Factors Associated with Self-Reported 14 or More Activity Limitation Days among Adults in the United States

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Abstract:

Objective: *It is estimated that 41 million American adults 18 and older experience poor physical or mental health which limits their ability to engage in their daily activities. The objective of this study was to assess the prevalence of and factors associated with ≥14activity limitation days (ALD) due to poor physical or mental health as self-reported by persons aged 18 years and over in the United States (U.S).*

Methods: *Using the 2012 Behavioral Risk Factors Surveillance System (BRFSS), persons over the age of 18 in the U.S. were examined to assess the prevalence of and factors associated with ≥ 14ALD due to poor physical or mental health. The BRFSS is administered on a continuous basis by telephone using random-digit dial sampling methods. A clustering sample design was used to account for differences in the probability of selection and non-response in order to accurately derive US and state-based population estimates. The design consists of a probability sample of all households with telephones in the state. Analyses were conducted using SAS 9.2.*

Results: *Of the 104,257 participants included in the analyses, 40% reported having ≥14 ALD due to poor physical or mental health. After adjusting for demographic and socioeconomic factors, males (AOR1.17, 95% CI: 1.14-1.21), those with high school or less education (AOR: 1.42, 95% CI: 1.37-1.21), those who were separated (AOR: 1.23; 95% CI=1.14-1.32), divorced (AOR: 1.10; 95% CI=1.06-1.15), those from the Southern Black Belt States (AOR1.14, 95% CI: 1.10-1.20), and those from the remainder of the Southern region of the U.S. (AOR1.14, 95% CI: 1.08-1.21) were significantly more likely to report ≥14ALD due to poor physical or mental health.*

Conclusion: *The prevalence of ≥14ALD due to poor physical or mental health among the study population was associated with sociodemographic and region of residence factors. These findings highlight the need for prevention strategies specifically for populations who might be more at risk for ALD due to social determinants of health.*

Keywords: *ALD, physical or mental health, United States*

1. INTRODUCTION

According to Healthy People 2020, limitation of activity refers to the reduction ina person's ability to perform his or her usual activities over a period of time. The ability to participate in daily activities is an important measure of the overall health and well-being of the population[1]. Studies have shown a positive association between self-reported physical activity and health-related quality of life (HRQOL)[2].In fact, a sedentary lifestyle is known to increase the risk of developing chronic health conditions such as cardiovascular diseases, hypertension, type 2 diabetes mellitus, colon and breast cancers, osteoporosis, depression, and backaches [2-4]. As such, the Centers for Disease Control and Prevention (CDC) monitors surveillance of health-related quality of life (HRQOL), defined as "perceived physical and mental health over time"[5] . In a previous study, 5.5 percent of adults ages 18 to 44 and 7.3 percent of children under age 18 experience limitation in their daily activities[1]. As the population ages, activity limitation becomes greater. The epidemic of chronic diseases is linked to population aging[6]and physical inactivity is a primary cause of many chronic diseases[7]. It has been noted that roughly 32.6 percent of non-institutionalized adults age 65 and older in the US experience

limitations of activities of daily living such as self-care, work, or recreation[8].For example, arthritis and activity limitation due to joint symptoms contributes to limitations which leads to dependency and subsequently decreases QOL[9]. It is also estimated that 41 million American adults 18 and older experience poor physical or mental health that limit their daily activity[10]. Since psychological distress may contribute to further impairment, screening and treatment are recommended for mental conditions that occur in persons with chronic diseases who report activity limitation days (ALD)[11]. This study assesses the prevalence of and factors associated with self-reported $\geq$ 14ALD due to poor physical or mental health among persons aged 18 years and over in the United States.

2. METHODS

2.1. Data Source

We analyzed data from the 2012 Behavioral Risk Factor Surveillance System (BRFSS)[12, 13].The BRFSS is a collaborative project between all of the 50 states in the U.S., the District of Columbia, three U.S. territories (Puerto Rico, Guam, and the US Virgin Islands) and the Centers for Disease Control and Prevention (CDC). It is designed to measure behavioral risk factors for non-institutionalized adults who reside in the U.S. and its territories.

2.2. Sampling and Setting

The BRFSS is nationally coordinated by the CDC and conducted by state health departments in all 50 states and the District of Columbia. BRFSS is used to collect prevalence data among adult U.S. residents regarding their risk behaviors and preventive health practices that can affect their health status. Respondent data are forwarded to CDC to be aggregated for each state.

The BRFSS questionnaire is administered on a continuous basis by telephone using random-digit dial sampling methods. The design consists of a probability sample of all households with telephones in the state. A clustering sample design was used to account for differences in the probability of selection and non-response in order to accurately derive US and state-based population estimates. In 2012, more than 450,000 interviews were conducted through the BRFSS. Annual surveys consist of a core set of questions about various health topics; such health-related risk behaviors, chronic health conditions, and use of preventive services. Sociodemographic data collected include age, sex, race/ethnicity, marital status, education, employment, and household income. The BRFSS data are publicly available and used for health policy development and advocacy at both the national and state levels.

2.3. Measures

All measures in this study were based on self-reported data obtained from the 2012 BRFSS.

Independent Variables or Demographic Characteristics

Participants responded to questions about their gender, race or ethnicity, age, education, income, marital status, and region of residence. The term "Southern Black Belt States" and "South remainder" were used to describe sub-regions of the Southern region of the U.S.

Dependent Variable

The ALD question is one of four core health-related QOL measures that have been monitored by states using the BRFSS. Response to the following question was used to determine the prevalence of ALD among persons with poor physical or mental health: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?" The response options were ''_ _number of days,'' "none," "don't know/not sure," or "refused." Only those records with "the number of days" were included in the analysis. The items measured in days were dichotomized at a cut-off value of $\geq$ 14 days of poor health in the past month versus $\leq$13[14].

Statistical Analysis

We used univariate analysis to calculate relative frequencies for gender, race or ethnicity, age, education, income, marital status, and region of residence. A bivariate analysis was utilized to conduct an initial assessment of the factors independently associated with $\geq$ 14ALD due to poor physical or mental health. All of the variables that had achieved $p \leq 0.05$ in the bivariate analysis were included in

the multivariable logistic regression model. Adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs) were obtained. Bivariate and multivariable analyses excluded persons with responses that were missing or recorded as "don't know/not sure" or "refused." A 2 sided p value of $\leq$ 0.05 was considered to indicate statistically significant. All statistical analyses were performed using SAS version 9.2[15].

3. RESULTS

Table 1 displays the socio-demographic characteristics and region of residence identified in the study population. Of the 104,257 individuals who responded to the survey question: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?", 62, 512 (60%) reported ≤13 days of activity limitation due to poor physical or mental health in the past 30 days, while 41, 745 (40%) reported ≥ 14 days of activity limitation.. The majority of the respondents who reported ≥ 14 days of activity limitation were females (63%), non-Hispanic Whites (72%), between the ages of 45-64 (49%). Included in this group of respondents were those who had a high school education or less (53%), had annual household incomes less than $25,000 (60%), were married (41%), and were from the Southern region of the U.S. (35%).

Table1. *Number^a and percentage for the recent activity limitation days, due to poor physical or mental health in the past 30 days, by select characteristics: 2012 BRFSS, United States*

Select Characteristics	Poor Activity Limitation Days (N=104,257)	
Overall	**1-13 days**	**14-30 days**
	n (%)	**n (%)**
	62512 (60)	41745 (40)
Gender		
Male	22427 (36)	15247 (37)
Female	40085 (64)	26498 (63)
Total	**62512 (100)**	**41745 (100)**
Race		
Non-Hispanic White	25261 (72)	17401(72)
Non-Hispanic Black (AA)	3648 (11)	2964 (12)
Hispanic or Latino	4894 (14)	3195 (13)
Asian	388 (1)	91 (0.3)
Native Hawaiian or Other Pacific Islander	57 (0.2)	33 (0.10)
American Indian or Alaska Native	673 (2)	639 (2.6)
Total	**34921 (100)**	**22759 (100)**
Age group		
17-44	21300 (34)	7290 (18)
45-64	25853 (42)	20301 (49)
65-74	8956 (14)	7541 (18)
75 and above	6034 (10)	6328 (15)
Total	**62143 (100)**	**41460 (100)**
Level of education		
High School or less	21710 (35)	21798 (53)
Some College	17809 (29)	11749 (28)
College Graduate	22823 (36)	8034 (19)
Total	**62342 (100)**	**41581 (100)**
Level of income		
Less than $24,999	19003 (35)	21634 (60)
$25,000 to $49,999	14078 (25)	7768 (22)
$50,000 to $74,999	8436 (15)	3009 (8)
$75,000 or more	13969 (25)	3466 (10)
Total	**55486 (100)**	**35877 (100)**
Marital Status		
Married	30083 (50)	16457 (41)
Never Married	11872 (20)	5777 (14)
Divorced	9632 (16)	9397 (23)

Separated	1723 (3)	1854 (5)
Widowed	6626 (11)	7005 (17)
Total	**59936 (100)**	**40490 (100)**
Region of residence		
South Black Belt States[b]	11615 (18)	9720 (24)
South Remainder[c]	5947 (10)	4551 (11)
Midwest	13992 (23)	8863 (22)
Northeast	13644 (22)	8431 (20)
West	16437 (27)	9556 (23)
Total	**61635 (100)**	**41121 (100)**

[a]*Frequency may vary due to missing values*

[b]*South Black Belt States: Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Louisiana, Arkansas, Texas*

[c]*South Remainder: Delaware, District of Columbia, Maryland, West Virginia, Kentucky, Oklahoma*

Table 2 presents the results of multivariable logistic regression analysis for socio-demographic (gender, race or ethnicity, age, education, income, marital status, and region of residence) variables regressed on self-reported days of activity limitation due to poor physical or mental health in the past 30 days. After adjusting for the aforementioned socio-demographic and region of residence variables and comparing to those who reported ≤13 days of activity limitation due to poor physical or mental health, male (AOR1.17, 95% CI: 1.14-1.21), respondents who were 45-64 years of age (AOR: 2.13, 95% CI: 2.06-2.23), those who were 65-74 years of age (AOR: 2.10, 95% CI: 2.00-2.21), respondents aged ≥ 75 years(AOR: 2.31, 95% CI: 2.20-2.24), being American Indian or Alaska Native (AOR=1.15;95% CI=1.01, 1.30), those with some college education (AOR: 1.42, 95% CI: 1.37,1.48), those with high school or less education (AOR: 1.42, 95% CI: 1.37-1.21), those with a <$75,000 annual household income, those who were separated (AOR: 1.23; 95% CI=1.14-1.32), divorced (AOR: 1.10; 95% CI=1.06-1.15), and those from the Southern region of the U.S. (Southern Black Belt States and the Southern Remainder) were more likely to report ≥ 14 days of activity limitations due to poor physical or mental health in the last 30 days. As compared to non-Hispanic Whites, non-Hispanic Blacks or African Americans were less likely to report ≥ 14 days of activity limitations (AOR=0.87; 95% CI=0.82, 0.93), as were Hispanic or Latino (AOR=0.84; 95% CI=0.79, 0.89), and Asian (AOR=0.56; 95% CI=0.43, 0.72).

Table2.*Multivariable analyses for self-reported ≥ 14 activity limitation days, due to poor physical or mental health in the last 30 days, by select characteristics: 2012 BRFSS, United States*

Characteristics	**Adjusted OR[a](95% CI)[b]**for self-reported ≥ 14 activity limitation days
Gender	
Female	1.00
Male	1.17 (1.14-1.21)[e]
Race	
Non-Hispanic Black (AA)	0.87 (0.82-0.93)[e]
Non-Hispanic White	1.00
Hispanic or Latino	0.84 (0.79-0.89)[e]
Asian	0.56 (0.43-0.72)[e]
Native Hawaiian or Other Pacific Islander	1.18 (0.72-1.91)
American Indian or Alaska Native	1.15 (1.01-1.30)[c]
Age group	
18-44	1.00
45-64	2.13 (2.06-2.23)[e]
65-74	2.10 (2.00-2.21)[e]
75 and above	2.31 (2.20-2.44)[e]
Level of education	
High School or less	1.72 (1.65-1.79)[e]
Some College	1.42 (1.37-1.48)[e]
College Graduate	1.00
Annual Household Income	
Less than $24,999	3.61 (3.43-3.80)[e]
$25,000 to $49,99	1.86 (1.77-1.96)[e]

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$50,000 to $74,99	1.33 (1.26-1.41)[e]
$75,000 or more	1.00
Marital Status	
Never Married	0.77 (0.73-0.80)[e]
Married	1.00
Divorced	1.10 (1.06-1,15)[e]
Separated	1.23 (1.14-1.32)[e]
Widowed	0.99 (0.94-1.04)
Region of residence	
South Black Belt States[f]	1.14 (1.10-1.20)[e]
South Remainder[g]	1.14 (1.08-1.21)[e]
Midwest	0.94 (0.90-0.98)[d]
Northeast	1.00
West	0.96 (0.92-1.00)

[a]*Odds Ratio*

[b]*Confidence Interval;*

[c]*p<0.05*

[d]*p<0.01*

[e]*p<0.0001*

[f]*South Black Belt States: Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Louisiana, Arkansas, Texas*

[g]*South Remainder: Delaware, District of Columbia, Maryland, West Virginia, Kentucky, Oklahoma*

4. DISCUSSION

Persons 60 years and older are increasing worldwide; aging is likely to be the next global public health challenge [16, 17]. In the U.S., poor physical or mental health and their related ALD will require public health attention and health systems strategies to address the needs of older adults[17], especially given the epidemiologic transition from acute illness to chronic disease [2]. As the population ages and chronic disease ensues, disabling conditions such as arthritis, chronic joint symptoms, and other causes for ALD become more likely[18]. Thus, continuous monitoring of the HRQOL, developed by the CDC, complements clinical research and practice and helps public health agencies to assess, protect and promote public health[2].

Our findings show that forty percent of the 2012 BRFSS survey participants reported ≥ 14 days of ALD due to poor physical or mental health. Of particular importance is how self-reported ALD varied within this study population. Consistent with previous studies, advancing age and marital status were associated with an increased likelihood of ≥14ALD, regardless of demographic and geographic factors[2, 19-22]Specifically, one study shows that older adults and those who were separated, widowed, or divorced were considerably more likely to experience limitations in their activities[21]. Another study found, however, when controlling for age and education, gender and race were most predictive of ALD although marital status was also important[23]. Differences in the prevalence of chronic disease in African American women were believed to account for this finding [23, 24]. With respect to level of income and educational attainment, previous studies have also shown that those with a lower level of income and educational attainment are more likely to report ≥14ALD as compared to those of higher socioeconomic status [19, 25, 26]. Our study used a national representative sample to confirm these significant findings.

Our findings also reveal that respondents from the Southern region of the U.S. were more likely to report ≥14ALD as compared respondents from Northeast. Other studies have also shown regional variations in HRQOL of older adults, particularly in the southern U.S.[25, 27].This is not surprising, especially when considering the regional differences in the distribution of high blood pressure, stroke, diabetes, and other chronic diseases in the southeastern U.S.[25].In other words, longer days of activity limitation cannot only be seen in isolation from the individual's demographic and socio economic status, but place of residence also interacts and influences self-reported ≥14ALD. This finding suggests an avenue for further investigation and suggests resources for physical and mental health interventions for ALD should be allocated for specific regions and populations. Such targeted

approaches are critical, as the number of people with chronic conditions is projected to increase over the next several decades[28] and the healthcare system will need to accommodate this increase. ALD is a primary contributor to most chronic diseases[7]

This study has at least two limitations to consider, regarding the data source. First, the BRFSS is a telephone-based survey and is administered to civilian, non-institutionalized adults. Therefore, the BRFSS excludes individuals without telephone service, those on military bases, and individuals in institutions. For this reason, generalizability to the entire US population is limited. Second, this study relied on self-reported information which may have introduced recall or reporting bias.

We conclude that socio-demographic factors and region of residence are associated with ≥14 ALD among individuals aged ≥ 18 years in the US as these were significant predictors of longer days of activity limitation. Longitudinal studies that incorporate quantitative and qualitative measures are essential to identify other factors associated with self-reported ≥14 ALD and to identify the best targets for public health interventions and in reducing or eliminating the ALD Americans experience due to physical or mental health issues. This is especially important as we focus on ensuring the best QOL for the aging population.

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