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Ageing and Cognitive Function: The Role of Physical Activity and Social Engagement

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ABSTRACT

Introduction: Aging is a natural biological process that results, among other things, in cognitive decline. While some cognitive abilities based on experience may be retained in seniors, information processing and memory skills may decline. Frequent physical, intellectual, and social activity can help slow brain degeneration. The coexistence of somatic and neurodegenerative diseases, along with a sedentary lifestyle in the elderly, complicates the development of appropriate clinical strategies and requires holistic care and research in this area. *Aim of the study:* Assessment of elements affecting cognitive function in seniors based on activity in various areas of daily life. *Materials and methods:* This study analyzed a 42-question survey administered to 116 individuals aged 60 or older residing in a nursing home. Health-promoting behaviors and knowledge about a healthy lifestyle were examined. *Results:* The analysis showed that the surveyed seniors most frequently engaged in physical activities such as walking, gardening, and cycling. They spent their free time chiefly watching television, reading books and newspapers, and relaxing. Respondents also demonstrated intellectual activity, most often through reading books, taking part in discussions, and attending University of the Third Age classes. *Conclusions:* Seniors are most active in daily life, including household chores and active participation in family life, which also gives them a sense of being needed. Seniors most often spend their free time passively, while their physical activity is usually moderate, such as walking or gardening. Respondents also pursue intellectual pursuits through reading books and attending University of the Third Age classes.

Keywords: ageing, elderly, cognitive functions, physical activity.

1. INTRODUCTION

Ageing is a natural biological process. It is characterized by the progressive deterioration of cellular, physiological, and mental functions. These changes contribute to the development of diseases commonly associated with ageing. The general well-being of older adults depends not only on health conditions but also on environmental and social circumstances, as well as how individuals see and approach the ageing process (Beard et al., 2016). Elderly individuals experience alterations in body composition, inequilibria between energy availability and

requirements, impaired regulation of signalling pathways, progressive neurodegeneration, and reduced neuroplasticity (Bektas et al., 2018).

Heterogeneity strongly characterizes the decline in cognitive abilities as we age. Building cognitive reserve over a lifespan—which is often achieved through continuous education, mentally taxing jobs, and other intellectual habits—effectively delays this deterioration, as Wang et al., (2024) demonstrated. Importantly, the brain does not age uniformly. For instance, older adults frequently maintain, or even improve, skills firmly rooted in life experience, such as vocabulary and autobiographical memory. On the other hand, rapid information processing, conscious memory recall, and verbal fluency are usually associated with a downward trend (An et al., 2018). Many scientific studies have confirmed the positive impact of moderate physical activity on reducing the risk of developing cancer and cardiovascular disease, but its effects on cognitive function are still being investigated.

Currently, we know that physical exercise improves brain function by increasing oxygenation, nourishing neurons, and stimulating neurotrophic growth factors, such as BDNF and NGF (Fernandes et al., 2018). Additionally, increased levels of orexin-A (Ox-A) have been demonstrated during exercise. Ox-A is a neuropeptide that, by acting on the hippocampus, not only participates in the regulation of wakefulness, arousal, motivation, emotions, motor and autonomic functions, but additionally supports learning and memory processes (Chieffi et al., 2017).

Despite health promotion efforts, many seniors do not engage in the level of physical activity recommended by the WHO. Common limitations are dysfunction and pain caused by chronic diseases, fear of falling, lack of motivation, and low socioeconomic status (Fang et al., 2023). Social contact is important for the elderly's well-being. Loneliness affects up to 30% of people over 60 and leads to an increased risk of cognitive impairment, stroke, depression, anxiety, and feelings of rejection (Ribeiro-Gonçalves et al., 2023). Seniors now have access to various leisure activities, such as senior clubs that organise social gatherings, cultural events, and gymnastics. Third Age Universities help develop new skills. Social Time Banks and volunteer programs also offer chances for engagement (Pędziwiatr, 2015).

Elderly people are at risk of malnutrition. This negatively impacts physical health and also reduces memory, attention, and thinking skills. Malnourished older adults, especially those with dementia, are at risk of accelerated cognitive decline, exacerbated neuropsychiatric symptoms, and have a higher risk of hospitalization and death (Ward et al., 2023).

Cognitive impairments in older adults are complex and multifactorial. Timely assessment and treatment require multidimensional care, an individualized approach, and joint effort among an interdisciplinary team. These specialists can slow down the ageing process via various mechanisms. For seniors, somatic diseases, neurodegenerative changes, and physical inactivity overlap. This complicates the clinical picture and emphasizes the need for holistic care and further research into therapeutic methods for cognitive disorders (Sandison et al., 2023).

2. METHODS

The study was conducted in November 2023 at a nursing home using a diagnostic survey and a questionnaire. The primary inclusion criterion for respondents was age 60 or older. A detailed 42-question questionnaire was used as the research tool. This instrument assessed the study group's health-promoting behaviors, knowledge of healthy lifestyles, and health self-awareness. The data obtained also aimed to verify the need for improved health education among seniors.

Participation in the study was voluntary and anonymous. Each respondent received instructions summarizing the project's scientific purpose and response rules before participating. This ensured standardization and guaranteed full confidentiality. Participant privacy was also respected. The ethical approval number is (KBE No. 09/05/2020). The collected material underwent quantitative and descriptive analysis. The data were statistically analyzed to identify dominant patterns and the percentage structure of respondents' responses.

3. RESULTS

Demographic and social characteristics of the study group.

The study involved 116 seniors. More than half were women (68.1%), and nearly one-third were men (31.9%). Only respondents aged 60 or older took part in the study. The group had varying education levels. The largest groups had secondary vocational education (25.9%) and higher education (25.9%). A significant portion had vocational education (20.7%). Only 15 had completed primary education. Over half were married (64.7%). Nearly one-quarter were widows or widowers. Single and divorced individuals each made up 5.2% of the group.

Most participants lived in urban areas. 53.4% lived in small towns, and 5 reported living in large cities. 42.2% lived in rural areas. Over half (56.9%) lived with their spouses. Nearly one-fifth lived alone. 11.2% lived with children. The remaining group lived in other mixed-gender settings (Table 1).

Table 1. Living arrangements of the respondents (N=116)

Living arrangement	Number of responses	Percent (%)
With spouse	66	56.9
Alone	23	19.8
With children	13	11.2
With spouse and children	10	8.6
With relatives	2	1.7
With a friend	1	0.9
With children and grandchildren	1	0.9

Financial situation and source of income

The vast majority of respondents (86.2%) rated their financial situation as good. The remaining respondents rated their financial situation as poor (7.8%), average (3.4%), and very good (2.6%). Pension benefits were the main source of income for 79.3% of respondents. It is worth noting that 1 in 10 respondents reported taking up paid employment after retirement, and the smallest group (2.6%) was still professionally active. The remaining group (6.9%) were individuals on disability pensions, and only 0.9% of respondents were supported by a spouse and children. It is worth noting that no one in the study group indicated financial support from children as their sole source of income.

Physical Activity and Health Status of Respondents

Among the surveyed seniors, the largest group (44.8%) rated their health as average. 37.9% rated their health as good. Only eight reported very good health. Twelve assessed their health as negative; eleven described it as poor, and one as very poor. Respondents rated their physical fitness: 45.7% said it was good, while 36.2% rated it as average. Twelve assessed their physical fitness negatively; eight rated it as poor, three as very poor, and one as poor. Walking was the most frequently chosen physical activity (77.6%). Gardening was second (57.8%), and cycling was chosen by half (50.0%). Other activities improving fitness are listed in Table 2. Respondents could choose more than one option.

Table 2. Types of activities improving physical fitness in older adults

Types of physical activity	Number of responses	Percent (%)
Walking	90	77.6
Gardening	67	57.8
Cycling	58	50.0
Attending rehabilitation	32	27.6

Daily gymnastics	25	21.6
Swimming	23	19.8
Group exercises (in a club, gym, etc.)	17	14.7
Other	15	12.9
Running	2	1.7
Do not engage in any activities	2	1.7

Cultural activity and ways of spending free time

Seniors most often spend their free time in passive activities. More than half of respondents watch television (73.3%) and read books or newspapers (62.9%). Exactly half indicated rest (50%), while 40.5% listen to the radio. Pursuing hobbies (34.5%), going to the cinema (33.6%), and going to the theatre (27.6%) are less popular. Other activities were chosen by less than 20% of respondents and are listed in Table 3. Respondents could select more than one answer.

Table 3. Leisure pursuits of older adults

Leisure pursuit	Number of responses	Percent (%)
Watching television	85	73.3
Reading books or newspapers	73	62.9
Resting	58	50.0
Listening to the radio	47	40.5
Pursuing hobbies	40	34.5
Going to the cinema	39	33.6
Attending the theater	32	27.6
Sleeping	20	17.2
Other	17	14.7
Singing in a choir	10	8.6
Participation in a folk group	9	7.8

The analysis shows that the most common obstacle is for 73.9% of respondents. Undertaking cultural activities in their free time was healthy. Distance to places of activity (44.1%) and limited financial resources (32.4%) also played an important role. The least frequently cited response was the lack of appropriate facilities and institutions nearby (23.4%), while 10.8% of Respondents reported other obstacles. Respondents could select more than one answer.

Respondents' Involvement in Daily Family Life

The research results show that the majority of people (83.6%) are involved in household chores, while the rest of the respondents are not involved in household chores. Based on the conducted research, older adults participate significantly in household chores. The most common activities performed by older adults include cleaning (21.0%), preparing meals (19.8%), and shopping (17.7%). Some individuals also take on more physical upkeep, with 10.1% carrying out minor home repairs. Interestingly, childcare – specifically watching over grandchildren (9.1%) and tending to family pets (8.8%) – accounted for nearly identical portions of respondents' time. Respondents least frequently indicated activities such as mending clothes or caring for the house when relatives were away, which received the same percentage (4.6%). Slightly fewer respondents (4.3%) selected "other" (Table 4). Respondents could select more than one answer.

Table 4. Types of daily responsibilities of older adults in the context of family life

Types of household responsibilities	Number of responses	Percent (%)
Cleaning	69	59.5%
Preparing meals	65	56.0%
Doing daily shopping	58	50.0%
Performing minor home repairs	33	28.4%
Caring for grandchildren	30	25.9%
Caring for pets	29	25.0%
Mending clothes	15	12.9%
House-sitting during relatives' absence	15	12.9%
Other	14	12.1%

Taking care of the house gives exactly half of the surveyed group (n=58) a sense of usefulness. Meanwhile, 37.9% view these everyday tasks simply as a method to occupy their time. A similar proportion (37.1%) reports a long-standing routine. For 34.5% of respondents, housework is an important source of motivation, while 30.2% derive satisfaction from it. For a much smaller group, 11.2% of participants, these chores served as a distraction from health problems, while 4.3% of respondents stated that household chores did not substantially affect their well-being. It is worth noting that none of the Participants selected "I have no opinion." Respondents could select more than one answer.

Intellectual Activity of Respondents

The analysis showed that older respondents most often update their knowledge through reading books (56.9%). A significant portion of the group discusses important topics with friends (39.7%) and reads newspapers daily (37.9%). Exactly the same percentage of respondents (34.5%) indicated participating in lectures or presentations and attending the University of the Third Age. The analysis showed that specialist press attracted less interest (20.7%), and other forms of educational activity were undertaken by approximately 24.1% of participants (Table 5). Respondents could select more than one answer.

The study results show that older adults have multiple preferences for venues to expand their knowledge. The largest group of respondents (69.0%) utilizes reading rooms and libraries, while slightly fewer (62.1%) attend Universities of the Third Age. Training centers (16.4%) and museums (13.8%) were less popular. Fourteen study participants (12.1%) reported attending other venues, whereas

twelve (10.3%) answered: "I do not know." Only nine individuals (7.8%) stated that there are no suitable places for knowledge development in their community (Table 6). Respondents could select more than one option.

Table 5. Activities enabling older adults to update their knowledge

Methods of expanding knowledge	Number of responses	Percent (%)
Reading books	66	56.9
Engaging in discussions with friends on important topics	46	39.7
Reading newspapers on a daily basis	44	37.9
Attending lectures or presentations	40	34.5
Being a student at the University of the Third Age	40	34.5
Reading specialized press	24	20.7
Other	28	24.1

Table 6. Venues for expanding knowledge in the older adult community

Venues for expanding knowledge	Number of responses (N)	Percent (%)
Reading rooms and libraries	80	69.0
University of the Third Age	72	62.1
Training centers	19	16.4
Museums	16	13.8
Other	14	12.1
I do not know	12	10.3
There are no such places	9	7.8

4. DISCUSSION

Research shows that seniors prefer to spend their free time at home. They can use this time in a variety of ways. Meghani et al., (2023) emphasize that the home environment can have both a positive and negative impact on leisure choices. Knowledge of the health benefits of exercise and established habits are key factors determining how elders choose to spend their free time. Respondents in our study most often chose low-intensity, easily accessible activities that do not require specialized equipment, such as walking or gardening, which is confirmed by the study by Martín-Martínez et al., (2026), which shows that seniors prefer independent, health-promoting, and recreational exercise.

In analyzing the activities of older adults, we note that passive activities, such as watching television or reading newspapers, are the most common. Although the majority of respondents report good or average health, You et al., (2023) argue that the main causes are

chronic diseases, pain, and fear of injury. It is worth noting the high level of intellectual activity among our study participants. They most frequently read books (56.9% of respondents), and over a third were students of the University of the Third Age. These behaviors are a key factor influencing cognitive function, supporting its proper functioning despite aging. Mao et al., (2023) emphasize that various forms of mental stimulation can increase cognitive reserve and help preserve cognitive abilities.

This study provides a multidimensional analysis of seniors' health and social spheres, emphasizing their involvement in family and intellectual life. It emphasizes the limitations associated with ageing that hinder full-time functioning in society.

5. CONCLUSION

The seniors who participated in the study were assessed in different aspects of their lives. Retirement has left them burdened with family and household responsibilities. Most respondents describe themselves doing things like cleaning, cooking, and daily shopping. In most cases, this isn't considered a heavy chore. Performing these tasks is not perceived solely as a burden. It is an important source of feeling needed and provides structure to their days. The home is still the primary place where older people fulfill their need for utility and activity.

The analysis of the collected data also indicates that the study group's financial situation is relatively stable and does not constitute a major barrier to their daily functioning. Most respondents report that their financial situation is good, mainly due to retirement. However, key limiting factors include health and distance from facilities offering such activities. These are the main reasons why older people must choose passive forms of spending time, such as watching television or reading the newspaper. Their physical activity, in turn, is based primarily on easily accessible, moderate forms of exercise, such as walking and gardening.

It is also worth mentioning the clear need for intellectual activity among the respondents. The survey results confirm that seniors are keen to expand their knowledge, not only through independent reading but also by taking part in classes at universities of the third age or local libraries. This indicates the growing importance of these institutions. Knowing these different needs of the study group - from eliminating health and communication barriers to further developing educational services - seems important for planning effective actions to support the quality of life of older people.

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Authors' Contributions

Conceptualization: Katarzyna Piekarz

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Writing – original draft: Katarzyna Piekarz

Writing – review & editing: Izabella Przado, Łukasz Karaś, Patrycja Patronik, Sabina Krupa- Nurcek. All authors have read and agreed with the final, published version of the manuscript.

Informed consent

Oral informed consent was obtained from individual participants included in the study.

Ethical approval

The study was done in conformity with ethical guidelines. Participation was entirely voluntary, and all respondents provided informed consent. The participants' anonymity and confidentiality were ensured, and the data obtained were utilized purely for the study. The ethical guidelines for Human Subjects are followed in the study. This article approved by the ethical approval number is (KBE No. 09/05/2020).

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Conflict of interest

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

Data and materials availability

All data associated with this study will be available based on the reasonable request to corresponding author.

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