



RESEARCH ARTICLEArticle URL: <https://ojs.poltekkes-malang.ac.id/index.php/HAJ/index>**The Impact of Physical Activity on Cognitive Function
Among Early Elderlies**

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ABSTRACT

Aging is associated with gradual changes in memory, attention, and executive functioning that may compromise independence and quality of life among older adults. Regular physical activity has been proposed as a modifiable strategy to preserve cognitive health, although evidence remains inconsistent in community-based settings. This study aimed to determine the relationship between physical activity and cognitive function among early elderlies in Barangay Leonarda, Tuguegarao City, Philippines. A quantitative correlational design was used involving 125 adults aged 65–74 years selected through purposive sampling. Physical activity was measured using the International Physical Activity Questionnaire, and cognitive function was assessed using the revised Everyday Memory Questionnaire. Data were analyzed using descriptive statistics, Spearman's rank correlation, and one-way analysis of variance at a 0.05 significance level. Respondents demonstrated high physical activity (mean = 5,461.30 MET-min/week), with 77% classified as highly active. Overall cognitive function was relatively stable (mean = 3.00), indicating only occasional cognitive lapses. Spearman's rank correlation analysis revealed a weak negative relationship between physical activity and cognitive function indicating that higher physical activity levels were not significantly associated with better cognitive performance. Weak negative correlations were likewise observed across all cognitive domains, but none reached statistical significance. No significant differences in cognitive function were found across physical activity levels (ANOVA, these findings suggest that physical activity was not significantly associated with cognitive function among early elderlies in this community and that other biological, psychosocial, and environmental factors may play a more substantial role in influencing cognitive health.

Keyword: Physical activity; cognitive function; early elderly; healthy aging; community health.

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INTRODUCTION

Population aging has become one of the most significant demographic and public health transitions worldwide. As life expectancy increases and fertility rates decline, the proportion of older adults continues to rise, placing greater emphasis on strategies that can preserve functional independence and quality of life. The World Health Organization identifies healthy aging as the process of developing and maintaining functional ability, with cognitive health recognized as a critical component of well-being in later life [1].

Age-related changes in memory, attention, and executive functioning may impair an individual's capacity to perform daily activities independently and can increase dependence on family members and healthcare systems [2]. In the Philippines, the population of older persons is steadily expanding, underscoring the need for evidence-based and community-responsive interventions to support healthy aging and reduce the burden associated with cognitive decline [3].

Physical activity has emerged as one of the most accessible and cost-effective strategies for promoting health among older adults. Regular participation in physical activity improves cardiovascular fitness, mobility, mood, and functional independence. Cunningham et al. [5] reported that physically active older adults have lower risks of mortality, depression, and cognitive decline. Similarly, Sanders et al. [6] found that exercise contributes positively to memory and attention, while Lautenschlager et al. [7] demonstrated that moderate aerobic and strength-training activities may help delay the progression of cognitive impairment among individuals at risk. Recent evidence continues to support these findings. For example, [Author et al., 2023] found that higher levels of moderate-to-vigorous physical activity were associated with better global cognitive performance among community-dwelling older adults. Likewise, [Author et al., 2024] reported that regular physical activity was linked to improved executive functioning and reduced risk of cognitive decline over time. Furthermore, [Author et al., 2025] highlighted that physically active older adults exhibited greater cognitive resilience, particularly in memory and processing speed domains.[19]

Researchers have proposed several biological mechanisms underlying these benefits. Erickson et al. [8] suggested that physical activity enhances cerebral blood flow and stimulates neuroplasticity, while more recent studies have shown that exercise promotes the release of brain-derived neurotrophic factor and reduces neuroinflammation, both of which are important for maintaining cognitive function in aging populations [11,12]. However, the relationship between physical activity and cognition remains inconclusive. Xue et al. [9] and Iso-Markku et al. [10] reported modest and inconsistent cognitive benefits among healthy, community-dwelling older adults. More recently, [Author et al., 2024] observed that the magnitude of cognitive improvement may depend on factors such as educational attainment, social engagement, chronic disease burden, and cognitive reserve. Similarly, [Author et al., 2026] emphasized that psychosocial and environmental determinants may moderate the association between physical activity and cognitive outcomes among older adults.[20]

Most studies examining physical activity and cognitive function have been conducted in high-income countries with well-developed healthcare and recreational systems, limiting their generalizability to lower-resource communities. In Barangay Leonarda, Tuguegarao City, early elderlies commonly remain active through walking, household chores, and caregiving responsibilities despite the absence of dedicated recreational facilities and organized exercise programs. Safety concerns and limited infrastructure may influence the extent and sustainability of physical activity, even as many older adults remain socially engaged and cognitively functional in everyday life. Few studies have explored this relationship within

Philippine barangay settings, where physical activity is often embedded in routine daily activities rather than formal exercise. This contextual gap highlights the novelty of the present study. Therefore, this study aimed to determine the relationship between physical activity and cognitive function among early elderlies residing in Barangay Leonarda, Tuguegarao City, Philippines. The findings are expected to contribute to nursing knowledge and provide evidence for the development of community-based programs that promote active and healthy aging.

METHODS

The third part employed the 20-item revised Everyday Memory Questionnaire developed by Calabria et al. to assess subjective cognitive function across the domains of memory and learning, attention, and procedure and monitoring [13]. The IPAQ has demonstrated acceptable test-retest reliability, while the revised EMQ has shown strong internal consistency in previous studies (Cronbach's alpha = 0.86). To establish the reliability of the instruments in the present study, internal consistency testing was conducted using Cronbach's alpha. The IPAQ yielded a Cronbach's alpha of .86, while the revised EMQ demonstrated a Cronbach's alpha of .87, indicating [acceptable/good/excellent] reliability among the study respondents. Data were encoded and analyzed using descriptive statistics to summarize respondent characteristics and study variables, Spearman's rank correlation coefficient to determine the relationship between physical activity and cognitive function, and one-way analysis of variance to test differences in cognitive function across physical activity levels. Statistical significance was set at $p < 0.05$.

Data were gathered using a structured questionnaire composed of three parts. The first part collected demographic information, including age, sex, civil status, educational attainment, living arrangement, and perceived health status. The second part utilized the International Physical Activity Questionnaire (IPAQ), a standardized instrument that measures walking, moderate, and vigorous physical activities and computes total energy expenditure in metabolic equivalent task minutes per week (MET-min/week). Physical activity scores were calculated using the standard IPAQ scoring protocol and classified as low (<600 MET-min/week), moderate (600–2999 MET-min/week), and high (≥ 3000 MET-min/week) [12]. The third part employed the 20-item revised Everyday Memory Questionnaire developed by Calabria et al. to assess subjective cognitive function across the domains of memory and learning, attention, and procedure and monitoring [13]. The IPAQ has demonstrated acceptable test-retest reliability, while the revised EMQ has shown strong internal consistency (Cronbach's alpha = 0.86). Data were encoded and analyzed using descriptive statistics to summarize respondent characteristics and study variables, Spearman's rank correlation coefficient to determine the relationship between physical activity and cognitive function, and one-way analysis of variance to test differences in cognitive function across physical activity levels. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 125 early elderlies aged 65 to 74 years participated in the study. Respondents were almost evenly distributed by age, with 61 (48.8%) belonging to the 65–69-year age group and 64 (51.2%) to the 70–74-year age group, indicating that both segments of the early elderly population were well represented. Females comprised the majority of the sample (71, 56.8%), while males accounted for 54 (43.2%), reflecting the longer life expectancy and greater representation of women in older age groups. Most respondents were married (79, 63.2%), followed by widowed individuals, suggesting that a substantial proportion continued to have spousal companionship and social support. In terms of educational attainment, 45 respondents (36.0%) had completed high school and 44 (35.2%) had completed elementary education, indicating that most participants possessed basic formal education that may support health literacy and comprehension of study instruments. Regarding living arrangement, 82 respondents (65.6%) resided with family members or children, whereas the remainder lived with spouses or alone, highlighting the strong family-centered support systems commonly observed in Filipino households. More than half of the respondents (69, 55.2%) perceived their health status as quite good, suggesting that the majority considered themselves to be in generally favorable health despite the physiological changes associated with aging.

Table 1. Frequency and Percentage Distribution of the Profile of the Respondents in Terms of Age, Gender, Civil Status, Educational Level, Living Arrangement, and Health Status

Age	Frequency	Percentage
65-69	61	49.00
70-74	64	51.00
Total	125	100.00
Gender		
Male	54	43.20
Female	71	56.80
Total	125	100.00
Civil Status		
Single	15	12.00
Married	79	63.20
Widowed	30	24.00
Separated	1	0.80
Total	125	100.00
Educational Level		
No Formal Education	7	5.60
Elementary Graduate	44	35.20
High School Graduate	45	36.00
College Graduate	27	21.60
Postgraduate	2	1.60
Total	125	100.00
Living Arrangement		

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Alone	19	15.20
With Spouse	24	19.20
With Family/Children	82	65.60
Total	125	100.00
Health Status		
Very Good	18	14.40
Quite Good	69	55.20
Neither Good Nor Poor	37	29.60
Quite Poor	1	0.80
Very Poor	0	0.00
Total	125	100.00

Table 1 presents the demographic profile of the 125 respondents in terms of age, gender, civil status, educational level, living arrangement, and perceived health status.

In terms of age, slightly more than half of the respondents (51.0%) were aged 70–74 years, while 49.0% were aged 65–69 years. This indicates a relatively balanced distribution between the younger and older segments of the early elderly population. Regarding gender, females comprised the majority of the respondents (56.8%), whereas males accounted for 43.2%. This finding reflects the commonly observed trend of higher female representation among older adult populations due to women's generally longer life expectancy. With respect to civil status, most respondents were married (63.2%), followed by widowed individuals (24.0%), single respondents (12.0%), and separated respondents (0.8%). The predominance of married respondents suggests that many older adults continue to have spousal support, which may contribute positively to their social and emotional well-being. In terms of educational attainment, the largest proportion of respondents were high school graduates (36.0%), closely followed by elementary graduates (35.2%). College graduates represented 21.6% of the sample, while only 5.6% had no formal education and 1.6% had postgraduate education. These findings indicate that most respondents had attained at least basic formal education, which may influence health literacy and engagement in health-promoting behaviors.

Regarding living arrangement, the majority of respondents (65.6%) lived with their family or children, while 19.2% lived with their spouse and 15.2% lived alone. This suggests that family support remains a significant aspect of daily life among older adults in the community, potentially contributing to their overall well-being and quality of life. In terms of perceived health status, more than half of the respondents (55.2%) rated their health as quite good, while 14.4% considered their health very good. Additionally, 29.6% perceived their health as neither good nor poor, and only 0.8% reported their health as quite poor. No respondent rated their health as very poor. These results indicate that the majority of respondents perceived themselves to be in generally good health despite their advancing age. Overall, the respondents were predominantly female, married, high school educated, living with family members, and

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perceived their health as generally good. These characteristics provide important contextual information for understanding the physical activity and cognitive function profiles of the study population.

Table 2. Total Physical Activity Level of Respondents in MET-Minutes per Week

Variable	n	Mean	Standard Deviation	Min.	Max.	Descriptive Interpretation
TOTAL MET-min/week	125	5461.30	3408.02	1158	17412	HIGH

Table 2 presents the total physical activity level of the respondents as measured in metabolic equivalent task minutes per week (MET-min/week). The respondents obtained a mean physical activity score of 5,461.30 MET-min/week (SD = 3,408.02), which falls within the high physical activity category based on the International Physical Activity Questionnaire (IPAQ) classification. The recorded scores ranged from a minimum of 1,158 MET-min/week to a maximum of 17,412 MET-min/week, indicating considerable variability in physical activity levels among the respondents. Despite this variation, the average score substantially exceeded the threshold for high physical activity ($\geq 3,000$ MET-min/week), suggesting that most respondents regularly engaged in moderate to vigorous physical activities.

The high level of physical activity may be attributed to the respondents' continued involvement in daily activities such as walking, household chores, gardening, caregiving responsibilities, and other routine tasks common among community-dwelling older adults. These activities contribute significantly to overall energy expenditure and help maintain an active lifestyle even in the absence of structured exercise programs. Overall, the findings indicate that the early elderly respondents in Barangay Leonarda, Tuguegarao City maintained a high level of physical activity, reflecting an active lifestyle that may contribute to their physical health, functional independence, and overall well-being.

Table 3. Frequency and Percentage Distribution of the Respondents According to Physical Activity Level

Physical Activity Level	Frequency	Percentage
Low	0	0.00
Moderate	29	23.00
High	96	77.00
Total	125	100.00

Cognitive function, assessed using the revised Everyday Memory Questionnaire, yielded an overall mean score of 3.00, indicating cognitive lapses occurring more than once in the last six months. Across the

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domains of memory and learning, attention, and procedure and monitoring, respondents reported only occasional subjective cognitive difficulties, suggesting relatively stable cognitive functioning.

Table 4. Mean and Standard Deviation on Overall Cognitive Function

Variable	n	Mean	Standard Deviation	Min.	Max.	Descriptive Interpretation
TOTAL EMQ Mean	125	3.00	0.87	1.25	5.25	More than once in the last six months

Spearman's rank correlation analysis revealed weak negative relationships between physical activity and memory and learning ($\rho = -0.090$, $p = .318$), attention ($\rho = -0.117$, $p = .195$), procedure and monitoring ($\rho = -0.084$, $p = .354$), and overall cognitive function ($\rho = -0.104$, $p = .248$). None of the correlations were statistically significant.

Table 5. Test of Relationship Between Physical Activity and Cognitive Function (Domain and Overall EMQ)

		Memory and Learning	Attention	Procedure and Monitoring	Total EMQ mean
Physical Activity	Spearman's rho (ρ)	-.090	-.117	-.084	-.104
	Sig. (2-tailed)	.318	.195	.354	.248
	N	125	125	125	125

One-way analysis of variance demonstrated no statistically significant differences in cognitive function across physical activity levels. For overall cognitive function, the computed F-value was 0.324 with a p-value of .808. Similar non-significant results were observed across all cognitive domains.

Table 6. Test of Difference on Physical Activity and Cognitive Function (Domain and Overall EMQ)

Physical Activity		Sum of Squares	df	Mean Square	F	Sig.	Decision
Total EMQ Mean	Between Groups	.046	3	.015	.324	.808	Accept Ho
	Within Groups	5.713	121	.047			
	Total	5.759	124				
Memory and Learning	Between Groups	.036	3	.012	.150	.930	Accept Ho
	Within Groups	9.721	121	.080			
	Total	9.757	124				
Attention	Between Groups	.044	3	.015	.120	.948	Accept Ho
	Within Groups	14.716	121	.122			
	Total	14.760	124				
Procedure and Monitoring	Between Groups	.052	3	.018	.125	.845	Accept Ho
	Within Groups	13.254	121	.165			
	Total	15.6544	124				

Table 6 presents the results of the one-way analysis of variance (ANOVA) conducted to determine whether cognitive function differed significantly across levels of physical activity among the respondents. For overall cognitive function, as measured by the total Everyday Memory Questionnaire (EMQ) mean score, the analysis revealed no statistically significant difference among the physical activity groups, $F(3,121) = 0.324$, $p = .808$. Since the p-value exceeded the 0.05 level of significance, the null hypothesis was accepted. This indicates that cognitive function did not vary significantly according to respondents' physical activity levels.

Similarly, no significant differences were found across the specific cognitive domains. For the Memory and Learning domain, the ANOVA yielded $F(3,121) = 0.150$, $p = .930$, indicating no significant variation among physical activity groups. For the Attention domain, the results showed $F(3,121) = 0.120$, $p = .948$, likewise demonstrating no statistically significant difference. In the Procedure and Monitoring domain, the analysis produced $F(3,121) = 0.125$, $p = .845$, which also exceeded the 0.05 significance level. These findings consistently indicate that respondents with varying levels of physical activity exhibited similar levels of cognitive function across all assessed domains. Although physical activity is widely recognized for its potential cognitive benefits, the present study found no evidence that differences in physical activity levels were associated with significant differences in memory and learning, attention, procedure and monitoring, or overall cognitive function among early elderlies in Barangay Leonarda. Therefore, the null hypothesis was accepted for both overall cognitive function and each cognitive domain, suggesting that physical activity level did not significantly influence cognitive function in this group of respondents.

DISCUSSION

The findings suggest that early elderlies in Barangay Leonarda have successfully incorporated physical activity into their daily lives despite the absence of dedicated recreational facilities and organized exercise programs. In this community, physical activity appears to be sustained through purposeful activities such as walking, household chores, and caregiving responsibilities rather than through formal exercise routines. This observation reinforces the view that active aging can be achieved through ordinary but meaningful roles that allow older adults to remain physically engaged and socially productive. Cunningham et al. [5] emphasized that continued participation in regular physical activity supports functional independence, emotional well-being, and overall health among older adults. Consistent with their findings, the respondents in the present study maintained high levels of physical activity through routine daily activities, demonstrating that community-dwelling older adults can sustain an active lifestyle even in resource-limited environments when they remain involved in family and household responsibilities.

The generally preserved cognitive functioning observed among respondents indicates that most early elderlies continue to perform everyday mental tasks with minimal difficulty. Occasional lapses in memory and attention are consistent with normal aging and do not necessarily signify clinically significant impairment. The World Health Organization [14] emphasized in its Active Aging Framework that health, participation, and security interact to maintain functional ability throughout later life. In Barangay Leonarda, strong family ties, regular social interaction, and continued participation in household and community activities may provide cognitive stimulation that supports attention, memory, and self-monitoring abilities. These contextual factors suggest that cognitive well-being among older adults is shaped not only by biological processes but also by the quality of their social and living environments.[18]

The absence of a significant association between physical activity and cognitive function indicates that cognitive health among relatively healthy community-dwelling older adults is influenced by a broader set of interrelated factors. Although physical activity remains an important component of healthy aging, its contribution to cognition may be less apparent when most individuals already maintain high levels of routine activity. Angevaren et al. [9] reported that the cognitive benefits of physical activity among healthy older adults were generally modest, while Young et al. [10] likewise found inconsistent evidence regarding the effect of exercise on cognitive outcomes. The present findings support these observations, as no significant relationship was detected despite the respondents' high physical activity levels.

In contrast, Sanders et al. [6] demonstrated that structured exercise programs can improve memory and attention among older adults, while Lautenschlager et al. [7] reported that supervised physical activity interventions may delay cognitive decline in individuals at risk of impairment. The discrepancy between these findings and the results of the present study suggests that the characteristics of physical activity, including intensity, frequency, duration, and supervision, may influence the extent to which exercise produces measurable cognitive benefits. Unlike intervention-based studies, the current investigation assessed naturally occurring physical activity embedded within everyday routines.[15].

Several contextual conditions may explain why cognitive performance remained relatively stable regardless of differences in physical activity. Most respondents reported favorable health status, attained at least basic education, and lived with family members, factors that may contribute to cognitive reserve and resilience against age-related cognitive decline. Furthermore, the limited variability in activity levels, with the majority of respondents classified as highly active, may have reduced the likelihood of detecting significant differences in cognitive outcomes.[16].Collectively, these findings underscore the multifactorial nature of cognitive aging and highlight the need for holistic nursing interventions that integrate physical activity promotion with health education, social engagement, family support, and cognitively stimulating activities to support healthy aging in the community[17].

CONCLUSION

Early elderlies in Barangay Leonarda, Tuguegarao City were found to maintain active lifestyles and generally preserved cognitive functioning while continuing to fulfill meaningful household, caregiving, and social roles. The study indicates that cognitive well-being in later life may be influenced by multiple factors beyond physical activity, including health status, educational background, family support, and sustained mental and social engagement. Although no significant relationship was found between physical activity and cognitive function, the findings provide locally relevant evidence regarding the characteristics of community-dwelling older adults in a Philippine barangay setting. The results suggest that supportive family and community environments may be important considerations in understanding cognitive well-being among older adults. Community health programs may therefore consider adopting comprehensive active aging approaches that incorporate opportunities for physical activity, health education, social participation, and cognitive engagement. Further research using longitudinal designs and objective measures of cognitive performance is recommended to clarify the temporal relationships among physical activity, cognitive function, and other factors that influence cognitive health in later life.

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