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ORIGINAL ARTICLE

Correlation Between Physical Activity, Social Isolation and Cognitive Function in Retired Adults: A Pilot Study

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ABSTRACT

Background: Retirement is a significant change in life that can lead to variations in physical activity levels, social interactions, and cognitive health. Decreased exercise and elevated It has been discovered that social isolation be important risk factors for cognitive decline among older adults.

Aims: This study's goal was to ascertain the connection between exercise, social isolation, and cognitive function among retired adults.

Settings and Design: A pilot research was conducted on retired adults aged 60 years and above with no active employment at the AJ Urban Health Center.

Methods and Materials: Retired adults aged ≥60 years were hired based on convenience sampling. Physical activity, social isolation, cognitive skills were assessed using the Scale of Physical Activity for the Elderly, Revised UCLA Loneliness Scale, and Montreal Cognitive Assessment, respectively.

Statistical Analysis Used: IBM SPSS Statistics was used to analyze the data version 29.0. Characteristic statistics and Karl Pearson's correlation coefficient were used. The statistical significance threshold was fixed at $P < 0.05$.

Results: Physical activity showed a marginally favorable relationship with social isolation ($r = 0.190$, $p = 0.555$) and a somewhat favorable association with cognitive function ($r = 0.486$, $p = 0.109$). Social isolation demonstrated a slight negative correlation with cognitive function ($r = -0.326$, $p = 0.300$). However, none of the observed correlations were statistically significant.

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Conclusions: There were no discernible correlations between physical activity, social isolation, and cognitive function among retired adults. Although weak to moderate correlations were identified, none reached statistical significance. To confirm these results, more studies with larger sample numbers are advised.

KEYWORDS:

• Physical Activity • Social Isolation • Cognitive Function • Retired Adults • Aging

INTRODUCTION

Life expectancy has increased, making retirement an important stage of later years with important consequences for wellbeing and health. Retirement is connected to modifications in daily routine, occupational responsibilities, social interactions, and lifestyle, This could have an impact on emotional, physical and cognitive health.[1] Population studies have shown a gradual decline in exercise with advancing age. Although retirement leads to the loss of work-related physical activity, it also provides an opportunity to adopt or maintain healthier lifestyle behaviours through leisure-time and household activities.[2] As a result, retirement has been identified as a critical period for interventions aimed at sustaining or encouraging physical activity and promoting healthy aging.[3,4]

Retirement also brings substantial changes in social relationships. Leaving the workplace may reduce regular contact with colleagues and raise the possibility of social isolation and loneliness.[5,6] Although some retirees experience greater interaction with family and friends, others may face reduced social participation because of changes in routine, financial circumstances, and community engagement.[6,7] Strong evidence has shown that social support ease the transition into retirement, whereas weaker social networks may increase feelings of loneliness and social isolation.[5]

Cognitive function is another important component of healthy ageing. Normal ageing is connected to gradual declines in executive function, memory, and focus and processing speed.[9] Retirement may further influence cognition by reducing engagement in mentally stimulating occupational activities. According to the "use it or lose it" hypothesis, continuous participation in cognitively stimulating activities maintains cognitive function, while reduced mental stimulation may accelerate cognitive decline.[11] Consequently, determining adjustable elements that support cognitive health after retirement is becoming increasingly important.

Physical activity is a well-established modifiable lifestyle factor that promotes healthy ageing. Frequent exercise improves heart health, functional independence, psychological well-being, and quality of life thereby lowering the possibility of chronic diseases.[14,17] In addition, physically active older adults generally demonstrate superior cognitive function compared to sedentary individuals.[26] Engaging in physical activity may improve cognitive function by improving cerebral blood flow, promoting neuroplasticity, increasing brain-derived neurotrophic factor (BDNF) production, and preserving white matter integrity.[27,29,30] Participation in physical activity, particularly in group settings, may also strengthen social relationships, reduce loneliness, and encourage community participation.[14,17,18]

Social isolation has emerged as an important concerns about public health among senior citizens and has been connected to poorer physical health, cognitive decline, as well as reduced well-being.[24,41] Elderly people with little social contacts and reduced community participation are more prone to experience cognitive decline, whereas stronger social relationships may enhance cognitive reserve through continuous mental stimulation.[43,44] However, the correlation between social exclusion and cognitive function remains inconsistent, and the relationship between exercise, social isolation, and cognition is not yet fully understood.

Despite the reality that multiple investigations have independently examined physical

activity, social isolation, considering cognitive abilities in senior citizens, these elements have not been thoroughly studied simultaneously among retired adults. Retirement is a unique life transition characterised by changes in physical activity patterns, social engagement, and daily routines, which may collectively influence cognitive health. Therefore, The current study's objective was to look at the correlation between physical activity, social isolation, and cognitive function among retired adults. Comprehending these connections could be beneficial identify modifiable lifestyle factors and encourage the growth of interventions to promote healthy ageing and improve the overall well-being of retired adults.

Objectives:

1. To assess the relationship between exercise and social isolation among retired adults.
2. To assess the connection between exercise and cognitive function among retired adults.
3. To evaluate the connection between social isolation and cognitive function among retired adults.

MATERIALS AND METHODS

This pilot a cross-sectional an investigation was conducted between retired adults aged ≥60 years attending the A.J. Urban Health Center, Mangalore. Convenience was accustomed to recruit participants. sampling. Retired adults who met the inclusion criteria and given written were included in the study with informed consent. Individuals with severe mental illnesses, severe physical disabilities limiting physical activity, or inability to understand and respond to the questionnaires were excluded.

After obtaining written Subjects were assessed following their informed consent for physical activity, social isolation, and cognitive function using standardized outcome measures. The Physical Activity Scale for the Elderly (PASE) was used to measure physical activity, social isolation using the Updated UCLA Loneliness Scale, superior cognitive performance utilizing the Montreal Cognitive Assessment (MoCA).

BM SPSS Statistics was used to analyze the data version 29.0 to ascertain the relationship between physical activity, social isolation, and cognitive function among retired adults.

RESULTS

IBM SPSS Statistics was used to analyze the data version 29.0. Characteristic statistics were calculated as mean ± standard deviation (SD) and median for continuous values, while categorical variables were displayed as frequency and percentage. The relationships between the Physical Activity Scale for the Elderly (PASE), Revised UCLA Loneliness Scale, and Montreal Cognitive Assessment (MoCA) were analysed using Karl Pearson's correlation coefficient (r). The statistical significance threshold was fixed at $p < 0.05$.

The research comprised 12 retired adults with an average age of 71.00 ± 6.08 years (range: 61.00–83.00 years). The Physical Activity Scale for the Elderly was used to measure physical activity. (PASE). The mean PASE score was 155.60 ± 39.36.

Table 1: Descriptive Statistics of Age of Retired Adults

		Frequency	Percent
Age	60 - 64 years	7	58.3
	65 - 69 years	5	41.7
	Total	12	100.0

Table 1: showed that among the 12 retired adults, 7 (58.3%) were in the 60–64 years age group, while 5 (41.7%) were in the 65–69 years age group. The total study sample comprised 12 (100.0%) participants. The mean age of the participants was 63.417 ± 2.660 years.

The mean Updated UCLA Loneliness Scale score was 42.80 ± 11.18, with scores ranging from 26.00 to 63.00. The mean Montreal Cognitive Assessment (MoCA) score was 24.90 ± 2.68, with scores ranging from 20.00 to 29.00.

Table 2: Descriptive Statistics of Physical Activity (PASE), Social Isolation (UCLA), and Cognitive Function (MoCA) Among Retired Adults

	Minimum	Maximum	Mean	Std. Deviation
PASE	95.00	160.00	118.333	23.773
UCLA	20.00	37.00	30.500	6.245
MoCA	27.00	30.00	28.833	1.115

Physical Activity Scale for the Elderly (PASE), University of California, Los Angeles (UCLA) Loneliness Scale, Montreal Cognitive Assessment (MoCA)

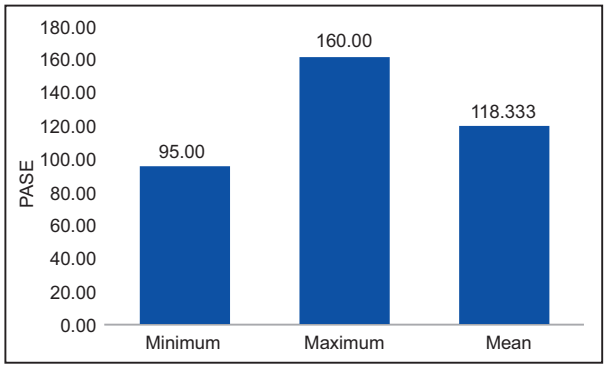


Figure 1: Representation of descriptive statistics of PASE

The correlation between exercising (PASE score) and social isolation (Revised UCLA Loneliness Scale) was weak and positive (r=0.190). However, the No statistically significant association was found (p=0.555), implying that participating in Among retired persons, there was no discernible link between physical activity and social isolation.

Table 3: Correlation Between Physical Activity (PASE) and Social Isolation (UCLA) Among Retired Adults

		UCLA
PASE	r value	.190
	p value	.555
	N	12

Physical Activity Scale for the Elderly (PASE), University of California, Los Angeles (UCLA) Loneliness Scale

There was a moderately favorable correlation (r=0.486) between physical activity (PASE score) and cognitive function (MoCA score). But this connection wasn't statistically significant (p=0.109), suggesting that engaging in Physical activity did not significantly connected with mental abilities in the study sample.

Table 4: Correlation Between Physical Activity (PASE) and Cognitive Function (MoCA) Among Retired Adults

		MoCA
PASE	r value	.486
	p value	.109
	N	12

Physical Activity Scale for the Elderly (PASE), Montreal Cognitive Assessment (MoCA)

Social isolation (Revised UCLA Loneliness Scale) demonstrated a slight negative correlation with cognitive function (MoCA score) (r=−0.326). However, the connection was not statistically significant (p=0.300), indicating that social isolation did not considerably connected with cognitive performance among retired adults. (Table 5, Figure 2)

Table 5: Correlation Between Social Isolation (UCLA) and Cognitive Function (MoCA) Among Retired Adults

		MoCA
UCLA	r value	-.326
	p value	.300
	N	12

University of California, Los Angeles (UCLA) Loneliness Scale, Montreal Cognitive Assessment (MoCA)

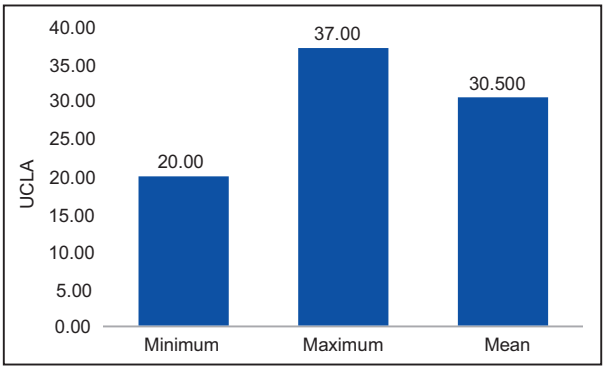


Figure 2: Representation of descriptive statistics of UCLA

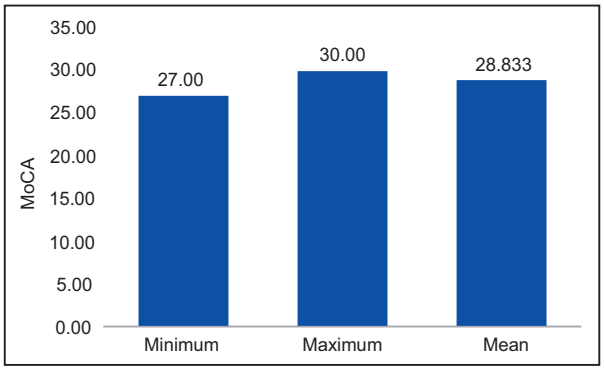


Figure 3: Representation of descriptive statistics of MoCA

DISCUSSION

The transition to retirement marks a major turning point in the life course, often accompanied by a decrease in occupational engagement, structured daily activity, and social participation, with consequences for physical, social, and mental well-being in older life.[1] Population information shows that engaging in physical activity declines steadily with age, and a substantial percentage of the activity previously accrued through work is lost following retirement.[2] As cognitively

stimulating occupational tasks are withdrawn, physical activity and social engagement may serve as compensatory pathways for preserving cognitive reserve in older adults.[9,11] The present pilot research looked at the connection between physical activity, cognitive function and social isolation among retired adults, using the Physical Activity scale for the Elderly (PASE), the updated UCLA Loneliness Scale and the Montreal Cognitive Assessment (MoCA).

A cross-sectional pilot study was conducted among 12 retired adults sixty years of age and above, of whom 7 (58.3%) were aged 60–64 years and 5 (41.7%) were aged 65–69 years, with an average age of 63.4 ± 2.66 years. The mean PASE score was 118.3 ± 23.77, the average score for loneliness at UCLA was 30.5 ± 6.25, and the mean MoCA score was 28.8 ± 1.12, indicating moderate physical activity, moderate loneliness, and cognitive function within the normal range. Karl Pearson's correlation was used in order to investigate the relationship among the three variables, with $p<0.05$ considered significant.

Contrary to expectation, the relationship between exercise and social isolation was weak and positive (r=0.190, p=0.555), suggesting that higher activity was marginally, non-significantly, connected to higher rather than lower loneliness. This diverges from the broader literature, where activity has consistently been inversely related to isolation: Schrempft S *et al*. found socially isolated older adults had lower activity and greater sedentary behaviour,14 Musich S *et al*. linked higher activity to lower loneliness and better psychological wellbeing,[17] and Sunarti S *et al*. and Gyasi RM *et al*. both confirmed a significant inverse relationship in elderly populations.[18,20] This disparity most likely reflects the little sample size (n=12) and consequent restricted statistical power as opposed to a genuine reversal; a weak positive association of this magnitude is well within the range expected from sampling variability at such a small n.

The connection between exercise and cognitive function was moderate and positive (r=0.486, p=0.109) — directionally comparable to, but not as strong as prior findings. Yi Q *et al*. reported a positive activity–cognition correlation partially mediated by cardiorespiratory endurance,[30] Chia YC *et al*. found higher activity significantly associated with better MoCA performance,[27] Zhao X *et al*. linked grip strength and walking performance with preserved cognition,[29] and Erickson KI *et al*. showed moderate-to-vigorous activity reduces cognitive impairment risk via increased cerebral blood flow, neuroplasticity, and elevated brain-derived neurotrophic factor (BDNF).[40] The same mechanism may be operating here, but the small sample and narrow MoCA range (27–30) limited the variance available to reach significance.

There was a slight negative connection found between social isolation and cognitive function (r=−0.326, p=0.300), in the expected direction but again non-significant. Lara E *et al*. and Duan Y *et al*. both reported greater isolation and loneliness associated with poorer cognition and steeper decline over time,[43,45] Evans IE *et al*.'s meta-analysis confirmed lower isolation was linked to improved cognitive outcomes,[44] and Kim J *et al*. found prolonged absence of formal social participation linked to sustained decline — a pattern especially relevant to retirees who lose structured engagement after workforce exit.[51] The weak, non-significant association here is consistent in direction with this evidence, though attenuated, plausibly by the small sample and restricted MoCA range in a relatively high-functioning group.

Taken together, the pilot data follow directions broadly consistent with the literature for the activity–cognition and isolation–cognition relationships, while the activity–isolation relationship showed an unexpected, non-significant positive trend. None of the three correlations reached significance, unsurprising in a sample of only 12 participants, which lacks the power to detect even moderate effects. The narrow MoCA range (27–30) and modest PASE range (95–160) in this cognitively intact sample likely restricted detectable variance further. These findings remain broadly consistent with prior work showing physical activity and social engagement as closely interrelated determinants of cognitive health in older adults,[52,53,54] and support targeting physical inactivity and social isolation together as modifiable factors in this population. As a pilot study, the value of these findings lies in establishing feasibility and generating preliminary effect-size estimates rather than confirmatory inference; a larger, adequately powered study is warranted to confirm whether these trends, particularly the

moderate activity–cognition association, hold at scale.

CONCLUSION

This pilot found no evidence of a relationship between physical activity, social isolation, and cognitive function among retired adults. Although weak to moderate correlations were observed, none reached statistical significance. These findings suggest that larger, adequately powered studies are required to further investigate the connection between exercise, social isolation, and cognitive function in retired adults.

Conflict of Interest: Nil

REFERENCES

1. Hagani N, Clare PJ, Luo M, Merom D, Smith BJ, Ding D. Effect of retirement on loneliness: a longitudinal comparative analysis across Australia, China and the USA.J Epidemiol Community Health. 2024 Oct 1;78(10):602-8.
2. Berger U, Der G, Mutrie N, Hannah MK. The impact of retirement on physical activity. Ageing & Society. 2005 Mar;25(2):181-95.
3. Barnett I, van Sluijs EM, Ogilvie D. Physical activity and transitioning to retirement: a systematic review. American journal of preventive medicine. 2012 Sep 1;43(3):329-36.
4. Baxter S, Johnson M, Payne N, Buckley-Woods H, Blank L, Hock E, Daley A,Taylor A, Pavey T, Mountain G, Goyder E. Promoting and maintaining physical activity in the transition to retirement: a systematic review of interventions for adults around retirement age. International journal of behavioral nutrition and physical activity. 2016 Dec;13:1-0.
5. Kenny L, Doherty N, Doherty AS, Lawlor B, O'Sullivan R, Leavey G. The relationship between retirement, social isolation and loneliness: A longitudinal analysis using the English Longitudinal Study of Ageing. BMC Public Health. 2025 Nov 3;25(1):3733.
6. Guthmuller S, Heger D, Hollenbach J, Werbeck A. The impact of retirement on loneliness in Europe. Scientific reports. 2024 Nov 14;14(1):26971.
7. Atalay K, Staneva A, Zhu R. Integration or Isolation?: The Impact of Retirement on Social Capital. Journal of Human Resources. 2026 Mar 11.
8. Grotz C, Meillon C, Amieva H, Stern Y, Dartigues JF, Adam S, Letenneur L. Why is later age at retirement beneficial for cognition? Results from a French population-based study. The journal of nutrition, health & aging. 2016 May;20(5):514-9.
9. Meng A, Nexø MA, Borg V. The impact of retirement on age related cognitive decline–a systematic review. BMC geriatrics. 2017 Jul 21;17(1):160.
10. Ofstedal MB, Fisher GG, Herzog AR. Documentation of cognitive functioning measures in the Health and Retirement Study. Ann Arbor, MI: University of Michigan. 2005 Mar;10:1114577250-662476251.
11. Bonsang E, Adam S, Perelman S. Does retirement affect cognitive functioning?. Journal of health economics. 2012 May 1;31(3):490-501.
12. Xue B, Cadar D, Fleischmann M, Stansfeld S, Carr E, Kivimäki M, McMunn A, Head J. Effect of retirement on cognitive function: the Whitehall II cohort study. European journal of epidemiology. 2018 Oct;33(10):989-1001.
13. Bai Y, Chen Y, Tian M, Gao J, Song Y, Zhang X, Yin H, Xu G. The relationship between social isolation and cognitive frailty among community-dwelling older adults: the mediating role of depressive symptoms. Clinical interventions in aging. 2024 Dec 31:1079-89.
14. Schrempft S, Jackowska M, Hamer M, Steptoe A. Associations between social isolation, loneliness, and objective physical activity in older men and women. BMC public health. 2019 Jan 16;19(1):74.
15. Robins LM, Hill KD, Finch CF, Clemson L, Haines T. The association between physical activity and social isolation in community-dwelling older adults. Aging & mental health. 2018 Feb 1;22(2):175-82.
16. Hopper S, Wister AV, Cosco TD, Best JR. Social isolation, physical activity, and subsequent changes in cognition among middle-and older-aged adults: results from the Canadian longitudinal study on aging. Biopsychosocial Science and Medicine. 2024 Feb 1;86(2):107-15.
17. Musich S, Wang SS, Schaeffer JA, Kraemer S, Wicker E, Yeh CS. The association of physical activity with loneliness, social isolation, and selected psychological protective factors among older adults. Geriatr Nurs. 2022 Sep 1;47:87–94.

18. Sunarti S, Subagyo KA, Haryanti T, Rudijanto A, Ratnawati R, Soeharto S, Maryunani M. The effect of physical activity on social isolation in elderly. Acta Medica Indonesiana. 2021;53(4):423-.

19. Herbolsheimer F, Mosler S, Peter R. Relationship between social isolation and indoor and outdoor physical activity in community-dwelling older adults in Germany: Findings from the ActiFE study. Journal of aging and physical activity. 2017 Jun 27;25(3):387-94.

20. Gyasi RM, Adu-Gyamfi S, Obeng B, Asamoah E, Kisiangani I, Ochieng V, Appiah K. Association between physical activity participation and perceived social isolation at older ages: Do social participation, age and sex differences matter?. Archives of gerontology and geriatrics. 2021 Sep 1;96:104441.

21. Siegmund LA, Distelhorst KS, Bena JF, Morrison SL. Relationships between physical activity, social isolation, and depression among older adults during COVID-19: A path analysis. Geriatric Nursing. 2021 Sep 1;42(5):1240-4.

22. Mazo GZ, Fank F, Franco PS, Capanema BD, da Silva Pereira F. Impact of social isolation on physical activity and factors associated with sedentary behavior in older adults during the COVID-19 pandemic. Journal of aging and physical activity. 2021 Aug 13;30(1):148-52.

23. Otaki N, Yokoro M, Yano M, Imamura T, Akita M, Tanino N, Fukuo K. Social contact impacts physical activity and sedentary behavior among older adults in Japan due to COVID-19. BMC geriatrics. 2022 Jun 8;22(1):491.

24. Delerue Matos A, Barbosa F, Cunha C, Voss G, Correia F. Social isolation, physical inactivity and inadequate diet among European middle-aged and older adults. BMC public health. 2021 May 15;21(1):924.

25. Imamura K, Kamide N, Ando M, Sato H, Sakamoto M, Shiba Y. Social isolation is associated with future decline of physical performance in community-dwelling older adults: a 1-year longitudinal study. Aging clinical and experimental research. 2022 Jun;34(6):1391-8.

26. Vance DE, Marson DC, Triebel KL, Ball KK, Wadley VG, Cody SL. Physical activity and cognitive function in older adults: the mediating effect of depressive symptoms. Journal of Neuroscience Nursing. 2016 Jul 1;48(4):E2-12.

27. Chia YC, Low EN, Teh JK, Chew J, Thanaraju A, Lim WG, Vafa S, Jenkins MJ. Association between physical activity and cognitive function in a multi-ethnic Asian older adult population. Scientific Reports. 2025 Feb 28;15(1):7249.

28. Qi C, Wang X, Li D, Ding H, Shen J, Jiao Y, Lu W, Xi Y. The role of physical function and physical activity on cognitive function in the elderly. Global Transitions. 2024 Jan 1;6:85-92.

29. Zhao X, Huang H, Du C. Association of physical fitness with cognitive function in the community-dwelling older adults. BMC geriatrics. 2022 Nov 16;22(1):868.

30. Yi Q, Yang C, Qi Y, Feng X, Tan J, Song X, Selvanayagam VS, Cheong JP. Physical activity and cognitive function among community-dwelling older adults: a mediating role of functional fitness. BMC Public Health. 2025 Mar 21;25(1):1081.

31. Li S, Zhang J, Yang Y. Correlation between the physical activity volume and cognitive and mental capacity among older adult people in China: a cross-sectional study based on the 2020 CHARLS database. Frontiers in Public Health. 2024 Nov 20;12:1462570.

32. Cox EP, O'Dwyer N, Cook R, Vetter M, Cheng HL, Rooney K, O'Connor H. Relationship between physical activity and cognitive function in apparently healthy young to middle-aged adults: A systematic review. Journal of science and medicine in sport. 2016 Aug 1;19(8):616-28.

33. Ploughman M. Exercise is brain food: the effects of physical activity on cognitive function. Developmental neurorehabilitation. 2008 Jan 1;11(3):236-40.

34. Carvalho A, Rea IM, Parimon T, Cusack BJ. Physical activity and cognitive function in individuals over 60 years of age: a systematic review. Clinical interventions in aging. 2014 Apr 12:661-82.

35. Kumar M, Srivastava S, Muhammad TJ. Relationship between physical activity and cognitive functioning among older Indian adults. Scientific reports. 2022 Feb 17;12(1):2725.

36. Sewell KR, Erickson KI, Rainey-Smith SR, Peiffer JJ, Sohrabi HR, Brown BM. Relationships between physical activity, sleep and cognitive function: A narrative review. Neuroscience & Biobehavioral Reviews. 2021 Nov 1;130:369-78.

37. González-Fernández FT, Delgado-García G, Coll JS, Silva AF, Nobari H, Clemente FM.

Relationship between cognitive functioning and physical fitness in regard to age and sex. BMC pediatrics. 2023 Apr 29;23(1):204.

38. Silva NC, Barha CK, Erickson KI, Kramer AF, Liu-Ambrose T. Physical exercise, cognition, and brain health in aging. Trends in neurosciences. 2024 Jun 1;47(6):402-17.

39. Festa F, Medori S, Macrì M. Move your body, boost your brain: the positive impact of physical activity on cognition across all age groups. Biomedicines. 2023 Jun 20;11(6):1765.

40. Erickson KI, Hillman C, Stillman CM, Ballard RM, Bloodgood B, Conroy DE, Macko R, Marquez DX, Petruzzello SJ, Powell KE. Physical activity, cognition, and brain outcomes: a review of the 2018 physical activity guidelines. Medicine and science in sports and exercise. 2019 Jun;51(6):1242.

41. Evans IE, Llewellyn DJ, Matthews FE, Woods RT, Brayne C, Clare L. Social isolation, cognitive reserve, and cognition in older people with depression and anxiety. Aging & mental health. 2019 Dec 2;23(12):1691-700.

42. Camacho D, Pacheco K, Moxley J, Aranda MP, Reid MC, Wethington E. Loneliness and global cognitive functioning in racially and ethnically diverse US midlife and older adults. Frontiers in psychology. 2024 Jun 19;15:1344044.

43. Duan Y, Jiang S, Yin Z, Wang S, Gao J, Yang M, Chen C, Fu H, Wang C. Association of social isolation and cognitive performance: a longitudinal study using a four-wave nationwide survey. BMC Public Health. 2023 Jul 22;23(1):1409.

44. Evans IE, Martyr A, Collins R, Brayne C, Clare L. Social isolation and cognitive function in later life: a systematic review and meta-analysis. Journal of Alzheimer's disease. 2019 Aug 13;70(s1):S119-44.

45. Lara E, Caballero FF, Rico Uribe LA, Olaya B, Haro JM, Ayuso Mateos JL, Miret M. Are loneliness and social isolation associated with cognitive decline?. International journal of geriatric psychiatry. 2019 Nov;34(11):1613-22.

46. Okamoto S, Kobayashi E. Social isolation and cognitive functioning: a quasi-experimental approach. The Journals of Gerontology: Series B. 2021 Sep 1;76(7):1441-51.

47. Cardona M, Andrés P. Are social isolation and loneliness associated with cognitive decline in ageing?. Frontiers in aging neuroscience. 2023 Feb 23;15:1075563.

48. Palmer BW. The effects of loneliness and social isolation on cognitive functioning in older adults: A need for nuanced assessments. International psychogeriatrics. 2019 Apr;31(4):447-9.

49. Guarnera J, Yuen E, Macpherson H. The impact of loneliness and social isolation on cognitive aging: a narrative review. Journal of Alzheimer's disease reports. 2023 Jun 29;7(1):699-714.

50. Kassam K, McMillan JM. The impact of loneliness and social isolation during COVID-19 on cognition in older adults: a scoping review. Frontiers in Psychiatry. 2023 Nov 16;14:1287391.

51. Kim J, Park GR. Prolonged social isolation and cognitive function in older adults: lack of informal social contact versus formal social activity as the source of social isolation. Aging & Mental Health. 2023 Dec 2;27(12):2438-45.

52. Hopper S, Wister AV, Cosco TD, Best JR. Social isolation, physical activity, and subsequent changes in cognition among middle-and older-aged adults: results from the Canadian longitudinal study on aging. Biopsychosocial Science and Medicine. 2024 Feb 1;86(2):107-15.

53. Bourassa KJ, Memel M, Woolverton C, Sbarra DA. Social participation predicts cognitive functioning in aging adults over time: comparisons with physical health, depression, and physical activity. Aging & mental health. 2017 Feb 1;21(2):133-46.

54. Zhao D, Chai S, Gao T, Li J, Zhou C. Physical mobility, social isolation and cognitive function: are there really gender differences?. The American Journal of Geriatric Psychiatry. 2023 Sep 1;31(9):726-36.