

EPIDEMIOLOGY

Physical Activity, Comorbid Health Symptoms and Falls in Diverse Older Americans at Different Cognitive Stages

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Abstract

Background: Engagement in regular physical activity is considered one of the most effective interventions in fall prevention, while physical inactivity is often associated with an increased risk of falls. However, research on the relationship between physical activity and falls in older adults at different cognitive stages is limited. This study describes the association of physical activity and comorbid health symptoms (depression, obesity, pain, and shortness of breath) with falls in persons with normal cognition (NC) and impaired cognition (IC).

Method: We conducted a cross-sectional study on Health and Retirement Study participants aged 65 and above (N = 8,943) using datasets from the 2020 interviews. Our measures include the 27-point cognition scale, physical activity questionnaire, Center for Epidemiological Studies Depression scale, and health questionnaire.

Result: Main logistic regression results (Table 2) showed that participants with IC were 26% more likely to fall than those with NC. Participants with moderate and high physical activity engagement were less likely to fall (31% and 36%, respectively) than physically inactive participants. However, there was no significant association between mild activity and physical inactivity. In our stratified models (Table 3), each physical activity level was significantly associated with a decreased risk of falls in the IC group, with high activity engagement showing the strongest effect. We observed similar significant trends in the NC group for high and moderate activity engagement but not mild activity. Black participants were 37% to 39% less likely to fall in the NC and IC groups. Although the risk of falling was 29% less in Hispanic participants in the NC group, the association of ethnicity and falls was non-significant in the IC group. Women had a higher risk of falls than men; the effect of this relationship was marginal in the IC group and significant in the NC group. Depression, pain, and shortness of breath were significantly associated with falls in both cognition groups, whereas the relationship between obesity and falls was significant only in the NC group.

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Conclusion: These findings inform fall prevention programs for older persons at different cognitive stages, considering ethnic, racial, and gender disparities and comorbid symptoms.

Table 1. Participants Characteristics Stratified by Falls Status

Characteristic	Total sample N= 8,946	Fallen N: 3,228	No Fall N= 5,718	p-value
Physical Activity, n (col %)	8,946	3,180	5,616	<.0001
Sedentary	1446 (16.44)	714 (22.45)	732 (13.03)	
Mild Activity Engagement	2226 (25.31)	923 (29.03)	1303 (23.20)	
Moderate Level Engagement	2823 (32.09)	896 (28.18)	1927 (34.31)	
High Activity Engagement	2301 (26.16)	647 (20.35)	1654 (29.45)	
Cognition, n (col %)	8364	2921	5443	<.0001
Cognitive Impairment & Dementia	1912 (22.86)	755 (25.85)	1157 (21.26)	
Normal	6452 (77.14)	2166 (74.15)	4286 (78.74)	
Age, n (col %)	8,946	3,228	5,718	<.0001
65<=AGE<=69	2605(29.12)	753(23.33)	1852(32.39)	
70<=AGE<=74	1902(21.26)	629(19.49)	1273(22.26)	
75<=AGE<=79	1600(17.89)	593(18.37)	1007(17.61)	
80<=AGE<=84	1548(17.30)	623(19.30)	925(16.18)	
85<=AGE	1291(14.43)	630(19.52)	661(11.56)	
Race, n (col %)	8928	3224	5704	<.0001
White/Caucasian	6589(73.80)	2513(77.95)	4076(71.46)	
Black/African American	1632(18.28)	498(15.45)	1134(19.88)	
Other	707(7.92)	213(6.61)	494(8.66)	
Ethnicity, n (col %)	8940	3226	5714	0.009
Hispanic	1239(13.86)	406(12.59)	833(14.58)	
Non-Hispanic	7701(86.14)	2820(87.41)	4881(85.42)	
Gender, n (col %)	8946	3228	5718	<.0001
Female	5287(59.10)	2021(62.61)	3266(57.12)	
Male	3659(40.90)	1207(37.39)	2452(42.88)	
Depression, n (col %)	8363	2921	5442	<.0001
Depressed	1211(14.48)	569(19.48)	642(11.80)	
Not depressed	7152(85.52)	2352(80.52)	4800(88.20)	
Obese, n (col %)	8840	3187	5653	<.0001
Yes	2895 (32.75)	1136 (35.64)	1759 (31.12)	
No	5945 (67.25)	2051 (64.36)	3894 (68.88)	
Frequent Pain, n (col %)	8889	3212	5677	<.0001
Yes	3551 (39.95)	1659 (51.65)	1892 (33.33)	
No	5338 (60.05)	1553 (48.35)	3785 (66.67)	
Shortness of Breath, n (col %)	8909	3214	5695	<.0001
Yes	1499 (16.83)	767 (23.86)	732 (12.85)	
No	7410 (83.17)	2447 (76.14)	4963 (87.15)	

Table 2. Relationship of Cognition, Physical Activity, Health Symptoms with Falls

Variable	Fallen in the last 2 years		
	Model 1 <i>OR [95% CI]</i>	Model 2 <i>OR [95% CI]</i>	Model 3 <i>OR [95% CI]</i>
Cognition (Reference: Normal Cognition)			
Demented & Cognitive Impairment	1.18 (1.05,1.31) **	1.28 (1.14,1.43) ***	1.26 (1.12,1.41) ***
Physical Activity (Reference: Sedentary)			
High Activity	0.51 (0.44,0.59) ***	0.49 (0.42,0.58) ***	0.64 (0.54,0.75) ***
Mild Activity	0.88 (0.76,1.02)	0.85 (0.73,0.98) *	0.90 (0.77,1.05)
Moderate Activity	0.60 (0.52,0.70) ***	0.58 (0.50,0.67) ***	0.69 (0.60,0.81) ***
Race (Reference: White)			
Black		0.63 (0.56,0.72) ***	0.62 (0.54,0.71) ***
Other		0.82 (0.67,1.00) *	0.82 (0.67,1.01)
Ethnicity (Reference: non-Hispanic)			
		0.80 (0.68,0.93) **	0.79 (0.67,0.93) **
Gender (Reference: Female)			
		0.80 (0.73,0.88) ***	0.86 (0.78,0.95) **
Depression (Depressed vs Not depressed)			
			1.29 (1.13,1.48) ***
Obesity (Yes vs No)			
			1.13 (1.02,1.25) *
Frequent Pain (Yes vs No)			
			1.73 (1.57,1.92) ***
Shortness of Breath (Yes vs No)			
			1.56 (1.38,1.78) ***

Model 1: adjusted for Physical activity + Cognition. Model 2: adjusted for Physical activity + Cognition+ demographics. Model 3: adjusted for Physical activity + Cognition+ demographics + fall-related risk conditions.

*p < 0.05; **p < 0.01; ***p < 0.001.

Table 3. Association of Physical Activity and Health Symptoms with Falls in Different Cognition Stages

Variable	Fallen in the last 2 years					
	Model 1 <i>OR [95% CI]</i>		Model 2 <i>OR [95% CI]</i>		Model 3 <i>OR [95% CI]</i>	
	Normal Cognition	Impaired Cognition	Normal Cognition	Impaired Cognition	Normal Cognition	Impaired Cognition
Physical Activity						
Mild Activity (Ref: Sedentary)	0.93 (0.77,1.11)	0.77 (0.60,0.99) *	0.88 (0.74,1.06)	0.74 (0.58,0.96) *	0.93 (0.77,1.13)	0.80 (0.61,1.05)
Moderate Activity (Ref: Sedentary)	0.59 (0.50,0.71) ***	0.67 (0.52,0.86) **	0.55 (0.46,0.66) ***	0.65 (0.50,0.85) **	0.68 (0.57,0.82) ***	0.73 (0.56,0.96) *
High Activity (Ref: Sedentary)	0.51 (0.43,0.61) ***	0.52 (0.38,0.69) ***	0.48 (0.40,0.58) ***	0.53 (0.39,0.71) ***	0.63 (0.52,0.77) ***	0.68 (0.50,0.93) *
Race (Ref: White)						
Black			0.62 (0.53,0.72) ***	0.67 (0.54,0.85) ***	0.63 (0.53,0.73) ***	0.61 (0.48,0.77) ***
Other			0.84 (0.66,1.08)	0.79 (0.56,1.10)	0.86 (0.67,1.10)	0.77 (0.54,1.09)
Ethnicity						
Hispanic (Ref: Non-Hispanic)			0.71 (0.59,0.86) ***	0.97 (0.75,1.26)	0.71 (0.58,0.87) ***	0.96 (0.73,1.26)
Gender						
Male (Ref: Female)			0.81 (0.72,0.90) ***	0.77 (0.63,0.93) **	0.87 (0.77,0.97) *	0.84(0.68,1.02)
Depressive symptoms					1.26 (1.07,1.48) **	1.39 (1.09,1.78) **
Obesity					1.16 (1.04,1.31) *	1.01 (0.81,1.26)
Pain					1.84 (1.65,2.07) ***	1.39 (1.13,1.72) **
Shortness of Breath					1.45 (1.24,1.68) ***	1.96 (1.53,2.49) ***

Model 1: adjusted for Physical activity index + Cognition. Model 2: adjusted for Physical activity index + Cognition+ demographics. Model 3: adjusted for Physical activity index + Cognition+ demographics + fall-related risk conditions.

*p < 0.05; **p < 0.01; ***p < 0.001.