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Original article

Psychological distress, use of rehabilitation services, and disability status among noninstitutionalized US adults aged 35 years and older, who have cardiovascular conditions, 2007

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Abstract

Objectives: To investigate whether psychological distress is associated with disability status and use of rehabilitation services among adults aged 35 years and older with cardiovascular conditions.

Methods: Using 2007 data from the Behavioral Risk Factor Surveillance System (BRFSS), we assessed the association between serious psychological distress (SPD) and the prevalence of disability and use of outpatient rehabilitation services among cardiovascular disease (CVD) survivors aged 35 years or older. Respondents' SPD status was ascertained by the Kessler 6 questionnaire; their CVD survivor status was based on self-reports of physician-diagnosed coronary heart disease (CHD) or stroke; and their disability status was based on self reports of activity limitation and use of special equipment.

Results: The prevalence of SPD was higher among respondents with a CVD history than those without. Among CVD survivors, those with SPD had worse disability status than those without SPD; the rate of having used any outpatient rehabilitation services following a heart attack or stroke was not significantly different by SPD status.

Conclusions: Further studies are needed to confirm whether higher rate of disability among CVD survivors with SPD is attributable to conditions that can be corrected or improved by rehabilitation services; whether alleviating psychological distress among CVD survivors may lead to more frequent use of rehabilitation services and thus to a reduction in their rate of disability.

Keywords: Activity limitation – Disability – Medication – Mental health – Psychological distress – Rehabilitation.

Introduction

A large body of evidence has shown that psychological distress is associated with the development of cardiovascular disease (CVD).[1–3] Psychological distress has also been shown to cluster with unhealthy behaviors and possibly to exacerbate chronic conditions and impair quality of life.[4,5] These findings indicate the importance of identifying demographic characteristics associated with an increased risk for psychological distress among people with cardiovascular conditions and of determining the extent to which psychological distress is associated with disability status and the use of health care services among people with these conditions. Both health care professionals and patients would benefit from this kind of information. To assess these relationships, we analyzed 2007 data from the Behavioral Risk Factor Surveillance System (BRFSS).

Methods

The BRFSS is an ongoing, state-based, health surveillance system that conducts random-digit-dial telephone surveys of noninstitutionalized U.S. adults.[6,7] Given the large sample size of BRFSS surveys, BRFSS data can be used to produce local, as well as state and national estimates on chronic illnesses, health behaviors, access to health care, and other health-re-

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Table 1. Three psychological distress indicators, by CHD, stroke, and CVD status among US adults aged ≥35 years, Behavioral Risk Factor Surveillance System, 2007.

Psychological distress indicators	CHD*		Stroke*		CVD*	
	Yes (n = 17645)	No (n = 158323)	Yes (n = 7427)	No (n = 169699)	Yes (n = 22231)	No (n = 153648)
Mean K6 score (SE)	4.82 (0.09)	3.05 (0.02)	4.92 (0.10)	3.15 (0.02)	4.81 (0.08)	3.01 (0.02)
Mean # days in the previous 30 days mental health problems interfered with usual activities (SE)	2.67 (0.09)	2.06 (0.02)	3.20 (0.13)	2.07 (0.02)	2.74 (0.08)	2.04 (0.02)
Prevalence of serious psychological distress (SE)	10.5 (0.6)	3.4(0.1)	9.1 (0.6)	3.8 (0.1)	10.2 (0.6)	3.3 (0.1)

CHD, coronary heart disease; CVD, cardiovascular disease (CVD indicates a history of either CHD or stroke); SE, standard error of the adjusted mean. Note. Estimates reflect adjustment for age, race/ethnicity, sex, marital status, education attainment, and employment status. All differences in indicators by CHD, stroke, and overall CVD status were significant at $P < 0.01$.
*The sample sizes used to calculate values by CHD, stroke, and CVD status were all less than the total sample size (n = 177663) because of missing values.

lated variables or indicators. BRFSS methods, including the weighting procedure, are described elsewhere.[6] All BRFSS questionnaires, data, and reports are available at www.cdc.gov/brfss.

In 2007, state health departments, in collaboration with the Centers for Disease Control and Prevention (CDC) and the Substance Abuse and Mental Health Services Administration (SAMHSA), implemented the Mental Illness and Stigma Module (MISM) based on the Kessler 6 (K6) questionnaire as part of the BRFSS survey in 37 states or territories. The median cooperation rate in states or territories that implemented the MISM – the percentage of potential respondents who completed the BRFSS survey – was 75.2%. Among the 187,394 BRFSS respondents aged 35 years or older in those jurisdictions, 177,663 (94.8%) answered all six MISM questions. Questions about respondents' disability status were included in the core BRFSS survey module and thus given to all BRFSS respondents; however, because only 18 states implemented both the MISM and the Cardiovascular Health Module (from which we obtained rehabilitation service utilization data), the sample sizes used to assess the prevalence of different variables were not the same.

Measures

The Kessler 6 (K6) questionnaire used in the MISM was originally used to screen for serious mental illness but is now used primarily to screen for serious psychological distress (SPD).[8,9] The K6 consists of six questions that ask respondents how frequently during the previous 30 days that they had felt: 1) "so sad that nothing could cheer …[them] up." 2) "nervous," 3) "restless or fidgety," 4) "hopeless," 5) "that everything was an effort," and 6) "worthless." Response options are "all of the time," "most of the time," "some of the time," "a little of the time," and "none of the time." Responses are scored on a 5-point Likert scale that ranges from 0 (none of the time) to 4 (all of the time). Respondents also have the option of responding "Don't know" or "Not sure" to any of the six questions; those who did so on the MISM were excluded from our analysis. Scores for respondents who answer all six questions are then added to produce a psychological distress score that could range from 0 to 24, with a score of 13 or above considered indicative of SPD.[9,11] In addition to the six questions, MISM respondents were also asked "During the past 30 days, for about how many days did a mental health condition or emotional problems keep you from doing your work or other usual activities?" We used their response to this question as another indicator of their level of psychological distress. Receipt of mental health services was ascertained by answering "yes" to the question "Are you now taking medicine or receiving treatment from a doctor or other health professional for any type of mental health condition or emotional problem?"Survey participants' CVD status was assessed by three questions: "Has a doctor, nurse, or other health professional EVER told you that you had a heart attack, also called a myocardial infarction?"; "Has a doctor, nurse, or other health professional EVER told you that you had angina or coronary heart disease?"; and "Has a doctor, nurse, or other health professional EVER told you that you had a stroke?" Respondents were considered to have a diagnosed coronary heart disease (CHD) if they responded "yes" to either of the first two questions and to have had a stroke if they responded "yes" to the third question. They were considered to have had some type of diagnosed CVD (and thus to be "CVD survivors") if they responded to all three questions and at least one response was "yes."

Respondents' disability status was assessed by two questions: "Are you limited in any way in any activities because of physical, mental, or emotional problems?" and "Do you now have any health problem that requires you to use special equipment,

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Table 2. Prevalence and adjusted prevalence ratios (APRs) and their 95 % CI of serious psychological distress among U.S. adults aged 35 years and older with a history of coronary heart disease or stroke, by selected sociodemographic characteristics (n = 22231). Behavioral Risk Factor Surveillance System, 2007.

	Serious psychological distress (K6 score ≥ 13)	
	Prevalence (95 % CI)	APR (95 % CI)
Total	9.2 (8.3, 11.0)	
Sex		
Women	10.4 (9.1, 11.7)	1.07 (0.90, 1.28)
Men	8.1 (6.9, 9.3)	1.00
Age		
35–44	18.4 (13.2, 23.6)	3.43 (2.40, 4.92)
45–54	16.5 (14.2, 18.8)	3.10 (2.35, 4.10)
55–64	11.6 (9.4, 13.7)	2.45 (1.87, 3.22)
65–74	5.4 (3.8, 7.1)	1.38 (0.98, 1.94)
75+	3.8 (3.1, 4.6)	1.00
Race/ethnicity		
White, non-Hispanic	7.1 (6.5, 7.8)	1.00
Black, non-Hispanic	11.8 (8.9, 14.7)	0.97 (0.74, 1.26)
Hispanic	18.9 (13.2, 24.6)	1.74 (1.31, 2.33)
Other, non-Hispanic	12.7 (9.0, 16.4)	1.44 (1.08, 1.92)
Education		
< High school	18.1 (14.7, 21.4)	1.95 (1.55, 2.46)
High school graduate	8.7 (7.5, 9.9)	1.20 (0.98, 1.47)
Some college or higher	6.3 (5.3, 7.2)	1.00
Marital Status		
Currently married	7.6 (6.4, 8.9)	1.00
Previously married	11.3 (10.1, 12.6)	1.27 (1.05, 1.54)
Never married	12.3 (8.8, 15.8)	0.93 (0.69, 1.26)
Employment status		
Currently employed	5.6 (3.5, 7.6)	1.00
Currently unemployed	19.2 (12.8, 25.5)	3.16 (1.95, 5.11)
Retired	3.7 (3.2, 4.3)	1.26 (0.83, 1.89)
Unable to work	26.1 (23.5, 28.6)	4.22 (2.89, 6.15)
Homemaker, student	10.3 (4.6, 15.9)	2.16 (1.16, 4.01)

CI, confidence interval; APR, adjusted prevalence ratio
Note: prevalence estimates are crude; the APR estimates reflect adjustment for all other variables in the table.

such as a cane, a wheelchair, a special bed, or a special telephone? (Include occasional use or use in certain circumstances.)" Response sets included "Yes," "No," "Don't know/not sure," and "Refused". Respondents who had a heart attack or stroke were asked "After you left hospital following your heart attack (or stroke), did you go to any kind of outpatient rehabilitation? This is sometimes called 'rehab'." Response sets included "Yes," "No," "Don't know/not sure," and "Refused". Sociodemographic variables were sex (male, female); race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other); age group in years (35–44, 45–54, 55–64, 65–74, 75 or older); education attainment (lower than high school, high school graduate, some college, college graduate); marital status (currently married, previously married, never married); and employment status (currently employed, currently unemployed, retired, unable to work, homemaker/student).

Statistical analyses

To account for the complex BRFSS sampling design, we used SAS-callable SUDAAN 9.0 (Release 9.0.1, Research Triangle Institute, Research Triangle Park, North Carolina, 2007) for all analyses. We used the CROSSTAB procedure to obtain crude prevalence estimates and their standard errors. We used the REGRESS procedure to produce adjusted estimates for continuous variables by respondents' SPD status; the RLOGIST procedure to produce adjusted prevalence estimates (adjusted for age, race/ethnicity, sex, marital status, education attainment, and employment status) for binary variables by respondents' SPD status; and the LOGLINK procedure to produce adjusted prevalence ratios (APRs) for the association of SPD with CHD, stroke, and CVD. In another set of analyses, we used the LOGLINK procedure to determine the association between SPD and sociodemographic characteris-

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Disability status/use of rehabilitation services	Serious psychological distress (K6 score ≥13)		
	SPD % (SR)	SPD No (RS) %	P for difference
Activity limitation due to physical, mental, or emotional problems	78.2 (2.5)	47.4 (0.7)	0.0000
Use of special equipment	48.0 (2.6)	25.6 (0.6)	<0.0001
Use of outpatient rehabilitation services after a heart attack*	34.7 (1.0)	31.5 (3.2)	0.34
Use of outpatient rehabilitation services after a stroke*	34.6 (3.4)	33.3 (1.3)	0.72

Table 3. Estimates of the prevalence of disability and use of rehabilitation services among U.S. adults aged 35 years or older with a history of cardiovascular disease, by serious psychological distress (SPD) status. Behavioral Risk Factor Surveillance System, 2007.

Note. The prevalence estimates reflect adjustment for age, race/ethnicity, sex, marital status, education attainment, and employment status.
*Estimates of the prevalence of outpatient rehabilitation service use were based on responses from 6147 survey participants in only 18 states, whereas the first two estimates were based on responses from 21794 survey participants from the entire United States.

tics among CVD survivors. We also calculated APRs for the association between use of mental health services or medications and disability status and use of rehabilitation services among CVD survivors.

Results

Among all respondents aged 35 years or older (n = 177,663), 12.5 % had a history of CVD, 9.9 % had diagnosed CHD, and 4. 2 % had a stroke; the overall prevalence of SPD was 9.2 % (95 % confidence interval [CI] = 8.3 %–11.0 %).

Compared with respondents without a history of CHD or stroke, those with a history of CVD had a higher mean K6 score (4.81 vs. 3.01); a higher prevalence of SPD (10.2 % vs. 3.3 %, p <0.0001); and a higher average number of days in which mental health problems had interfered with their work or usual activities during the previous month (2.74 vs. 2.04) (Table 1).

Among CVD survivors, the prevalence of SPD was significantly higher among those aged 35–44, 45–54, and 55–64 than among those aged 75 years or older; higher among Hispanics and those in the "other" racial/ethnic group than among non-Hispanic whites; higher among those with a high school education or less than among those with at least some college; higher among those previously married than among those currently married; and higher among those currently unemployed, those unable to work, and those who were homemakers or students than among those who were currently employed. In our adjusted analysis, we found a particularly strong association between employment status and SPD prevalence among CVD survivors (26.1 % among those unable to work and 19.2 % among those who were unemployed versus 5.6 % among those currently employed, APR = 4.22 [95 % CI, 2.89–6.15] and APR = 2.58 [95 % CI, 1.76–3.81], respectively). However, SPD prevalence among female CVD survivors was not significantly higher than that among male CVD survivors, and that among retired CDC survivors was not significantly higher than that among employed CVD survivors after adjustment for other sociodemographic characteristics.

Among CVD survivors, those with SPD had a higher prevalence of activity limitation (78.2 % vs. 47.4 %; p <0.0001) and a higher rate of special equipment use (48.0 % vs. 25.6 %; p <0.0001) than those without, but they did not have a significantly higher rate of outpatient rehabilitation service use after either a heart attack or a stroke (Table 3).

Among CVD survivors with SPD, the percentage receiving mental health treatment or medications was significantly higher among those who had an activity limitation than among those who did not (57.0 % vs. 35.8 %), higher among those who used special equipment than among those who did not (59.2 % vs. 46.7 %), higher among those who received outpatient cardiac rehabilitation services than among those who did not (71.1 % vs. 49.5 %) (Table 4).

Discussion

The results of our analysis confirmed those from previous studies[12–14] showing that psychological distress is more common among people with a history of cardiovascular conditions than among those without such a history. They also confirmed the results of previous studies[15,16] showing that, among CVD survivors, certain racial/ethnic minority classifications, low socioeconomic status (e. g., low education attainment, unemployment), and lack of social support (e. g., being separated, divorced, widowed) are all associated with a higher likelihood of experiencing psychological distress.

We also found that prevalence of activity limitation and use of special equipment among CVD survivors with SPD was high-

Disability status/use of rehabilitation services	Receive mental health services % (95 % CI)	APR (95 % CI)
Activity limitation due to physical, mental, or emotional problems		
No	35.8 (6.1)	1.00
Yes	57.0 (2.8)	1.37 (1.04, 1.81)
Use of special equipment		
No	46.7 (3.8)	1.00
Yes	59.2 (3.4)	1.31 (1.12, 1.53)
Use of outpatient rehabilitation services after a heart attack		
No	49.5 (4.6)	1.00
Yes	71.1 (4.9)	1.36 (1.11, 1.66)
Use of outpatient rehabilitation services after a stroke		
No	53.1 (4.6)	1.00
Yes	57.7 (5.7)	1.11 (0.85, 1.44)

Table 4. Estimated percentage (95 % CI) of U.S. adults aged 35 years or older with cardiovascular disease and serious psychological distress who received mental health services, by activity limitation status and use of selected rehabilitation services. Behavioral Risk Factor Surveillance System, 2007.

CI, confidence interval; APR, adjusted prevalence ratio
*The prevalence estimates are crude; the APR estimates reflect adjustment for age, race/ethnicity, sex, marital status, education attainment, and employment status.

er than those without SPD; therefore, this subgroup of people may potentially have greater need for rehabilitation services. However, we found no significant difference between the two groups in their use of outpatient rehabilitation services following hospital discharge. Because of the cross-sectional nature of the survey, we could not determine whether higher prevalence of disability among CVD survivors with SPD was attributable to their poorer health status upon discharge; or whether increasing use of rehabilitation service could ameliorate their disability severity. For the same reason, we were also unable to determine the temporal relationship between disability and psychological distress among respondents with both. Results from a previous study, however, showed that coronary patients with high levels of psychological distress who participated in cardiac rehabilitation programs experienced marked improvement in their cardiovascular profile, behavioral characteristics, and quality of life.[17] In addition, our results showed that heart attack survivors with SPD who used outpatient cardiac rehabilitation services were also more likely to have used mental health services. This may represent a group of CVD survivors with SPD who seek professional help proactively for both physical and mental health conditions. The use of and adherence to one type of health care service may facilitate use of and adherence to another type of service.

Overall, our results, which showed a high level of psychological distress among CVD survivors, suggest that mental health care should be integrated into the chronic care routinely provided to people with cardiovascular conditions; that CVD survivors who experience psychological distress should receive appropriate mental health services following their diagnosis or discharge from the hospital; and that efforts are needed to encourage CVD survivors to utilize rehabilitation services.

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