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Cross-Sectional Association Between Physical Activity Level and Subjective Cognitive Decline Among US Adults Aged ≥45 Years, 2015

John D. Omura, MD[a,*], **David R. Brown, PhD**[a], **Lisa C. McGuire, PhD**[b], **Christopher A. Taylor, PhD**[b], **Janet E. Fulton, PhD**[a], **Susan A. Carlson, PhD**[a]

[a]Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS S107-5, Atlanta, GA 30341, USA

[b]Division of Population Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS F-77, Atlanta, GA, 30341, USA

Abstract

Subjective cognitive decline (SCD) is the self-reported experience of worsening or more frequent confusion or memory loss within the previous 12 months and can be one of the earliest symptoms of Alzheimer's disease. Regular physical activity can contribute to the primary, secondary, and tertiary prevention of cognitive decline. At the national level, prevalence estimates of SCD by physical activity level in the United States are currently unknown. The purpose of this study is to examine the prevalence of SCD and resulting functional limitations by physical activity level among US adults aged ≥45 years. Data from 33 states and the District of Columbia participating in the 2015 Behavioral Risk Factor Surveillance System (N=128,925) were analyzed. We estimated the prevalence of SCD (a positive response to a question about worsening or more frequent confusion or memory loss within the previous 12 months) and resulting functional limitations overall and by self-reported physical activity level based on current guidelines (i.e., active, insufficiently active, and inactive). Odds ratios were estimated using logistic regression models adjusting for respondent characteristics. Overall, 11.3% of US adults aged ≥45 years reported SCD. Prevalence of SCD increased as physical activity level decreased (active: 8.8%; insufficiently active: 11.4%; inactive: 15.7%). Among those with SCD, the prevalence of functional limitations also increased as physical activity level decreased (active: 40.5%; insufficiently active: 50.0%; inactive: 57.4%). These differences largely remained after adjusting for respondent characteristics. Findings highlight the potential public health impact nationally of efforts to promote physical activity for cognitive health.

[*]Corresponding author at: Physical Activity and Health Branch, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, 4770 Buford Highway NE, Mailstop S107-5, Atlanta, GA 30341, USA, ydk8@cdc.gov (J. Omura).

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conflicts of interest: none

Keywords

physical activity; prevention; disease management; cognition; dementia

1. Introduction

An estimated 11.2% of US adults aged ≥45 years have subjective cognitive decline (SCD), which is the self-reported experience of worsening or more frequent confusion or memory loss within the previous 12 months [1–3]. SCD can be one of the earliest noticeable symptoms of Alzheimer's disease (Alzheimer's), a fatal form of dementia [2]. Although not everyone who reports SCD goes on to develop dementia, previous studies suggest that half of older adults with subjective memory complaints develop more severe cognitive decline [2, 4, 5]. In addition, regardless of progression to more severe cognitive impairment, SCD can result in limitations to an individual's ability for self-care [1, 5]. Such functional limitations can include an inability to perform activities important to daily living or to socialize [1, 5].

Regular physical activity can contribute to the primary, secondary, and tertiary prevention of cognitive decline and dementia [2, 6, 7]. Recognizing the importance of physical activity for promoting cognitive health, the Alzheimer's Association includes physical activity as one of "10 ways to love your brain" [8]. In addition, an objective of Healthy People 2020 is to increase the proportion of older adults with reduced physical or cognitive function who engage in light, moderate, or vigorous leisure-time physical activities [9]. The *Physical Activity Guidelines for Americans*, second edition (Guidelines), suggests that regular physical activity can help improve cognition and reduce the risk of dementia [10]. The Guidelines recommend that adults with chronic conditions be physically active on a regular basis: adults with chronic conditions who are able should do at least 150 to 300 minutes of moderate-intensity aerobic physical activity a week or 75 to 150 minutes of vigorous-intensity activity or an equivalent combination of both [10]. The review of scientific evidence supporting the Guidelines found strong evidence demonstrating that greater amounts of physical activity can help reduce the risk of cognitive impairment and moderate evidence indicating that moderate-to-vigorous physical activity can have beneficial effects on cognition in individuals with diseases or disorders that impair cognitive function [6, 11].

The positive association between physical activity and improved cognitive functioning is well established in the literature, resulting in key guidelines recommending physical activity for cognitive health [6, 11]. However, these studies have largely been conducted either among prospective cohorts or as part of randomized controlled trials [11–18]. To our knowledge the magnitude of this important public health issue at a national level is currently unknown. National estimates of the prevalence of SCD and resulting functional limitations by physical activity level in the United States can help highlight the potential public health impact of promoting physical activity for cognitive health, including preventing cognitive decline and its progression to more severe outcomes including functional limitations. Therefore, the objectives of this study were twofold. First, to assess differences in the prevalence of SCD and resulting functional limitations by physical activity level among US

adults aged ≥45 years. Second, to examine the association between physical activity levels and select demographic characteristics with (1) SCD among US adults aged ≥45 years and (2) functional limitations among those with SCD. These findings can be used to identify opportunities to promote physical activity in the United States to help reduce the risk of cognitive decline, and slow its progression among individuals exhibiting this early indicator of poor cognitive health.

2. Methods

2.1 Study sample

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual, random-digit–dialed telephone survey of the noninstitutionalized U.S. civilian population aged ≥18 years. If the selected respondent is unable to respond to the survey because of physical or mental problems, the entire household is removed from the sample [19]. Thus, respondents who complete the survey have been deemed by themselves or another household member to be mentally fit to respond to the survey [19]. The survey is conducted independently in all 50 states and the District of Columbia (DC). The optional six-question cognitive decline module examines how SCD affects the life of respondents, including difficulties performing activities or caring for themselves. This module is asked only among respondents aged ≥45 years. For the 2015 BRFSS survey, the overall combined landline and cellular telephone response rates among the 33 states and DC ranged from 33.9% to 61.1% (median = 46.3%) [20].

Overall, the 2015 BRFSS sample size was 224,412 for the 33 states and DC that administered the cognitive decline module. Of these respondents, 166,575 were aged ≥45 years. Respondents were excluded if they were missing data on demographic characteristics (6164), body mass index (BMI; 11,950), physical activity (13,752), SCD (5397), or functional limitations (387). The final analytic sample was 128,925 adults aged ≥45 years.

2.2 Measures

SCD was defined as a yes response to the question “During the past 12 months, have you experienced confusion or memory loss that is happening more often or is getting worse?” (response options were yes, no, or don’t know/not sure). Respondents with SCD were then asked about having functional limitations resulting from SCD. Specifically, they were asked, “During the past 12 months, as a result of confusion or memory loss, how often have you given up day-to-day household activities or chores you used to do, such as cooking, cleaning, taking medications, driving, or paying bills” and “During the past 12 months, how often has confusion or memory loss interfered with your ability to work, volunteer, or engage in social activities outside the home?” Respondents who reported “always,” “usually,” or “sometimes” for either question were defined as having a functional limitation, as opposed to those who reported “rarely” or “never” for both questions.

We assessed sex, age group, race/ethnicity, education level, and BMI category. BMI was calculated from self-reported height and weight and respondents were categorized as underweight/normal weight (BMI<25 kg/m^2), overweight (BMI 25.0–<30 kg/m^2), or

having obesity (BMI≥30.0 kg/m^2) [21]. To assess physical activity, respondents were first asked, “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?” (response options were yes, no, or don’t know/not sure) [22]. Those who responded yes were then asked, “What type of physical activity or exercise did you spend the most time doing during the past month?” and selected from a list of 76 common types of physical activity. They were then asked about the frequency and duration of participation in this activity. Next, they were asked “What other type of physical activity gave you the next most exercise during the past month?” and the frequency and duration of participation in this activity. To classify adults into levels of aerobic physical activity, minutes of moderate-intensity equivalent activity were calculated by counting 1 minute of vigorous-intensity activity as 2 minutes of moderate-intensity activity [10, 22]. Respondents were then classified into three activity levels using the current adult aerobic guideline: 1) active, reporting at least 150 minutes/week of moderate-intensity equivalent physical activity; 2) insufficiently active, reporting some moderate-intensity equivalent physical activity but not enough to meet active definition; 3) inactive, reporting no moderate-intensity equivalent physical activity that lasted at least 10 minutes [10, 22].

2.3 Statistical analysis

Prevalence and 95% confidence intervals (CIs) of reporting SCD were calculated overall, by physical activity level, and by respondent characteristics (i.e., sex, age group, race/ethnicity, education level, and BMI category). Among those with SCD, prevalence of reporting a resulting functional limitation was estimated by physical activity level, overall and by age group (ages 45–64 years and ≥65 years). Pairwise *t*-tests and orthogonal polynomial contrasts were used to identify significant differences and trends where appropriate [23]. Orthogonal polynomial contrasts are used to assess the shape of the trend (linear, quadratic, etc.) for variables with ordinal levels. To examine the impact of potential confounders, logistic regression analyses were conducted. First, univariate regression analyses assessed the association between physical activity level with having 1) SCD versus not among adults and 2) resulting functional limitations versus not among adults with SCD. Next, these analyses were repeated using multivariable logistic regression analyses adjusting for sex, age group, race/ethnicity, education level, and BMI. All regression analyses were conducted overall and by age group (ages 45–64 years and ≥65 years). Trends in adjusted odds ratios by physical activity level were determined using general linear contrasts. *P*-values < 0.05 were considered statistically significant. Statistical weights and survey design information were provided as part of the BRFSS public use dataset [24]. Analyses were conducted in 2018 using SUDAAN Version 11.0 (Research Triangle Institute, Research Triangle Park, NC) to account for the complex survey design and weighted data. This analysis was exempt from institutional review board approval because personal identifiers were not included in the data file.

3. Results

Our sample of adults aged ≥45 years was 52% women and 63% were aged 45–64 years (Table 1). Most were non-Hispanic white (72%), had at least some college education (59%),

and were either overweight or had obesity (70%). The majority of adults were physically active (53%); however, 31% were inactive.

Overall, 11.3% of adults aged ≥45 years had SCD and this prevalence increased with decreasing physical activity levels. Specifically, the prevalence of SCD was an estimated 8.8% for active adults, 11.4% for those insufficiently active, and 15.7% for inactive adults (Table 2). In addition, the prevalence of SCD increased in a linear fashion by decreasing physical activity level across sex, age group, race/ethnicity, education level, and BMI categories, except for those aged ≥65 years, in the race/ethnicity category "other," and with a college degree. For example, among adults aged 45–54 years, the prevalence of SCD among adults who were active was 7.7%; for those who were insufficiently active, 10.6%; and for those who were inactive, 15.5%.

In terms of the prevalence of functional limitations resulting from SCD, 5.6% (95% CI, 5.3%–5.9%) of adults aged ≥45 years had SCD and a resulting functional limitation (data not shown). Among adults with SCD, 49.2% reported a functional limitation (data not shown). This proportion of adults with SCD reporting a functional limitation increased with decreasing physical activity level (Figure). Specifically, among those with SCD, 40.5% of those who were active had a functional limitation; this proportion was 50.0% among those who were insufficiently active and 57.4% among those who were inactive (data not shown). Similar patterns were observed for both adults aged 45–64 years and ≥65 years.

The trends in the prevalence of SCD among all adults by physical activity level remained significant even after adjusting for other respondent characteristics (Table 3). The adjusted odds ratios (AORs) of having SCD increased linearly by decreasing physical activity level overall and among adults aged 45–64 years and ≥65 years. When compared to adults who were active, the AOR of having SCD for adults who were inactive was 1.68 (95% Confidence Interval [95% CI] = 1.52–1.85) overall (aged 45–64 years: AOR = 1.99, 95% CI = 1.74–2.28; aged ≥65 years: AOR = 1.32, 95% CI = 1.15–1.52). In terms of having a resulting functional limitation among adults with SCD, the AORs also increased linearly by decreasing physical activity level overall and among those aged 45–64 years and ≥65 years. Among adults with SCD, when compared to those who were active, the AOR of having a resulting functional limitation for adults who were inactive was 1.59 (95% CI = 1.32–1.92) overall (aged 45–64 years: AOR = 1.56, 95% CI = 1.21–2.03; aged ≥65 years: AOR = 1.62, 95% CI = 1.26–2.09).

4. Discussion

Among US adults aged ≥45 years across 33 states and DC, the prevalence of SCD increased as physical activity level decreased, ranging from 8.8% among active adults to 15.7% among those who were inactive. Among adults with SCD, the proportion of those with a resulting functional limitation also increased with decreasing physical activity level, ranging from 40.5% for active adults to 57.4% for those who were inactive. These differences largely remained after adjusting for respondent characteristics. Promoting physical activity, especially among adults who are inactive, presents an important opportunity for optimizing cognitive health in the US.

The positive association between physical activity and cognitive health has been well established [2, 6, 7, 11]. Our estimates of this prevalence and strength of association are consistent with previous studies [11–18]. However, these studies have largely been conducted either among prospective cohorts or as part of randomized controlled trials. In addition, no standard form of evaluating SCD exists, and several questionnaires and scales have been developed [25]. It is possible that our measure of SCD is broader than others, which may have led to a heterogeneous assessment across age groups. For example, not all SCD is due to pre-clinical Alzheimer's disease and various other conditions can be associated with subjective memory complaints (e.g. psychiatric disorders), particularly among younger adults [25]. However, we found that the dose-response relationship between physical activity level and both SCD and resulting functional limitations was observed in different age groups, specifically adults aged 45–64 years and ≥65 years. While cross-sectional in nature, our study is unique in assessing the magnitude of this important public health issue at a national level and our findings highlight the potential public health impact of promoting physical activity for cognitive health in the United States.

Improving physical activity levels in the United States is the emphasis of several multi-sector initiatives. For example, the Centers for Disease Control and Prevention's (CDC's) Active People, Healthy Nation^{SM} initiative aims to get 27 million Americans more active by 2027 [26, 27]. This multisector initiative promotes recommendations from the Guidelines and effective strategies recommended by the Community Preventive Services Task Force (CPSTF) to improve physical activity [10, 28]. Improving physical activity levels is also emphasized in initiatives aimed at preventing cognitive decline and dementia, including the third Healthy Brain Initiative Road Map released in 2018 by the Alzheimer's Association and CDC [29]. This initiative promotes similar strategies to establish dementia-friendly communities, and also has actions specific to the role of caregivers as well as public health and healthcare professionals to promote cognitive health.

Programmatic approaches can help users overcome barriers to participation in physical activity and tailored approaches may be especially important for groups known to be less active, such as those with cognitive decline. People with cognitive decline and Alzheimer's encounter unique barriers to participation in physical activity, such as limitations in attention and memory that make it difficult and unsafe to walk for exercise without a companion or in an unfamiliar environment [30–32]. Programs such as SilverSneakers and EnhanceFitness may be helpful in addressing barriers for older adults who are more likely to have cognitive decline and less likely to be active [2, 33–37]. In addition, Go4Life is an exercise and physical activity campaign designed to help older Americans fit exercise and physical activity into daily life [38]. Go4Life offers exercises, motivational tips, and resources including an evidence-based exercise guide [38]. Mall walking programs may also be beneficial for helping older adults, including those with mild cognitive impairments, overcome barriers to walking and physical activity [39]. Future research may wish to examine what other types of programs may be effective in helping adults with cognitive decline be more active.

The findings in this report are subject to several limitations. First, BRFSS data are self-reported and might be susceptible to recall and social-desirability bias. Second, the low

response rates could have resulted in response bias; however, weighting methodology may help reduce some of the survey nonresponse bias [40]. Similarly, 22.6% of the original sample of respondents was excluded for missing data, which could also introduce response bias. However, the distributions of the original and analytic samples by respond characteristics were similar. Third, our findings cannot be used to estimate the prevalence of SCD for the US population overall for several reasons: (1) BRFSS is not administered to persons with known cognitive impairment who might not generate valid or reliable data; (2) BRFSS is only administered to community-dwelling noninstitutionalized adults, excluding adults living in long-term care facilities, where a large proportion of residents have cognitive impairment, including Alzheimer's or related dementias; and (3) the cognitive decline module was only administered in 33 states and DC. Fourth, respondents reported their top two physical activities outside of regular job duties. Some respondents classified as not meeting the Guidelines might have been misclassified because information about additional aerobic activities or job duties was not included. Fifth, while this study used 2015 BRFSS data, the most recent year with both cognitive decline and physical activity data is 2017. However, since only 10 states completed the cognitive decline module in 2017, this analysis used 2015 data in order to maximize the number of respondents since data was available from 33 states and DC that year. Sixth, while we adjusted models for a wide array of variables, concern for unmeasured confounding persists. Finally, the cross-sectional design of this study does not allow for examining the causal direction between physical activity levels and SCD and resulting functional limitations. However, this study was grounded on the fact that this protective relationship has previously been well established, and our purpose was to examine related estimates at the national level to inform public health action.

5. Conclusions

Among US adults aged ≥45 years, the prevalence of SCD and resulting functional limitations was greater among those with lower physical activity levels, particularly those who were inactive. Our findings highlight the magnitude of this public health issue nationally and the importance of promoting physical activity to contribute to the primary, secondary, and tertiary prevention of cognitive decline and dementia. Practitioners can use these findings to inform the development of strategies to promote physical activity and optimize cognitive health in the US.

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HIGHLIGHTS

- Physical activity may help reduce the risk of subjective cognitive decline (SCD)
- Among US adults, prevalence of SCD increased as physical activity level decreased
- 1 in 11 active adults (8.8%) report SCD, compared to 1 in 6 inactive adults (15.7%)
- Among those with SCD, functional limitations were more common among inactive adults
- Promoting physical activity may help optimize cognitive health in the US

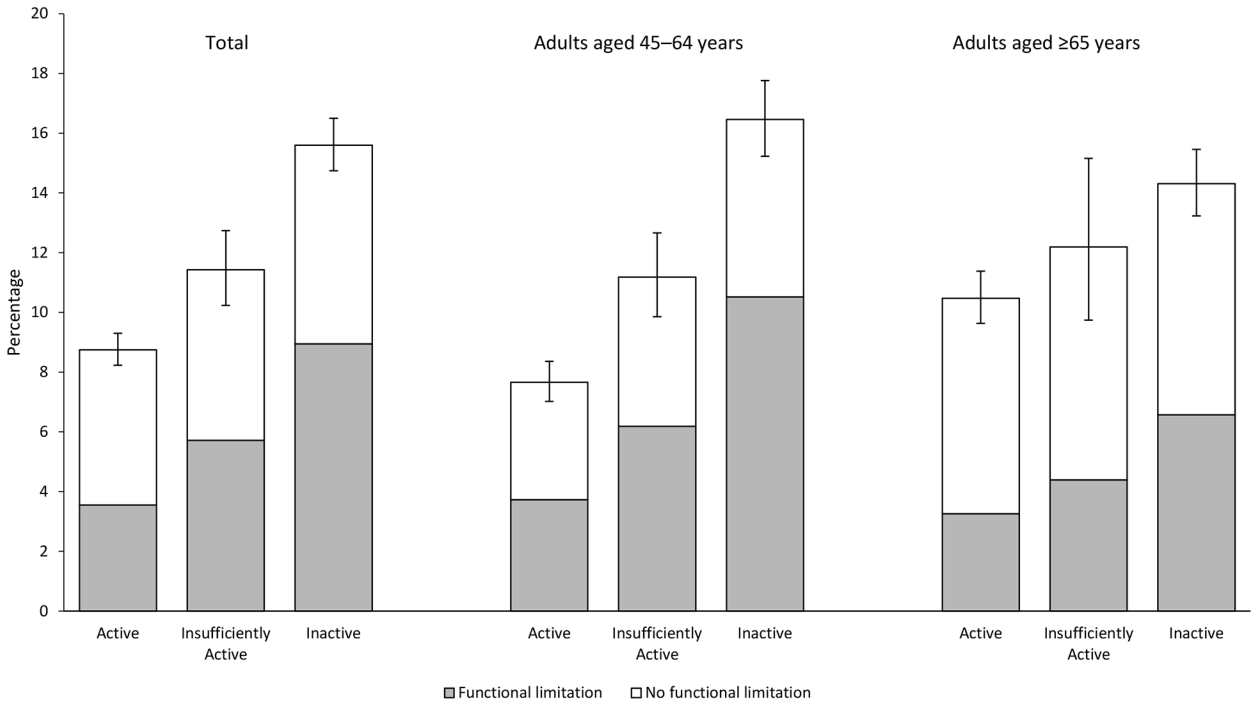

Figure.

Prevalence of subjective cognitive decline and functional limitation status by physical activity level[a], Behavioral Risk Factor Surveillance System, 33 states and the District of Columbia, 2015 (N=128,925)[b]. [a]Physical activity level definitions: active (meeting the aerobic physical activity guideline of 150 minutes/week of moderate-intensity physical activity, 75 minutes/week of vigorous-intensity physical activity, or an equivalent combination); insufficiently active (some activity, but not enough to meet active definition); and inactive (no leisure-time physical activity for at least 10 minutes). [b]Error bars represent 95% confidence intervals. All estimates are weighted.

Table 1.

Sample characteristics — Behavioral Risk Factor Surveillance System, 33 states and the District of Columbia, 2015

	Sample size	Crude %	Weighted % (95% CI)
Total	128,925	100	100
Sex			
Men	53,976	41.9	48.1 (47.4–48.9)
Women	74,949	58.1	51.9 (51.1–52.6)
Age group (yrs)			
45–54	27,647	21.4	32.3 (31.5–33.1)
55–64	38,743	30.1	30.8 (30.1–31.5)
65–74	36,173	28.1	21.6 (21.0–22.2)
≥75	26,362	20.5	15.3 (14.9–15.8)
Race/Ethnicity			
White, non-Hispanic	107,611	83.5	72.1 (71.2–72.9)
Black, non-Hispanic	11,882	9.2	11.2 (10.8–11.7)
Hispanic	4801	3.7	11.5 (10.8–12.1)
Other	4631	3.6	5.2 (4.7– 5.8)
Education			
<High school graduate	9559	7.4	13.7 (13.1–14.3)
High school graduate	37,168	28.8	27.5 (26.8–28.1)
Some college	34,899	27.1	30.1 (29.4–30.8)
College degree	47,299	36.7	28.7 (28.1–29.4)
Body mass index[a]			
Has obesity	39,855	30.9	31.6 (30.9–32.3)
Overweight	48,449	37.6	38.5 (37.8–39.3)
Normal or underweight	40,621	31.5	29.9 (29.2–30.6)
Physical activity level[b]			
Active	68,916	53.5	52.8 (52.1–53.6)
Insufficiently active	20,751	16.1	16.6 (16.0–17.2)
Inactive	39,258	30.5	30.6 (29.9–31.2)

Abbreviations: CI, confidence interval; yrs, years.

[a]Body mass index (weight in kilograms divided by height in meters squared) estimates were calculated from self-reported weight and height. Underweight and normal weight = BMI <25, overweight = BMI 25.0–29.9, and has obesity = BMI ≥30.

[b]Physical activity level definitions: active (meeting the aerobic physical activity guideline of 150 minutes/week of moderate-intensity physical activity, 75 minutes/week of vigorous-intensity physical activity, or an equivalent combination); insufficiently active (some activity, but not enough to meet active definition); and inactive (no leisure-time physical activity for at least 10 minutes).

Table 2.

Prevalence of subjective cognitive decline among adults aged ≥45 years by physical activity level[a] and select characteristics — Behavioral Risk Factor Surveillance System, 33 states and the District of Columbia, 2015 (N=128,925)[b]

			Physical Activity Level[a]					
	Overall		Active		Insufficiently active		Inactive	
Characteristic	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**
Total[c]	11.3	(10.9–11.8)	8.8	(8.2–9.3)	11.4	(10.2–12.7)	15.7	(14.8–16.6)
Sex								
Men[c]	11.2	(10.5–11.8)	9.0	(8.2–9.8)	10.9	(9.3–12.7)	15.5	(14.2–16.9)
Women[c]	11.5	(10.8–12.1)	8.6	(7.8–9.3)	11.9	(10.2–13.9)	15.8	(14.6–17.0)
Age group (yrs)								
45–54[c]	10.6	(9.7–11.5)	7.7	(6.6–8.9)	10.6	(8.7–13.0)	15.5	(13.8–17.4)
55–64[c]	11.3	(10.6–12.1)	7.7	(7.0–8.5)	11.8	(10.2–13.7)	17.6	(15.9–19.4)
65–74[d]	10.2	(9.5–10.9)	8.7	(7.7–9.6)	8.9	(7.5–10.6)	13.6	(12.1–15.1)
≥75	14.4	(13.2–15.7)	13.0	(11.5–14.7)	20.4	(13.5–29.5)	15.2	(13.6–16.9)
Race/Ethnicity								
White, non-Hispanic[c]	11.2	(10.7–11.6)	8.7	(8.1–9.2)	11.3	(10.1–12.6)	15.8	(14.9–16.8)
Black, non-Hispanic[c]	13.0	(11.8–14.4)	10.6	(8.9–12.6)	13.8	(11.2–17.0)	15.5	(13.4–17.8)
Hispanic[c]	10.9	(9.2–12.8)	7.6	(5.8–9.8)	10.6	(6.6–16.6)	15.3	(12.3–18.9)
Other	10.4	(8.0–13.5)	9.0	(6.1–13.0)	9.9	(4.8–19.3)	14.2	(9.2–21.1)
Education								
<High school graduate[c]	17.8	(16.2–19.7)	15.1	(12.8–17.9)	18.7	(13.9–24.7)	19.6	(17.3–22.1)
High school graduate[c]	11.9	(11.2–12.7)	8.7	(7.9–9.6)	11.6	(10.0–13.4)	16.0	(14.6–17.6)
Some college[c]	11.5	(10.7–12.4)	9.2	(8.2–10.4)	13.5	(11.1–16.4)	14.8	(13.5–16.3)
College degree[c]	7.4	(6.8– 8.0)	6.7	(6.0–7.5)	6.2	(4.8–7.9)	11.2	(9.7–13.0)
Body mass index[e]								
Has obesity[c]	13.0	(12.2–13.7)	10.2	(9.2–11.3)	12.3	(10.2–14.6)	16.3	(15.1–17.5)
Overweight[c]	10.5	(9.7–11.3)	8.5	(7.6–9.4)	10.9	(9.0–13.0)	14.3	(12.8–15.9)

	Physical Activity Level[a]							
	Overall		Active		Insufficiently active		Inactive	
Characteristic	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Normal or underweight[c]	10.7	(9.9–11.5)	8.0	(7.2–8.9)	11.2	(9.0–13.7)	16.6	(14.7–18.6)

Abbreviations: CI, confidence interval.

[a]Physical activity level definitions: active (meeting the aerobic physical activity guideline of 150 minutes/week of moderate-intensity physical activity, 75 minutes/week of vigorous-intensity physical activity, or an equivalent combination); insufficiently active (some activity, but not enough to meet active definition); and inactive (no leisure-time physical activity for at least 10 minutes).

[b]All estimates are weighted.

[c]Significant linear trend by physical activity level ($P<0.05$).

[d]Significant trend by physical activity level, although deviates from linear ($P<0.05$).

[e]Body mass index (weight in kilograms divided by height in meters squared) estimates were calculated from self-reported weight and height. Underweight and normal weight = BMI <25, overweight = BMI 25.0–29.9, and has obesity = BMI ≥30.

Table 3.

Odds ratios of having SCD and a functional limitation among U.S. adults aged ≥45 years by age group and physical activity level — Behavioral Risk Factor Surveillance System, 33 states and the District of Columbia, 2015[a]

	Among all adults					Among adults with SCD				
		Odds ratio of having SCD					Odds ratio of having a functional limitation			
		Unadjusted		Adjusted[b]			Unadjusted		Adjusted[b]	
Age group	**N**	**OR**	**(95% CI)**	**AOR**	**(95% CI)**	**N**	**OR**	**(95% CI)**	**AOR**	**(95% CI)**
Total	128,925					13,891				
Physical activity level[c]										
Active	68,916	Ref	Ref	Ref	Ref	5806	Ref	Ref	Ref	Ref
Insufficiently active	20,751	1.34	(1.17–1.55)	1.33	(1.15–1.53)	2142	1.47	(1.12–1.92)	1.13	(0.85–1.50)
Inactive	39,258	1.93	(1.76–2.12)[d]	1.68	(1.52–1.85)[d]	5943	1.97	(1.65–2.36)[d]	1.59	(1.32–1.92)[d]
45–64 years	66,390					6996				
Physical activity level[c]										
Active	34,446	Ref	Ref	Ref	Ref	2577	Ref	Ref	Ref	Ref
Insufficiently active	13,121	1.51	(1.28–1.79)	1.45	(1.21–1.73)	1379	1.31	(0.94–1.82)	1.20	(0.86–1.67)
Inactive	18,823	2.38	(2.09–2.72)[d]	1.99	(1.74–2.28)[d]	3040	1.87	(1.45–2.40)[d]	1.56	(1.21–2.03)[d]
≥65 years	62,535					6895				
Physical activity level[c]										
Active	34,470	Ref	Ref	Ref	Ref	3229	Ref	Ref	Ref	Ref
Insufficiently active	7630	1.19	(0.91–1.55)	1.22	(0.96–1.56)	763	1.24	(0.78–1.99)	0.93	(0.54–1.61)
Inactive	20,435	1.43	(1.25–1.63)[d]	1.32	(1.15–1.52)[d]	2903	1.88	(1.45–2.42)[d]	1.62	(1.26–2.09)[d]

Abbreviations: SCD, subjective cognitive decline; OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; yrs, years.

[a] All estimates are weighted.

[b] Logistic regression models adjusted for sex, age group (45–54, 55–64, 65–74, and ≥75 years), race/ethnicity, education level, and body mass index.

[c] Physical activity level definitions: active (meeting the aerobic physical activity guideline of 150 minutes/week of moderate-intensity physical activity, 75 minutes/week of vigorous-intensity physical activity, or an equivalent combination); insufficiently active (some activity, but not enough to meet active definition); and inactive (no leisure-time physical activity for at least 10 minutes).

[d] Significant linear trend ($P<0.05$).