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Original article

Modifiable characteristics of a healthy lifestyle and chronic health conditions in older adults with or without serious psychological distress, 2007 Behavioral Risk Factor Surveillance System

Lisa C. McGuire[1*], Tara W. Strine[1], Stephanie Vachirasudlekha[1], Lynda A. Anderson[1], Joyce T. Berry[2], and Ali H. Mokdad[3]

[1] *Centers for Disease Control and Prevention, Atlanta, GA, USA*
[2] *Substance Abuse and Mental Health Services Administration, Washington, DC, USA*
[3] *University of Washington, Seattle, WA, USA*

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Abstract

Objective: The associations between serious psychological distress (SPD), chronic health conditions, healthy behaviors, healthy weight, and use of preventive services were examined among adults 65 years old and older using the 2007 Behavioral Risk Factor Surveillance System (BRFSS).

Methods: Participants (N = 35,845) completed a scale of nonspecific psychological distress for the past 30 days. Chronic health conditions were investigated in addition to having a healthy weight (body mass index 18.5–24.9 kg/m^2), not smoking, consuming ≤1 alcoholic beverage per day, consuming at least five fruits or vegetables daily, participating in moderate-to-vigorous physical activity during the average week, receiving an annual influenza immunization, and ever receiving a pneumococcal immunization.

Results: People with SPD were more likely than those without SPD to report chronic health conditions and less likely to be nonsmokers. No differences were found for the remaining healthy behaviors, healthy body weight, and use of preventive services.

Conclusions: Older adults with SPD have a similar pattern of engagement in health behaviors, healthy weight, and use of preventive services compared to those without SPD despite reporting worse health status and presence of multiple chronic health conditions.

Keywords: Aging – Health behaviors – Behavioral risk factor surveillance system – Mental health – Serious psychological distress.

Introduction

Chronic health conditions are fairly prevalent for older adults aged 65 years old and older with 80 % reporting at least one chronic health condition[1] and many of these older adults have multiple conditions or comorbid conditions. Comorbid conditions frequently exist between mental disorders and other chronic physical health conditions[2]. Scott and colleagues[2] in a sample of adults from 17 countries reported that mental health was significantly related to obesity and the chronic health conditions of diabetes, asthma, hypertension, arthritis, ulcer, heart disease, back/neck problems, chronic headache, and multiple pains[2]. Modifiable health behaviors have been attributed to much of the morbidity and mortality related to chronic diseases and to their comorbidities[3,4]. The co-occurrence of mental and physical health conditions have considerable public health implications, but also can create complications for the people living with this combination[2]. The result can be increased risk of disability, poor quality of life, and premature mortality, as well as issues associated with disease management and treatment[2].

Mental health is considered as an important component of overall health for people of all ages[5]. A considerable number of people live with some type of mental health issue. For people 65 years old and older, it is estimated that 25 % of people experience some type of mental health issue, such as a mood disorder or severe cognitive impairment not associated with normative aging[6]. However, a much smaller portion of the population are experiencing serious psychological distress (SPD).

SPD is a type of mental health issue that can be found among portions of the population who have the most severe mental

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Table 1. Unadjusted prevalence of characteristics of adults (N = 35,845) aged ≥65 years old residing in the U.S. by Serious Psychological Distress (SPD), Behavioral Risk Factor Surveillance System, 2007.

	N	Total * % (SE)	SPD* % (SE)	Non-SPD* % (SE)	*p*-value†
Serious Psychological Distress (SPD), %					
Yes	949	2.7 (0.2)	NA	NA	NA
No	34896	97.3 (0.2)			
Socio-demographic characteristics					
Sex, %					0.04
Male	12332	41.9 (0.6)	34.4 (3.4)	42.1 (0.6)	
Female	23513	58.1 (0.6)	65.6 (3.4)	57.9 (0.6)	
Age, %					0.51
65–74	20203	54.0 (0.6)	56.5 (3.7)	53.9 (0.6)	
≥75	15642	46.0 (0.6)	43.5 (3.7)	46.1 (0.6)	
Marital status, %					<0.01
Married/couple	16774	58.4 (0.6)	46.5 (4.1)	58.8 (0.6)	
Previously married	17680	38.4 (0.5)	51.1 (4.0)	38.0 (0.6)	
Never married	1391	3.2 (0.2)	2.5 (0.6)	3.2 (0.2)	
Education, %					<0.01
<High school	5722	16.7 (0.5)	44.3 (4.2)	15.9 (0.5)	
High school	12470	31.8 (0.5)	28.2 (2.8)	31.9 (0.5)	
>High school	18075	51.2 (0.6)	27.6 (3.1)	52.2 (0.6)	
Race/Ethnicity, %					<0.01
White, non-Hispanic	29759	76.7 (0.7)	60.6 (4.4)	77.1 (0.7)	
Black, non-Hispanic	2274	6.9 (0.3)	10.7 (1.8)	6.8 (0.3)	
Other	3812	16.4 (0.7)	28.7 (4.9)	16.1 (0.7)	
Income, %					<0.01
<$15K	5131	14.3 (0.5)	38.9 (4.3)	13.6 (0.5)	
≥$15K to <$25K	7290	18.4 (0.4)	21.2 (2.7)	18.3 (0.4)	
≥$25K to <$35K	4740	13.0 (0.4)	9.9 (1.2)	13.1 (0.4)	
≥$35K to <$50K	4763	14.3 (0.4)	6.3 (1.2)	14.5 (0.4)	
≥$50K	7334	24.5 (0.5)	6.9 (1.7)	25.0 (0.5)	
No response provided	6587	15.5 (0.3)	16.8 (2.7)	15.5 (0.3)	
Physical and mental health					
Self-rated health, %					<0.01
Excellent	4217	11.9 (0.4)	2.5 (1.3) ‡‡	12.1 (0.4)	
Very good	9544	25.7 (0.5)	4.4 (0.9)	26.3 (0.5)	
Good	12037	34.0 (0.6)	17.7 (2.5)	34.5 (0.6)	
Fair	6893	20.1 (0.5)	33.4 (4.5)	19.8 (0.5)	
Poor	3154	8.2 (0.3)	42.1 (3.7)	7.3 (0.3)	
Physically unhealthy days per month, %					<0.01
<14	29749	83.7 (0.4)	45.8 (4.2)	84.8 (0.4)	
≥14	6096	16.3 (0.4)	54.2 (4.2)	15.2 (0.4)	
Mentally unhealthy days per month, %					<0.01
<14	33054	92.9 (0.3)	48.4 (4.0)	94.1 (0.2)	
≥14	2791	7.1 (0.3)	51.6 (4.0)	5.9 (0.2)	
Disability, %					<0.01
Yes	12972	35.2 (0.5)	79.8 (2.5)	33.9 (0.5)	
No	22873	64.8 (0.5)	20.2 (2.5)	66.1 (0.5)	
Heart disease, %					0.01
Yes	4525	12.7 (0.4)	26.0 (4.7)	12.3 (0.4)	
No	31320	87.3 (0.4)	74.0 (4.7)	87.7 (0.4)	
Diabetes, %					0.02
Yes	6596	19.8 (0.5)	31.8 (4.6)	19.5 (0.5)	
No	29249	80.2 (0.5)	68.2 (4.6)	80.5 (0.5)	

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Table 1. Continued

	N	Total * % (SE)	SPD* % (SE)	Non-SPD* % (SE)	*p*-value†
Arthritis, %					<0.01
Yes	20515	55.4 (0.6)	75.4 (3.1)	54.8 (0.6)	
No	153303	44.6 (0.6)	24.6 (2.5)	45.2 (0.6)	
Asthma, %					<0.01
Yes	3895	10.9 (0.4)	19.9 (2.7)	10.7 (0.4)	
No	31950	89.1 (0.4)	80.1 (2.7)	89.3 (0.4)	
Number of chronic health conditions, %‡					<0.01
0	11005	30.7 (0.6)	12.6 (2.0)	31.3 (0.6)	
1	16175	45.4 (0.6)	41.7 (3.8)	45.5 (0.5)	
2	6855	18.7 (0.4)	27.6 (2.9)	18.4 (0.4)	
3	1594	4.6 (0.3)	16.3 (5.0)	4.3 (0.3)	
4	216	0.6 (0.1)	1.8 (0.5)‡‡	0.5 (0.1)	

Abbreviation: SE = Standard Error, NA = Not Applicable
* Weighted population estimate
† Cochran-Mantel-Haenszel χ^2
‡ Heart Disease, Diabetes, Asthma, and Arthritis
‡‡ Unstable estimate with a relative standard error >30 or cell size <0

health issues[7]. People classified as having SPD have an increased likelihood of having a diagnosable mental illness or mental health problems severe enough to cause moderate to serious impairment in functioning that might require treatment[5]. The prevalence of SPD in the United States was 2.7 % in 2007 for the entire adult population and it has remained stable since 2001[8]. A similar low prevalence of SPD was found in rural Australia (3.9 %)[9]. In the United states, there is a relationship between SPD and age with older adults (≥65 years, 2.1 %) have been shown to have a lower prevalence of SPD than middle-aged (45–64 years; 3.4 %) and younger adults (18–44 years; 2.4 %)[5,8]. A similar association between age and SPD was found in South Africa[10] and rural Australia[9,11]. However, Quine in a population study of Australians 65 years old and older noted that those people 80–84 years old had the highest prevalence of SPD compared to those 65–79 years old and those 85 years old and older[12], while findings from Australian primary care settings found no association between age and SPD prevalence[13]. Bédard and colleagues noted that older adults (≥60 years old) with SPD had more physical comorbidities than younger adults with SPD[14].

Research indicates that adults 18 years old and older who have SPD compared to those without SPD have a higher prevalence of obesity, current smoking, heart disease, diabetes, arthritis, and stroke[5,15,16]. People who have SPD were more likely to report needing assistance with activities of daily living and instrumental activities of daily living[5,15,16]. Additionally, SPD is related to more hospitalizations, work-related disabilities, and suicide attempts as well as being less likely to receive stable treatment[17]. People who rated their health as poor were five times more likely to suffer from psychological distress than those who rated their health as higher[18]. Unfortunately, similar information is not available for older adults on how SPD relates to chronic health conditions and the healthy behaviors that can serve as a precursor to many chronic health conditions.

Despite the relatively low prevalence of SPD in older adults, this is an important group to investigate with their greater likelihood of comorbidities. Shih and Simon provided the only estimates for adults (≥18 years old) with SPD with respect to healthy behaviors and chronic health conditions; however, it was from a regionally-specific sample[15]. It is uncertain if those findings could be replicated or if they would generalize to a more diverse sample of U.S. adults. Thus, the purpose of our study was two-fold using information from a large U.S. population-based study. First, we estimated the prevalence for adults 65 years old and older with and without SPD for four chronic health conditions, six healthy behaviors, including two clinical preventive services, and the prevalence of a healthy weight. Second, we compared the prevalence for adults 65 years old and older with and without SPD for four chronic health conditions, six healthy behaviors, and the prevalence of a healthy weight.

Methods

Of 430,912 participants in the 2007 BRFSS Survey, 35,845 were included in our sample who were at least 65 years old and completed the Mental Illness and Stigma Module. Parti-

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cipants were more likely to be female, aged 65–74 years old, to be married, to have greater than a high school education, to be white, with an annual income of at least $ 50,000, to have at least good health, to have less than 14 physically or mentally unhealthy days, with no disability present, and to have one chronic health condition (Table 1).

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based surveillance system operated by state health departments in collaboration with the Centers for Disease Control and Prevention (CDC). Briefly, the objective of the BRFSS is to collect uniform, state-specific data on preventive health practices and risk behaviors linked to chronic diseases, injuries, and preventable infectious diseases in the adult population[19–20]. Trained interviewers collect data on a monthly basis using a standardized questionnaire given to an independent probability sample of households with telephones among the non-institutionalized United States adult population. Data from all states and territories were pooled to produce national estimates.

The questionnaire consists of three parts: 1) core questions asked in all 50 states, the District of Columbia, and three territories, 2) supplemental modules that are a series of questions on specific topics (e. g., adult asthma history, intimate partner violence, mental health), and 3) state-added questions. In 2007, trained interviewers administered questions about common symptoms of mental illness and the stigma associated with mental illness (Mental Illness and Stigma Module) in 35 states (Alaska, Arkansas, California, Colorado, Connecticut, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Texas, Vermont, Virginia, Washington, Wisconsin, Wyoming), the District of Columbia (DC), and Puerto Rico. Of the 35 state that administered the Mental Illness and Stigma Module, 11 states (Colorado, Kansas, Maine, Massachusetts, Michigan, Nebraska, Ohio, Oregon, Texas, Wisconsin, and Washington) administered it to only a subset of the state annual sample, using a split sample methodology. The weights were adjusted accordingly for the 11 states using a split sample and information on the weighting methodology and the weights to use for each of these states can be found at http://www.cdc.gov/brfss/technical_infodata/surveydata/2007/2007_dual.htm. Additional BRFSS methodology, including the weighting procedure, is described elsewhere[21]. All BRFSS questionnaires, data, and reports are available at www.cdc.gov/brfss.

To assess the prevalence of SPD in U.S. adults 65 years old and older, the standardized and validated Kessler-6 (K-6) scale of nonspecific psychological distress was used[22]. The K-6 originally was developed to identify persons with a high likelihood of having a diagnosable mental illness and those with mental health problems severe enough to cause moderate to serious impairment in functioning that may require treatment[5]. Those who are identified with SPD may or may not fit into diagnostic categories described in the Diagnostic Statistical Manual, fourth edition (DSM-IV)[5]. The K-6 queries participants about the frequency of their experience with six common manifestations of psychological distress during the past 30 days. Participants were asked if they felt nervous, hopeless, restless or fidgety, so depressed that nothing could cheer you up, that everything was an effort, or worthless. Possible response options were "All of the time", "Most of the time", "Some of the time", "A little of the time", and "None of the time" with points assigned to each category (0–4), respectively. The scores for all participants with complete information for each of the K-6 items were summed to produce a total K-6 score between 0 and 24 points[7]. Those who scored ≥13 were considered to have SPD[22]. The K-6 scale is currently used in a variety of governmental health surveys in the United States, Canada, and Australia, and in the World Health Organization's World Mental Health Surveys in 30 countries[23].

For this study, the following information was selected for analysis:

1. Four modifiable healthy behaviors:
   a. Consuming at least five fruits or vegetables daily[24.]
   b. Engaging in physical activity[25].
   c. Not currently smoking[26].
   d. Consuming ≤1 alcoholic beverage daily[27].
2. Healthy weight as measured by body mass index (BMI)[28].
3. Obtaining two clinical preventive services:
   a. Having received an influenza immunization (including both vaccine injection and intra-nasal spray) within the past year[29].
   b. Having received a lifetime pneumococcal immunization[30].

BMI was calculated as weight in kilograms divided by the square of height in meters (kg/m^2) and was used to classify people into two BMI weight categories: 1) unhealthy weight (underweight, BMI <18.5, or overweight/obese, BMI ≥25), and 2) healthy weight (BMI = 18.5–24.9)[28]. Current smokers were those who reported having smoked ≥100 cigarettes during their lifetime and who currently smoked everyday or some days. Participants were asked how many days in the past 30 days they had at least one drink of any alcoholic beverage and the number of alcoholic beverages consumed, on average, on those days. Heavy alcohol consumption was defined as exceeding one drink per day for both older men and women[27]. Consistent with federal guidelines, respondents were classified into two levels of physical activity: 1) inactive (no physi-

	N	Total * % (SE)	SPD* % (SE)	Non-SPD* % (SE)	*p*-value†
Health Behaviors and Healthy Weight					
At least 5 fruit or vegetable servings per day	10182	28.9 (0.5)	21.8 (2.8)	29.1 (0.5)	<0.01
Recommended moderate – to vigorous physical activity in an average week	9372	26.1 (0.5)	22.3 (4.8)	26.2 (0.5)	0.40
Nonsmoker	32311	91.2 (0.3)	80.9 (2.6)	91.5 (0.3)	<0.01
≤1 Alcoholic beverage per day	2653	7.4 (0.3)	5.4 (1.4)	7.5 (0.3)	0.17
Healthy weight††	12667	35.7 (0.6)	31.6 (3.3)	35.8 (0.6)	0.05
Preventive Services					
Receipt of annual influenza vaccination	25489	70.1 (0.5)	66.9 (3.3)	70.2 (0.5)	0.33
Receipt of pneumococcal vaccination	23849	63.7 (0.6)	63.0 (3.7)	63.8 (0.6)	0.84

Table 2. Unadjusted prevalence of health behaviors, having a healthy weight, and use of preventive services by U.S. adults (N = 35, 845) aged ≥65 years old residing in the U.S. by Serious Psychological Distress (SPD), Behavioral Risk Factor Surveillance System, 2007.

Abbreviation: SE = Standard Error
* Weighted population estimate
† Cochran-Mantel-Haenszel[2]
†† Healthy weight: Body Mass Index (BMI) = 18.5–24.9 kg/m^2

cal activity) or insufficient activity (some, but not at recommended levels), and 2) recommended activity – those who met either the moderate physical activity recommendation of at least 30 minutes of moderate intensity physical activity at least 5 days per week or the vigorous recommendation of at least 20 minutes of vigorous intensity activity at least 3 days per week[25].

The socio-demographic factors of sex, age, marital status, education, race/ethnicity, and income were used to characterize the population of older adults and used as covariates. Two categories were used for age (65–74-years old or ≥75 years old), and three levels were used to define marital status (married or a couple, previously married, or never married), education (<high school, high school, >high school), and race/ethnicity (white non-Hispanic, black non-Hispanic, or of other race or ethnicity). Income (≤$14,999, $15,000–$24,999, $25,000–$34,999, $35,000–$49,999, ≥$50,000, no response provided) was classified as six levels with the "no response provided" category including missing and "don't know/not sure" responses.

Health-related quality of life (HRQoL) (e.g., physically unhealthy days, mentally unhealthy days, and self-rated health), disability status, chronic health conditions (heart disease, diabetes, arthritis, and asthma), and number of chronic health conditions were indicators of physical and mental health. They were used to characterize the population of older adults and used as covariates. HRQoL was measured by the answers to three questions: the number of days in the past 30 days in which physical health was not good; the number of days in the past 30 days in which mental health was not good (frequent mental distress (FMD) = ≥14 mentally unhealthy days); and self-rated health on a five-item scale ranging from poor to excellent. The reliability of these questions is reported elsewhere[31]. Consistent with previous BRFSS disability research (e.g., 32, 33), participants were considered to have a disability if their activities were limited by physical, mental, or emotional problems, or if they required the use of special medical equipment (e.g., wheelchair, special telephone). The number of chronic health conditions was a summation for participants who self-reported physician diagnoses of heart disease, diabetes, arthritis, or asthma.

Data analyses

To account for the complex sampling design, SUDAAN, version 9.0[34] was used in all analyses with the appropriate specification of the primary sampling units (PSUs) and the strata[35]. Within the BRFSS, the PSU corresponds to the individual telephone numbers sampled from a bank of telephone numbers and the strata represents the stratification for comparisons selected by each state[35].

First, we examined socio-demographic characteristics, and the physical and mental health characteristics among older adults (≥65 years old). Then, we examined socio-demographic characteristics and the physical and mental health characteristics among older adults by SPD status. Finally, three series of logistic regression models were developed. The first set of models were unadjusted models using SPD as a predictor of health behaviors, healthy weight, and preventive services. The second set of models used SPD as a predictor of health behaviors, healthy weight, and preventive services

Table 3. Unadjusted odds ratios and adjusted odds ratios for health behaviors, having a healthy weight, and preventive services Among U.S. adults (N = 35,845) Aged ≥65 years old residing in the U.S. by Serious Psychological Distress Status (SPD), Behavioral Risk Factor Surveillance System, 2007.

	Model 1: OR (95 % CI)*‡		Model 2: AOR (95 % CI)*‡‡		Model 3: AOR (95 % CI)*‡‡‡	
	Older Adults with SPD††	*p*-value ∞	Older Adults with SPD ††	*p*-value ∞	Older Adults with SPD ††	*p*-value ∞
Health Behaviors and Healthy Weight						
At least 5 fruit or vegetable servings per day	0.68 (0.49–0.95)	$p = 0.02$	0.81 (0.58–1.12)	$p = 0.20$	0.88 (0.63–1.24)	$p = 0.47$
Recommended moderate-to-vigorous physical activity in an average week	0.81 (0.47–1.40)	$p = 0.44$	0.97 (0.56–1.69)	$p = 0.92$	1.56 (0.90–2.71)	$p = 0.11$
Nonsmoker	0.39 (0.28–0.55)	$p < 0.01$	0.45 (0.32–0.64)	$p < 0.01$	0.57 (0.39–0.85)	$p = 0.01$
≤1 Alcoholic beverage per day	0.71 (0.41–1.23)	$p = 0.22$	1.02 (0.58–1.80)	$p = 0.95$	1.40 (0.75–2.64)	$p = 0.29$
Healthy weight†	0.83 (0.61–1.12)	$p = 0.21$	0.87 (0.64–1.19)	$p = 0.38$	1.08 (0.79–1.48)	$p = 0.63$
Preventive Services						
Receipt of annual influenza vaccination	0.86 (0.64–1.16)	$p = 0.33$	1.11 (0.78–1.58)	$p = 0.58$	0.91 (0.65–1.28)	$p = 0.59$
Receipt of pneumococcal vaccination	0.97 (0.70–1.33)	$p = 0.84$	1.26 (0.86–1.85)	$p = 0.24$	0.87 (0.61–1.25)	$p = 0.45$

Abbreviations: OR = Odds Ratio, AOR = Adjusted Odds Ratio, SPD = Serious Psychological Distress
* Weighted population estimate
† Healthy weight: Body Mass Index (BMI) = 18.5–24.9 kg/m^2
†† Referent group consists of people without SPD.
‡ Unadjusted model.
‡‡ Adjusted for sex, age, marital status, education, and race/ethnicity.
‡‡‡ Adjusted for sex, age, marital status, education, race/ethnicity, HRQoL disability, and number of chronic health conditions.
∞ Wald *F*

while controlling for the socio-demographic variables (age, marital status, education, and race/ethnicity). In the third set of models, SPD was a predictor of health behaviors, healthy weight, and preventive services controlling for the socio-demographic, physical, and mental health variables (HRQoL, disability status, and number of chronic health conditions).

Results

Of the participants, 2.7 % (standard error, SE = 0.2) of older adults were classified with SPD. People with SPD were more likely than those without SPD to be female ($p = 0.04$), to be previously married ($p < 0.01$), to have less than a high school education ($p < 0.01$), to be black or of another race/ethnicity ($p < 0.01$), and to have an annual income of < $ 15,000 ($p < 0.01$; Table 1).

With respect to physical and mental health characteristics, people with SPD were more likely than those without SPD to have fair or poor health ($p < 0.01$); to have at least 14 physically or mentally unhealthy days ($ps < 0.01$); and to be characterized with a disability ($p < 0.01$; Table 1). Older adults with SPD compared to those without SPD had a higher prevalence of heart disease, diabetes, arthritis, or asthma ($p = 0.01$, $p = 0.02$, $p < 0.01$, $p < 0.01$, respectively); and to have at least two chronic health conditions ($p < 0.01$).

The prevalence of healthy lifestyle behaviors, having a healthy weight, and use of preventive services were examined as factors of SPD status (Table 2). Older adults with SPD were significantly less likely than those without SPD to consume at least five fruits or vegetables daily ($p < 0.01$) and to be nonsmokers ($p < 0.01$) than those without SPD. No other statistically significant differences were found.

Three series of logistic regression models were independently calculated to assess association with SPD status for healthy lifestyle behaviors, having a healthy weight, and for using preventive services (Table 3). The first set of models was unadjusted models using SPD as a predictor of health behaviors, healthy weight, and preventive services. Older adults with SPD were less likely to consume at least five fruits or vegetables daily ($p = 0.02$) and less likely to be non-smokers ($p < 0.01$). No differences in SPD status were found as a function of being physically active at recommended levels ($p = 0.44$), consuming ≤1 alcoholic beverage per day ($p = 0.22$), having a healthy weight ($p = 0.21$), receipt of an annual influenza immunization ($p = 0.33$), or having received a lifetime pneumococcal immunization ($p = 0.84$).

After adjusting the logistic regression models for the socio-demographic covariates (age, marital status, education, and race/ethnicity) in the set of second models, older adults with SPD were less likely than those without SPD to be nonsmokers ($p < 0.01$). No differences in SPD status were found be-

tween participants consuming at least five fruits or vegetables daily ($p = 0.20$), to be physically active at recommended levels ($p = 0.92$), consuming ≤ 1 alcoholic beverage per day ($p = 0.95$), having a healthy weight ($p = 0.38$), receipt of an annual influenza immunization ($p = 0.58$), or having received a lifetime pneumococcal immunization ($p = 0.24$).

When the logistic regression models were adjusted for the socio-demographic and physical and mental health variables (HRQoL, disability status, and number of chronic health conditions) in the third set of models, a similar patterning of results was found. People with SPD were less likely than those without SPD to be nonsmokers ($p = 0.01$). No additional differences in healthy lifestyle behaviors, having a healthy weight, and for using preventive services as a function SPD status were found.

Discussion

This study, to our knowledge, was the first to investigate chronic health conditions, healthy behaviors, healthy weight, and use of preventive services exclusively in a large sample of U.S. community-dwelling older adults with SPD. In addition, the large sample size of the BRFSS provided unique opportunities to investigate the relationships between physical and mental health not available elsewhere. We found that 2.7 % of adults 65 years old and older were classified as experiencing SPD. This percentage is comparable to other U.S. estimates that range from 2.3 % to 5.1 % and is equivalent to the age-adjusted estimate of 2.7 % from the 2001–2004 National Health Interview Survey (NHIS)[5,15,36]. An estimated 5.4 % of adults had a serious mental illness in any 1 year, and 50 % of those individuals had a serious or persistent illness[5]. Consistent with analyses of the 2005 Los Angeles County Health Survey and the 2001–2004 NHIS, we found that people with SPD were more likely than those without SPD to have a lower income, to be unmarried, to report fair to poor health, to have a disability, or to have heart disease, diabetes, or arthritis[5,15]. Consistent with previous research, we found that adults with SPD also reported more mentally and physically unhealthy days than those without SPD[15].

Much of the morbidity and mortality related to chronic disease in the U.S. can be attributed to modifiable behaviors[3–4]. We found that people who were classified with SPD were more likely to smoke cigarettes than those without SPD. This was evident in both the unadjusted and adjusted models. A parallel finding was noted comparing older adults classified as having FMD (≥ 14 mentally unhealthy days) to those who are not classified as having FMD[37]. The increased prevalence of smoking is also consistent with the general mental illness literature[37]. People with mental illness have been shown to have a higher prevalence of smoking in both U.S. population-based study[38] and internationally[39]. In a recent U.S. population-based study, adults with SPD were twice as likely to currently smoke than those without SPD, and the prevalence of smoking also increases with the number of mental illness diagnoses[40]. Those with a mental illness consume approximately 44 %–50 % of all cigarettes sold in the United States[38]. Persons with a mental illness not only smoke more cigarettes but they have a greater difficulty with cessation[41]. With respect to smoking cessation, the prevalence is greater for people without SPD (49 %) than for those with SPD (29 %) [40].

For a patient with mental illness, smoking can be a means of self-medication[38,41–42]. In addition, there might be an underlying biological etiology for smoking behavior in persons with a mental illness[42]. The high prevalence of smoking and low prevalence of smoking cessation have significant health implications and can complicate the treatment of mental illness[38]. Smoking can reduce the blood levels of neuroleptics and can require the person being treated for a mental illness to have higher doses of medication to obtain the same therapeutic effect, which increases the risk of side effects[38].

Older adults with SPD had a greater prevalence of heart disease, diabetes, arthritis, or asthma. In a recent study of the general population, 80 % of people aged 65 years old and older were found to have at least one chronic health condition[1]. Our results indicated that approximately 70 % of older adults 65 years old and older have at least 1 of the chronic health conditions of heart disease, diabetes, arthritis, or asthma. Consistent with our findings, people with SPD tended to have more chronic health conditions than those without SPD[15]. In addition, older adults with SPD were significantly more likely to report that their health was fair to poor than people without SPD. These variables collectively suggest that people with SPD are generally in worse health as indicated by several metrics.

Chronic disease self-management programs (CDSMP) are designed to help participants with chronic health conditions to better manage their symptoms, adhere to medication regimens, and maintain functional ability[43]. Given the increased prevalence of chronic conditions for persons with SPD, CDSMP might be beneficial. For example, programs such as the Stanford Chronic Disease Self-Management Program that teach participants how to manage their chronic health conditions may be particularly important for older adults experiencing SPD. These programs need to be sensitive to persons with mental health issues such as SPD because these persons could be more likely to experience adherence problems and have more complex issues that need to be addressed. CDSMP are effective for persons with depressive symptoms[44]; how-

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ever, we found no published literature examining the use or benefits of such programs among persons classified with SPD. This is a potential avenue open for exploration by future researchers.

Understanding the parallels among the various mental health conditions as they relate to the health behaviors of older adults is crucial for planning targeted programs and interventions. Older adults with FMD and those with SPD share some commonalities with respect to several healthy behaviors, healthy weight, and clinical preventive services. Consistent with previous population-based research on older adults who have FMD, we found that for persons with SPD that there was a significant difference in smoking behavior and that there was no difference in alcohol consumption, having a healthy weight, receipt of annual influenza vaccination, or receipt of pneumococcal vaccination[37]. However, the results for people who have SPD and those who have FMD are inconsistent for consuming at least five fruit or vegetable servings per day or engaging in recommended physical activity as people who were classified as having FMD were significantly less likely to participate in these behaviors [37]. Our somewhat discrepant findings may suggest that FMD and SPD are unique constructs that may share some similarities. FMD as assessed by the number of mentally unhealthy days measure is a valid indicator of general perceived burden of mental distress in patients with common mental health disorders [45–46]. People classified as having SPD have a high likelihood of having a diagnosable mental illness or mental health problems severe enough to cause moderate to serious impairment in functioning that might require treatment [5]. The moderate to severe impairment in functioning for people with SPD or financial constraints might be responsible for the inconsistent findings between older adults with FMD and those with SPD.

Our findings are subject to several limitations. First, because the BRFSS is a telephone survey, the results may not be generalizable to people 65 years old and older who do not have telephones; use cell phones exclusively; have difficulties with hearing, speaking, or cognition; or have physical limitations that interfere with their ability to answer the telephone. Second, people with SPD may be underrepresented on the BRFSS because the sample consists exclusively of community-dwelling and noninstitutionalized older adults. The sample excludes homeless people, and residents of nursing homes and other institutional settings who potentially may have higher rates of mental illness and SPD. In addition, no specific mental health diagnoses, such as depression or anxiety, were available within the 2007 BRFSS. Third, selective survival can be an issue when studying older adults. There might have been more morbidity and mortality among those who engaged in a less healthy lifestyle or those who had SPD. Despite these limitations, the large sample size of the BRFSS, with its proven reliability and validity[47], allowed us to investigate the associations between SPD status, chronic health conditions, healthy behaviors, healthy weight, and use of preventive services in a large sample of community-dwelling older U.S. adults.

Mental illnesses have a significant impact on the health and functioning of older people[6]. They are associated with increased use of health care and higher costs[6]. With the anticipated growth in the number of older adults, more older adults will have late-life mental disorders that potentially will require treatment or may co-exist with other chronic health conditions [6]. Despite the influence of mental health on health and well-being, mental health conditions do not receive the same priority and urgency as other chronic health conditions[15]. With the recent passage of the Mental Health Parity Act, that requires limits on mental health benefits to be no lower than the limits for medical and surgical benefits offered in connection with a group health insurance plan[48].

The enhanced monitoring of mental health is needed to advance the issue of mental health globally (2007). In the U.S., BRFSS is a valuable tool for tracking and monitoring both physical health and mental health. Including mental health measures on the 2006–2009 BRFSS provides important state- and local-level information about mental health not previously available. Information available about the mental health of older adults from surveillance systems can be used when planning and implementing programs for older adults.

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Address for correspondence

Lisa C. McGuire, PhD
Division of Adult and Community Health,
Centers for Disease Control and Prevention,
4770 Buford Highway NE
Mail-stop K-45
Atlanta, GA 30341-3724
E-mail: LMcGuire@cdc.gov