni N, Maulana R. Demographic transition and population ageing in Yogyakarta. Haryono E, Lavigne F, Che Omar R, White B, Cardenas Tristan A, Rahmawati Hizbaron D, et al., editors. E3S Web Conf [Internet]. 2020 [cited 2025 May 31]; 200:04002. Available from: https://www.e3s-conferences.org/10.1051/e3sconf/202020004002
3. Bosu WK, Reilly ST, Aheto JMK, Zucchelli E. Hypertension in older adults in Africa: A systematic review and meta-analysis. PLoS ONE. 2019;14(4):1–25.
4. Tanziha I, Khomsan A, Riyadi H, Syahwani AKI. Analisis Situasional Aktivitas Fisik dengan Instrumen Alat Analisis Stituasi (Situational Analysis Tools) untuk Aktivitas Fisik di Indonesia. 2021. (Cited 2025, Maret 10) Available from: https://repository.ipb.ac.id/handle/123456789/111119
5. Biernat E, Piątkowska M. Sociodemographic Determinants of Physical Inactivity of People Aged 60 Years and Older: A Cross-Sectional Study in Poland. BioMed research international. 2020;2020(1):7469021.
6. Kepper, M.M., Myers, C.A., Denstel, K.D. *et al.* The neighborhood social environment and physical activity: a systematic scoping review. *Int J Behav Nutr Phys Act* **16**, 124 (2019). https://doi.org/10.1186/s12966-019-0873-7
7. Stamatakis E, Koster A, Hamer M, Rangul V, Lee IM, Bauman AE, et al. Emerging collaborative research platforms for the next generation of physical activity, sleep and exercise medicine guidelines: the Prospective Physical Activity, Sitting, and Sleep consortium (ProPASS). Vol. 54, British journal of sports medicine. BMJ Publishing Group Ltd and British Association of Sport and Exercise Medicine; 2020. p. 435–7.
8. Steinhoff, P., Reiner, A. Physical activity and functional social support in community-dwelling older adults: a scoping review. *BMC Public Health* **24**, 1355 (2024). https://doi.org/10.1186/s12889-024-18863-6
9. World Health Organization. Promoting physical activity and healthy diets for healthy ageing. 2023. 1–42 p. Cited 2025, April 20. Available from: https://www.who.int/europe/publications/i/item/WHO-EURO-2023-8002-47770-70520
10. Kementrian Kesehatan Republlik Indonesia. Gerakan Masyarakat Hidup Sehat (GERMAS). Cited 2025, March 2. Available from: https://ayosehat.kemkes.go.id/germas

11. WHO (World Health Organization). WHO guidelines on physical activity and sedentary behaviour. Geneva: World Health Organization. 2020;
12. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. British journal of sports medicine. 2020;54(24):1451–62.
13. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. The Lancet Global Health. 2018 Oct;6(10):e1077–86.
14. Setiati, S. et al. Sedentary lifestyle and its associated factors among older adults in Indonesia: A nationwide survey. Journal of Gerontology: Series A. 2023;
15. Tey, C. K. et al. Sedentary behavior and its associated factors among older adults in Southeast Asia: A systematic review. Geriatrics & Gerontology International. 2022(7):541–50.
16. Aoyagi, Y., & Park H. Gender differences in physical activity and sedentary behavior in older adults: A review. Journal of Clinical Gerontology and Geriatrics. 2021;12(1):1–8.
17. Liu, Y. et al. Socioeconomic status and physical activity among older adults: A systematic review and meta-analysis. Journal of Sport and Health Science,. 2020;9(5):456–67.
18. Sanjoto, I. M. D. et al. Hubungan Antara Aktivitas Fisik dan Kontrol Tekanan Darah pada Lansia dengan Hipertensi. Jurnal Ilmu Kesehatan Masyarakat. 2022;13(2):200–9.
19. Pinto, M., Lima, L., & Guedes M. Social support and physical activity in older adults: A systematic review and meta-analysis. BMC Geriatrics. 2021;21(1):1–15.
20. Wulandari, E., Kurniawati, D., & Masyita S. Community-based intervention to promote physical activity and well-being among older adults: A case study of "Klasikal-Ya" program in Bantul, Yogyakarta. Jurnal Pengabdian Kepada Masyarakat. 2020;
21. Nik-Nasir NM, Md-Yasin M, Ariffin F, Mat-Nasir N, Miskan M, Abu-Bakar N, et al. Physical Activity in Malaysia: Are We Doing Enough? Findings from the REDISCOVER Study. International Journal of Environmental Research and Public Health. 2022;19(24).
22. Haileamlak A. Physical Inactivity: The Major Risk Factor for Non-Communicable Diseases. Ethiop J Health Sci. 2019 Jan;29(1):810. doi: 10.4314/ejhs.v29i1.1. PMID: 30700947; PMCID: PMC6341444.
23. Indriani AN. Hubungan Dukungan Sosial Keluarga Dengan Aktivitas Fisik Pada Lansia Dengan Asam Urat Di Wilayah Kerja Puskesmas Baki Kabupaten Sukoharjo. Universitas Kusuma Husada Surakarta. 2023;

24. Sugiyama, T., Tamura, N., & Aoyagi Y. Community-based physical activity groups and their association with physical activity levels in older Japanese adults. Journal of Sport and Health Science. 2019;8(3):209-216.
25. Setyaningsih, N., & Sari IP. Peran Posyandu Lansia dalam Peningkatan Aktivitas Fisik dan Kualitas Hidup Lansia. Jurnal Kesehatan Masyarakat Indonesia,. 2020;15(1):1–8.
26. Bauman, A. et al. The effects of Neighbourhood built environment on physical activity: A systematic review and meta-analysis of longitudinal studies. The Lancet Planetary Health,. 2021;5(6):e388–99.
27. Harahap, Arman et al. Posyandu Elderly As An Alternative Health Care Program. International Journal Of Community Service. 1(3):365-369 DOI: 10.51601/ijcs.v1i3.51
28. Kurniati, A., & Budihapsari R. Peran Lingkungan Fisik Terhadap Tingkat Aktivitas Fisik Lansia di Perkotaan: Tinjauan Sistematis. Jurnal Ilmu Kesehatan Masyarakat. 2022;17(11):12–21.
29. Collado-Mateo D, Lavín-Pérez AM, Peñacoba C, Del Coso J, Leyton-Román M, Luque-Casado A, Gasque P, Fernández-Del-Olmo MÁ, Amado-Alonso D. Key Factors Associated with Adherence to Physical Exercise in Patients with Chronic Diseases and Older Adults: An Umbrella Review. Int J Environ Res Public Health. 2021 Feb 19;18(4):2023. doi: 10.3390/ijerph18042023. PMID: 33669679; PMCID: PMC7922504.
30. Gharahani, P. et al. Built environment and physical activity in older adults: A systematic review of intervention studies. Journal of Urban Health. 2022;99(1):1–15.
31. The US Department of Health and Human Services (HHS). Rural Health Promotion and Disease Prevention Toolkits. 2020. Cited 2025, March 1. Available from: https://www.ruralhealthinfo.org/toolkits/health-promotion/2/theories-and-models/ecological#:~:text=Theory%20at%20a%20Glance:%20A,detection%2C%20control%2C%20and%20management.
32. Abdulla Baobeid, Muammer Koç and Sami G. Al-Ghamdi. Walkability and Relationships with Health, Sustainability, Liveability; Elements of Physical Environment and Evaluation Framework. Frontier. Built Environ. 7:721218. Published: 30 September 2021doi: 10.3389/fbuil.2021.721218
33. Mohammed Ali Berawi, Mustika Sari, Perdana Miraj. Developing Sustainable Smart Cities To Improve Citizen's Quality Of Life And Well-Being. 2023. CSID Journal of Infrastructure Development, 6(1): 1-3 ISSN 2407-4438
34. Yufang Zhang, Marijke Koene, Chen Chen, Cor Wagenaar, Sijmen A. Reijneveld. Association between the Built Environment and Physical Activity in Children, Adults and Older People: A Narrative Review of Reviews. 2024. The Journal of Preventive Medicine, Volume 180, March 2024, 107856