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Original article

Activity limitation, chronic disease, and comorbid serious psychological distress in U.S. adults – BRFSS 2007

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Abstract

Objectives: This study examines the prevalence of self-reported activity limitation from poor physical or mental health in the past 30 days among a sample of noninstitutionalized U.S. adults. The associations between frequent activity limitation, chronic diseases, and comorbid serious psychological distress (SPD) were also examined.

Methods: 2007 Behavioral Risk Factor Surveillance System (BRFSS) data were used to generate prevalence estimates of days of self-reported activity limitation in the past 30 days (i.e., 0 days, 1–13 days, 14–29 days, 30 days, and 14 or more days) by selected sociodemographic characteristics, chronic disease conditions (i.e., lifetime diagnosis of diabetes, hypertension, coronary heart disease, stroke, asthma), and comorbid serious psychological distress. Multivariate logistic regression analysis was used to generate adjusted odds ratios of frequent activity limitation (14–30 days in the past 30 days) among persons with selected chronic disease conditions and among those with comorbid serious psychological distress.

Results: A total of 21 % of adults reported activity limitation for at least 1 day in the past 30 days; 6.6 % reported 14 or more days, and 3.4 % reported all 30 days. Comorbid serious psychological distress was significantly associated with reported frequent activity limitation among persons who also reported a lifetime diagnosis of selected chronic diseases. Furthermore, in multivariate models adjusted for sociodemographic variables and the presence of the other chronic conditions, adults with comorbid lifetime diagnosis of a selected chronic disease and serious psychological distress were significantly more likely to report 14 or more days of activity limitation than those with only a lifetime diagnosis of a chronic condition.

Conclusion: Physicians should proactively screen and effectively treat co-occurring mental conditions in patients with chronic diseases who report frequent days of activity limitation because serious psychological distress may contribute to their level of impairment.

Keywords: Activity limitation – Role disability – Serious psychological distress.

Introduction

Chronic diseases and mental illnesses are costly, debilitating, and common. According to the World Health Organization (WHO) report entitled, Preventing Chronic Diseases: A Vital Investment, chronic diseases, which include cancer, diabetes, heart disease, stroke, and chronic respiratory diseases, are the leading causes of mortality in the world.[1] These chronic diseases were estimated to cause 60 % of the approximately 58 million deaths in 2005 and to disproportionately impact persons in low- and middle-income countries.[1] WHO estimates that 450 million people suffer from mental and behavioral disorders globally.[2] Unipolar depression has been considered one of the leading causes of disability, as measured by Years Lived with Disability, and was ranked as the seventh and third leading contributor to the burden of disease as assessed by Disability-Adjusted Life Years in 2001 in low/ middle, and high-income countries, respectively.[3] It was estimated that in 2005, the accumulated losses "in international dollars" to national income from heart disease, stroke, and diabetes were $ 18 billion for China, $ 9 billion for India, and $ 11 billion for the Russian Federation.[1] In the United States, costs for treat-

ing seven common chronic diseases (cancer, diabetes, heart disease, hypertension, stroke, mental disorders, and pulmonary conditions) totaled $277 billion in 2003 without consideration of the secondary health problems they may cause.[4] Further, serious mental illnesses were estimated to cost the United States more than $193 billion in lost personal earnings in 2002.[5]

Activity limitation, also referred to as "role disability," is generally defined as an inability to perform usual activities, and is commonly associated with chronic physical and mental health conditions even after controlling for demographic variables.[6] In addition, role disabaility is a major source of indirect costs.[7] At the individual level, indirect costs can include impaired functioning in work and social roles, as well as family burden. On the broad societal level, these costs can include lost productivity and workers' compensation. Further, data from the National Comorbidity Survey Replication indicated that in the United States, a total of nearly 3.6 billion days each year are spent out-of-role due to physical and mental conditions: 1.3 billion days due to mental disorders (primarily major depression), and 2.4 billion days due to chronic physical health conditions from the diseases studied.[7] A nationally representative study of the United States' population found that an estimated 50 % of adults have a physical or mental condition that impacts their role functioning[7] and they reported 32 % more role disability days than matched controls, in the past year.

Mental disorders occur commonly with chronic medical diseases, and they significantly impact indirect costs, including role impairment, work cut-back, and work loss.[6] Specifically, persons with certain diseases, including stroke, liver disease, arthritis, diabetes mellitus, and cancer, reported more depressive symptomatology compared to those who reported no chronic diseases.[8] Studies are needed to assess the prevalence of perceived activity limitation days in the U.S. population to monitor trends and to assess the economic, personal, and social impacts. This study examines the prevalence of perceived frequent activity limitation in the past 30 days among noninstitutionalized adults to determine if the effect on days of activity limitation from a specific comorbid chronic disease and serious psychological distress is greater than the association between frequent activity limitation days and the specified chronic disease alone.

Methods

BRFSS

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing, state-based, random-digit dialed telephone survey of noninstitutionalized persons 18 years or older in the United States, Guam, Puerto Rico, and the Virgin Islands. The BRFSS collects self-reported information on many of the behaviors and conditions that increase the risk of chronic disease among adults.[9] The median cooperation rate or percentage of eligible respondents who completed the BRFSS survey in 2007 was 72.1 %. Each sample of the BRFSS is weighted to the respondent's probability of selection and to the age- and sex-specific population or age-, sex-, and race-specific population of each state. Thirty-five states, Puerto Rico, and the District of Columbia collected the 2007 Mental Illness and Stigma module. Of these, 11 (i. e., Colorado, Kansas, Maine, Massachusetts, Michigan, Nebraska, Ohio, Oregon, Texas, Washington, Wisconsin) administered 2007 Mental Illness and Stigma Module data from a subset of the state sample, a common practice for some states. Analysis included all 37 geographic units.

Sociodemographic characteristics

We classified age into the following six categories: 18–24, 25–34, 35–44, 45–64, 65–74, and 75 years and older. Employment status included the following: employed (i. e., employed for wage or self-employed), unemployed (i. e., out of work for less than a year or out of work for more than a year), retired, unable to work, or otherwise employed (e. g., homemakers, students). We categorized education at 3 levels: less than 12 years; 12 years or high school equivalent; and more than 12 years, some college or technical education, or college graduate. We classified marital or relationship status into the following six categories: married, divorced, widowed, separated, never married, or member of an unmarried couple. The presence of children in the household was dichotomized as "yes" for at least one child in household and "no." Respondents who did not indicate having any health care coverage (i. e., health insurance, prepaid plans, such as managed care, or government plans, such as Medicare) were classified as not having health care coverage.

Activity limitation

We assessed activity limitation by combining responses to the following three BRFSS core questions: "Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?" "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" and "During the past 30 days, for about how may days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?" Persons who reported no physically and

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no mentally unhealthy days were not asked the initial activity limitation question and were categorized as "0 days" for activity limitation. Other categories were "1–13 days," "14–29 days," and "30 days." A second categorization classified respondents as "14 or more days" versus less than 14 days.

Lifetime diagnosis of a chronic disease

A lifetime diagnosis of diabetes was assessed by responses to the following question: "Have you ever been told by a doctor that you have diabetes?" We coded gestational diabetes, prediabetes or borderline diabetic as "no." To assess a lifetime diagnosis of hypertension, respondents were asked, "Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?" We coded gestational hypertension, prehypertension, or borderline hypertension as "no." To assess a lifetime diagnosis of high cholesterol, respondents were asked, "Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?" To assess for a lifetime diagnosis of a coronary heart disease (e. g., heart attack or myocardial infarction), respondents were asked two questions: "Has a doctor, nurse, or other health professional ever told you that you had a heart attack, also called a myocardial infarction?" and "Has a doctor, nurse, or other health professional ever told you that you had any of the following? (ever told) you had angina or coronary heart disease?" To assess for a lifetime diagnosis of a stroke, respondents were asked, "Has a doctor, nurse, or other health professional ever told you that you had any of the following? (ever told) you had a stroke?" To assess for a lifetime diagnosis of asthma, respondents were asked, "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?"

Measure of serious psychological distress

U.S. Public Law (PL) 102-321, also referred to as the Alcohol, Drug Abuse, and Mental Health Administration Reorganization Act, established a block grant for states to fund community mental health services for adults with "serious mental illness" and required the Substance Abuse and Mental Health Services Administration (SAMSHA) to develop a method to estimate the prevalence of serious mental illness in states.[10] As a result of this legislation, several screening measures were developed to use in the SAMHSA National Household Survey on Drug Abuse, including the Kessler 6 (K6) measure of nonspecific distress. The K6 is a measure of generalized psychological distress developed for use in general population samples.[11] The K6 has subsequently been found to be a useful screen for depression in population health surveys.[12] It has been widely used in epidemiologic surveys to measure psychological distress in the past 30 days. The K6 has been found to have good agreement with the Composite International Diagnostic Interview depression module, with areas under the receiving operating characteristic curve in excess of 0.9.(11).[13]

The K6 questions were asked as a component of the 2007 BRFSS Mental Illness and Stigma module. In brief, the K6 is comprised of six questions regarding how often a respondent during the past 30 days felt, "so sad that nothing could cheer them up," "nervous," "restless," "hopeless," "worthless," or that "everything was an effort." Responses for each item range from 0 (none of the time) to 4 (all of the time). The range for summed responses on the K6 scale is 0 to 24, with 0 suggesting no nonspecific psychological distress and 24 suggesting the highest level of nonspecific psychological distress. According to the scoring criteria proposed by Kessler, persons with a score of 13 or greater are likely to be experiencing severe mental illness.[11] For the purposes of this study, scores of 13 or greater were considered as indicators of serious psychological distress (SPD) and coded accordingly.

Analysis

Descriptive analyses were conducted to examine the weighted prevalence of activity limitation days by sociodemographic characteristics. In addition, we used separate multivariate logistic regression models to examine the associations between each specific chronic disease and comorbid frequent SPD, with a referent group of the specified chronic disease alone, for the outcome of 14 or more activity limitation days in the past month. We hypothesized that people with a self-reported lifetime diagnosis of a specified chronic disease and SPD (K6 score of ≥ 13) would report significantly more days of activity limitation (≥ 14 days) in the past 30 days than those persons with a lifetime diagnosis of the selected chronic disease alone. For all analyses, only p values <0.05 were considered statistically significant. SAS was used to calculate weighted prevalence estimates and 95 % confidence limits (CL). SAS-callable SUDAAN (Research Triangle Institute, Research Triangle Park, NC, 2001) was used to calculate adjusted odds ratios (AOR), as it takes into account the complex sample design of the BRFSS. Additional information regarding the BRFSS, including the methods, weighting procedures, questionnaires, data, and reports are available at http://www.cdc.gov/brfss.[9]

Results

Responses from a total of 220,448 adults in 35 states, the District of Columbia, and Puerto Rico were included in this analysis. Approximately 39.9 % were 25–44 years of age,

Table 1. Descriptive characteristics of the study population among U.S. adults aged ≥18, 35 States DC and Puerto Rico, BRFSS 2007.

Characteristic	N	%
Total	**220,448**	**100**
Age (yrs)		
18–24	8,279	11.1
25–34	23,106	18.8
35–44	35,222	21.1
45–54	45,863	19.0
55–64	45,058	14.0
65–74	33,184	8.4
75+	28,067	7.7
Sex		
Men	82,230	48.8
Women	138,218	51.2
Race or ethnicity		
White, non-Hispanic	170,206	67.8
Black, non-Hispanic	16,609	8.6
Hispanic	17,373	16.1
Other, non-Hispanic[1]	*14,030*	*7.6*
Employment status		
Employed	118,797	61.3
Unemployed	7,931	4.8
Retired	56,111	15.5
Unable to work	14,456	5.2
Student or Homeworker	22,376	13.3
Educational Level (yrs)		
<12	22,600	12.0
12 or equivalent	65,524	28.3
>12	131,702	59.8
Marital/Relationship Status		
Married	123,353	61.5
Divorced	30,936	8.8
Widowed	29,247	6.1
Separated	4,638	2.0
Never married	26,272	17.6
Member of unmarried couple	5,238	4.1
Any children in Household	68,675	44.3
Any Health Care Coverage	194,948	84.7
Serious Psychological Distress	8,252	4.0
Activity Limitation in the Past 30 Days		
No Activity Limitation Days in the Past 30 Days	171,098	78.8
Any Activity Limitation Days in the Past 30 Days	47,002	21.2
Frequent Activity Limitation Days (≥14 days) in the Past 30 Days	17,693	6.6
Ever Diagnosis of Chronic Disease:		
Hypertension	77,946	27.5
High Cholesterol	78,167	37.0
Coronary Heart Disease	19,030	6.2
Asthma	28,403	13.2
Diabetes	24,039	8.4
Stroke	8,132	2.6
Ever Diagnosis of Chronic Disease & Serious Psychological Distress		
Hypertension	3,979	5.9
High Cholesterol	3,701	5.1

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Table 1. Continue

Characteristic	N	%
Total	**220,448**	**100**
Coronary	1,487	9.7
Asthma	2,175	7.0
Diabetes	1,608	7.6
Stroke	741	10.6
Number of Chronic Lifetime Conditions[2]		
0	100,350	55.0
1	57,115	23.5
2	37,410	13.2
3	17,585	5.8
4	6,141	2.0
5	1,483	0.5
6	184	0.07

[1] Asian, Native Hawaiian or Pacific Islander, American Indian or Alaskan Native, other race, multiracial
[2] Estimates based upon persons responding "yes" or "no" to all chronic disease questions selected.

67.8 % were white non-Hispanic, 51.2 % were women, 61.3 % were employed, 59.8 % had more than a high school education, 61.5 % were currently married, 84.7 % currently had health care coverage, and 44.3 % had children living in the household (Table 1). A total of 4.0 % of the study population reported SPD. For activity limitation in the past 30 days, 78.8 % of the study population reported 0 days while 6.6 % reported frequent activity limitation (≥14 days), and a total of 21.2 % of adults reported activity limitation for at least 1 day in the past 30 days. For a lifetime diagnosis of a chronic condition, 27.5 % reported hypertension, 37.0 % reported high cholesterol, 6.2 % reported coronary heart disease, 13.2 % reported asthma, 8.4 % reported diabetes, and 2.6 % reported stroke. The prevalence of SPD among those with a lifetime diagnosis of a selected chronic disease ranged from 5.1 % among persons reporting high cholesterol, to 10.6 % among persons reporting a lifetime diagnosis of a stroke. The majority of the study population reported no lifetime diagnosis of one of the selected chronic diseases (55.0 %), although more than a fifth reported having one (23.5 %) and less than 10 % reporting 3 or more of the selected chronic diseases.

Overall, 6.6 % (6.4–6.8) of adults reported 14 or more activity limitation days because of poor physical or mental health in the past 30 days. The prevalence of 14 or more activity limitation days (frequent activity limitation) was significantly different for each of the demographic characteristics examined (Table 2). Specifically, there was a higher prevalence of 14 or more activity limitation days among women (7.3 %) compared to men (5.8 %), and the prevalence increased with age until age 64. Furthermore, the prevalence was higher in black non-Hispanics (8.4 %) than in white non-Hispanics (6.5 %) or Hispanics (5.6 %), but the prevalence was similar to other non-Hispanic minorities (7.0 %). The prevalence of 14 or more activity limitation days was highest among those with less than a high school education (11.5 %), declined with increasing education to 8.0 % for those with a high school diploma or GED, and declined to 4.9 % for those with more than a high school education. Those who were unable to work had a higher prevalence of 14 or more activity limitation days (47.4 %) compared to all other employment categories (range 2.5–13.0 %). Those who were previously married had a higher prevalence of 14 or more activity limitation days (i.e., divorced, 12.5 %; widowed, 11.5 %; or separated, 13.0 %) compared to those who were currently married (5.5 %), never married (5.1 %), or a member of unmarried couple (5.3 %). Those without health care coverage had a higher prevalence of 14 or more activity limitation days (8.2 %) compared to those with a health plan (6.3 %). Finally, those with no children in the household had a higher prevalence of 14 or more activity limitation days (7.8 %) compared to those with children in the household (5.1 %). The prevalence of frequent activity limitation was greater among persons with SPD or a reported lifetime diagnosis of specific chronic disease than those without SPD or a reported lifetime diagnosis of specific chronic disease (Figure 1).

The prevalence of activity limitation days was significantly greater with concomitant diagnoses of chronic disease and SPD than with the chronic condition alone (Table 3). For example, the prevalence of 14 or more activity limitation days because of poor physical or mental health in the past 30 days for those ever diagnosed with coronary heart disease, but without SPD, was 16.0 % (Table 3). However, the prevalence of 14 or more activity limitation days among those ever diagnosed with coronary heart disease and with SPD was 59.1 %. Similar pat-

Table 2. Prevalence of activity limitation days due to poor physical or mental health in the past 30 days among adults in the past 30 days, BRFSS 2007, n = 220,448.

	0 days		1–13 days		14–29 days		30 days		14 or more days	
	% (95 % CL)		% (95 % CL)		% (95 % CL)		% (95 % CL)		% (95 % CL)	
Characteristic										
Total	78.7	(78.4–79.2)	14.7	(14.3–15.0)	3.2	(3.1–3.3)	3.4	(3.2–3.5)	6.6	(6.4–6.8)
Gender										
Men	81.5	(80.9–82.2)	12.8	(12.2–13.3)	2.5	(2.3–2.7)	3.3	(3.1–3.6)	5.8	(5.5–6.1)
Women	76.2	(76.2–76.7)	16.5	(16.1–16.9)	3.9	(3.7–4.1)	3.4	(3.3–3.6)	7.3	(7.1–7.6)
Age (yrs)										
18–24	78.4	(76.7–80.1)	18.5	(16.9–20.2)	1.9	(1.5–2.5)	1.1	(0.8–1.5)	3.0	(2.5–3.7)
25–34	78.9	(77.9–79.9)	16.8	(16.0–17.9)	2.4	(2.1–2.7)	1.8	(1.5–2.1)	4.1	(3.7–4.6)
35–44	78.7	(77.8–79.5)	16.1	(15.4–16.9)	2.8	(2.5–3.1)	2.4	(2.1–2.8)	5.2	(4.8–5.7)
45–54	77.4	(76.7–78.2)	14.3	(13.7–14.9)	4.1	(3.8–4.4)	4.2	(3.9–4.5)	8.3	(7.8–8.9)
55–64	78.1	(77.4–78.9)	12.3	(11.7–12.9)	4.2	(3.9–4.6)	5.4	(4.9–5.9)	9.8	(9.2–10.5)
65–74	81.2	(80.3–82.1)	10.4	(9.7–11.3)	3.5	(3.1–3.9)	4.9	(4.5–5.3)	8.3	(7.8–8.9)
>=75	80.6	(79.6–81.5)	9.6	(8.9–10.4)	3.8	(3.5–4.3)	6.0	(5.5–6.5)	9.8	(9.2–10.5)
Race										
White non-Hispanic	79.1	(78.8–79.5)	14.4	(14.1–14.7)	3.1	(2.9–3.2)	3.4	(3.3–3.5)	6.5	(6.3–6.7)
Black non-Hispanic	75.9	(74.4–77.4)	15.7	(14.4–17.1)	4.3	(3.8–4.9)	4.1	(3.4–5.0)	8.4	(7.5–9.4)
Hispanic	78.9	(77.4–80.2)	15.6	(14.3–16.9)	2.8	(2.5–3.3)	2.8	(2.3–3.3)	5.6	(5.0–6.3)
Other, non-Hispanic	78.7	(77.0–80.3)	14.4	(13.0–15.9)	3.6	(3.1–4.2)	3.4	(2.8–4.0)	7.0	(6.2–7.8)
Educational level (yrs)										
<12	74.2	(72.8–75.5)	14.3	(13.1–15.5)	4.8	(4.3–5.3)	6.7	(6.1–7.4)	11.5	(10.7–12.4)
12 or equivalent	78.6	(77.9–79.3)	13.3	(12.7–14.0)	4.0	(3.7–4.3)	4.0	(3.8–4.3)	8.0	(7.7–8.4)
>12	79.7	(79.2–80.2)	15.4	(15.0–15.8)	2.5	(2.3–2.7)	2.4	(2.2–2.6)	4.9	(4.7–5.1)
Employment status										
Employed	83.1	(82.7–83.6)	14.4	(13.9–14.8)	1.6	(1.4–1.7)	1.0	(0.9–1.1)	2.5	(2.4–2.7)
Unemployed	66.3	(64.0–68.5)	20.7	(18.8–22.8)	6.8	(5.9–7.9)	6.2	(5.2–7.3)	13.0	(11.6–14.5)
Retired	80.4	(79.7–81.1)	10.9	(10.3–11.5)	3.9	(3.6–4.2)	4.9	(4.5–5.2)	8.7	(8.3–9.2)
Unable to work	34.4	(32.5–36.3)	18.2	(16.8–19.6)	17.7	(16.4–19.0)	29.8	(28.1–31.5)	47.4	(45.6–49.3)
Other	77.7	(76.5–78.8)	17.2	(16.2–18.3)	3.3	(2.8–3.8)	1.8	(1.6–2.1)	5.1	(4.6–5.7)
Marital Status										
Married	81.2	(80.8–81.6)	13.3	(12.9–13.7)	2.7	(2.6–2.9)	2.8	(2.7–3.0)	5.5	(5.3–5.8)
Divorced	71.6	(70.4–72.7)	16.0	(15.0–16.9)	5.6	(5.1–6.1)	6.9	(6.3–7.6)	12.5	(11.7–13.3)
Widowed	77.3	(76.2–78.3)	11.2	(10.4–12.1)	4.8	(4.3–5.3)	6.8	(6.2–7.3)	11.5	(10.8–12.3)
Separated	70.3	(67.2–73.3)	16.7	(14.3–19.5)	6.7	(5.5–8.3)	6.3	(5.0–7.8)	13.0	(11.2–15.0)
Never married	76.4	(75.2–77.6)	18.5	(17.4–19.6)	2.8	(2.4–3.2)	2.4	(2.0–2.8)	5.1	(4.6–5.7)
Member of unmarried Couple	74.3	(71.3–77.0)	20.4	(17.8–23.3)	3.1	(2.4–4.1)	2.2	(1.5–3.1)	5.3	(4.3–6.6)
Any Healthcare Coverage										
Yes	79.5	(78.9–80.1)	14.3	(14.0–14.7)	3.0	(2.8–3.1)	3.2	(3.1–3.4)	6.3	(6.1–6.5)
No	76.0	(74.8–77.1)	15.9	(14.9–16.9)	4.3	(3.8–4.7)	3.9	(3.3–4.5)	8.2	(7.5–8.9)
Children in the Household										
Yes	79.5	(78.9–80.1)	15.4	(14.9–16.0)	2.8	(2.6–3.0)	2.3	(2.1–2.5)	5.1	(4.7–5.4)
No	78.1	(77.7–78.6)	14.1	(13.7–14.5)	3.5	(3.4–3.7)	4.2	(4.1–4.4)	7.8	(7.5–8.0)

terns were seen for other chronic diseases and conditions, such as hypertension, high cholesterol, asthma, diabetes, and stroke. Remarkably, the adjusted odds of 14 or more days of activity limitation among those with SPD and one of the chronic diseases we examined was 4 to 8 times higher than among those with the selected chronic disease in the absence of SPD. For instance, the adjusted odds of 14 or more days of activity limitation for those with high cholesterol and with SPD was AOR

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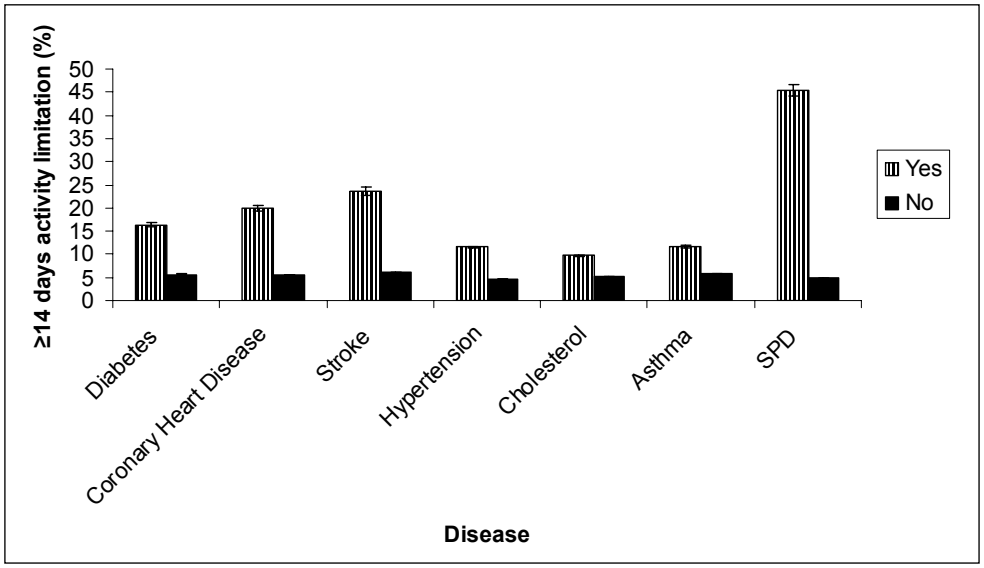

Figure 1. Prevalence (%) of ≥14 activity limitation days during the past 30 days due to poor physical or mental health among adults by chronic condition or serious psychological distress, BRFSS 2007.

Chronic Condition (n)	≥14 days % (95 % CI)	AOR (95 % CI)*	AOR (95 % CI) **
No SPD (194,844)	4.8 (4.7–5.0)	1.00	1.00
SPD (8,252)	46.9 (44.4–49.3)	7.65 (6.33–9.26)	8.15 (7.01–9.48)
Hypertension, – SPD (67,360)	8.9 (8.5-9.3)	1.00	1.00
Hypertension, + SPD (3,979)	54.5 (50.7–58.2)	6.78 (5.65–8.15)	5.96 (4.91–7.24)
High Cholesterol, – SPD (68,890)	7.2 (6.8–7.5)	1.00	1.00
High Cholesterol, + SPD (3,701)	54.8 (51.4–58.3)	7.65 (6.33–9.26)	7.19 (5.90–8.75)
Coronary Heart Disease, – SPD (15,759)	16.0 (15.0–17.1)	1.00	1.00
Coronary Heart Disease, + SPD (1,487)	59.1 (52.5–65.3)	5.00 (3.75–6.67)	5.29 (3.91–7.16)
Asthma, – SPD (24,098)	8.4 (7.8–9.0)	1.00	1.00
Asthma, + SPD (2,175)	53.3 (49.0–57.6)	5.88 (4.63–7.48)	4.78 (3.70–6.18)
Diabetes, – SPD (20,158)	12.9 (12.1–13.8)	1.00	1.00
Diabetes, + SPD (1,608)	60.0 (54.7–65.1)	6.08 (4.65–7.94)	5.89 (4.44–7.82)
Stroke, – SPD (6,485)	19.7 (17.9–21.7)	1.00	1.00
Stroke, + SPD (741)	60.1 (52.7–67.1)	4.73 (3.40–6.59)	4.78 (3.35–6.82)

Table 3. Prevalence and adjusted odds ratios for activity limitation days due to poor physical or mental health in the past 30 days associated with serious psychological distress among U.S. adults with selected chronic conditions – BRFSS, 2007.

*Adjusted odds ratio (AOR) from logistic regression model that included age, race, gender, employment status, educational level, marital status, health care coverage, and children living in the household as covariates
** Adjusted odds ratio (AOR) from logistic regression model that included age, race, gender, employment status, educational level, marital status, health care coverage, children living in the household, and the other chronic conditions as covariates

= 7.65 (95 % CL: 6.3–9.3), 7 times higher than those with high cholesterol in the absence of SPD (Table 3). The odds ratios for each disease did not decrease significantly in the logistic regression models that were adjusted for both sociodemographic factors and the presence of a lifetime diagnosis of any of the other chronic conditions examined (Table 3). With increases in the number of chronic disease(s), persons with SPD and co-morbid chronic condition(s) were significantly more likely to report frequent activity limitation than those with chronic condition (s) alone. These estimates approach non-significance at six chronic disease conditions, which represents a small percentage of the sample population (0.09 %; Figure 2).

Discussion

To our knowledge, this study was the first to use a large, state-based data set from a national surveillance system to evalu-

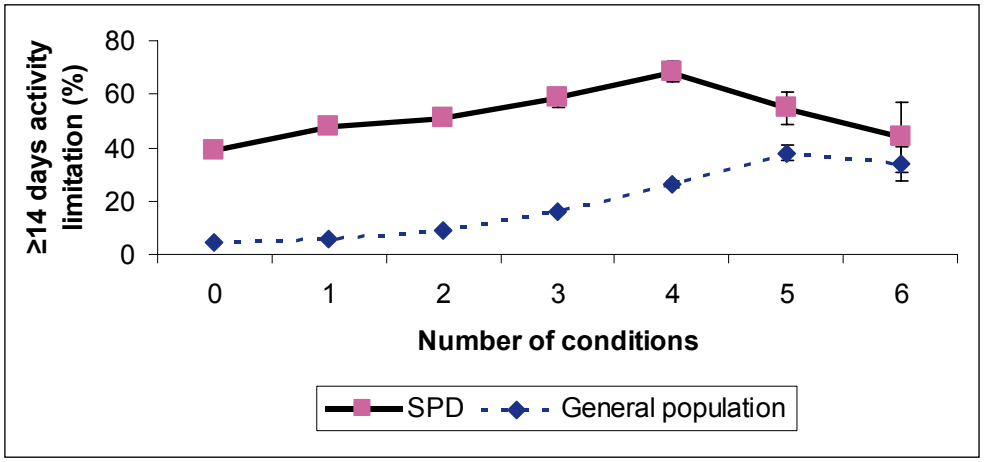

Figure 2. Prevalence (%) of ≥14 activity limitation days during the past 30 days due to poor physical or mental health among adults by number of chronic conditions with serious psychological distress and in the general population, BRFSS 2007.

ate the relationship between chronic diseases and comorbid serious psychological distress on frequent activity limitation among U.S. adults. Our study revealed that chronic diseases and comorbid serious psychological distress are associated with frequent activity limitation, although the direction of this relationship cannot be determined because of the cross-sectional nature of the data. It cannot be determined by this study's results if activity limitation is caused by chronic diseases and serious psychological distress or if the inverse is true. However, a previously conducted study that used the World Health Organization Disability Assessment Schedule found that the joint effect of comorbid mental and physical conditions on the probability of severe disability was synergistic[13], and results from the National Comorbidity Survey found that role impairment in persons with hypertension, arthritis, asthma, and ulcers were confined almost entirely to cases with comorbid mental disorders.[6]

The use of these data will allow states to plan better for their chronic disease and mental health programs. Furthermore, this study points out a need to incorporate mental illness into chronic disease prevention and intervention programs. Respondents who were women, 55–64 years of age, 75 or older, had less than a high school diploma, unable to work, divorced, widowed, separated, without a health plan, and without children in the household were also significantly more likely to report 14 or more days of activity limitation than their peers; these findings are similar to 2002 BRFSS data.[15]

For all selected chronic diseases, comorbidity with serious psychological distress was more strongly associated with activity limitation for 14 or more days in multivariate regression analysis after adjusting for sociodemographic factors, compared to a lifetime diagnosis of the chronic disease alone. Because chronic diseases are known to cluster, the presence of comorbid chronic diseases were examined in the adjusted regression models, but they were not found to impact significantly the adjusted odds ratios for frequent activity limitation. Adults with one or more chronic conditions have been found to be more likely to have serious psychological distress than those persons without a chronic disease(s).[16]

Results from the World Mental Health Surveys indicated that physical and mental illness, particularly depression and anxiety, comorbidity is common, but not for all combinations of specific physical and mental disorders.[17] Studies have suggested that comorbid mental disorders may impact activity limitation in persons with chronic diseases by increasing reactivity in somatic symptoms, decreasing motivation to care for the chronic diseases, having maladaptive physical effects and somatic symptoms, and reducing coping capacity.[14] In addition, depression has been found to adversely impact self-care and increase medical complications, emergency room use, and mortality.[18] Conversely, chronic conditions may impact mental disorders, particularly depressive symptomatology.[19] For example, stroke is associated with physical limitations that are believed to contribute to depressive symptoms in older persons.[19] The additional negative impact of serious psychological distress on perceived activity limitation in persons with a lifetime diagnosis of a chronic disease, after controlling for all covariates, was greater than the effect of a chronic disease presence alone and should be considered in the treatment of persons with chronic diseases by healthcare providers.

Limitations

The BRFSS is a cross-sectional survey and, therefore, causality and the direction of the multivariate results cannot be determined. Only noninstitutionalized adults from 37 U.S. states and territories who participated in the Mental Illness and Stigma Module of the 2007 BRFSS were included in this

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study, which limits generalizability of results to the entire U.S. population or the populations of other countries in the world. This study examined perceptions of activity limitation and did not assess actual measurements; therefore, persons with serious psychological distress may have greater perceived activity limitation than actual activity limitation. Furthermore, we may have underestimated the prevalence of serious psychological distress (use of screener, may not have persons too ill to answer phone in the survey population or those without phone). However, the K6 has been found to be a valid screening tool for depression, although performance on the scale may vary by disorder group.[12] Finally, lifetime diagnoses of chronic conditions were not verified. Some potential chronic diseases associated with activity limitation are not included on the BRFSS (e. g. sickle cell disease) or were not included in this analysis. Further, a lifetime diagnosis of specific mental disorders was not included on the 2007 BRFSS.

Due to the associations among comorbid serious psychological distress, chronic disease, and frequent activity limitation, physicians and other healthcare professionals should screen and treat patients with chronic medical diseases reporting frequent activity limitation days for mental disorders accordingly and not subscribe reported impairment to the presence of a chronic disease(s) alone.[16] To screen and treat these patients, effective treatments for specific disorders have to be available to consumers who screen positive for comorbid mental illness conditions, prescribed by healthcare professionals, and included as a reimbursable component of healthcare insurance packages.[16] Additional longitudinal studies are needed to examine the impact of treating comorbid chronic and mental illness conditions on activity limitation. Moreover, increased surveillance of mental disorders on local, state, and national surveys is needed to categorize fully and to quantify their impact on activity limitation, as well as other personal, societal, economic, and disease domains.

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