

Health Status of Individuals With Serious Mental Illness

Faith B. Dickerson^{1,2}, Clayton H. Brown^{3–5},
Gail L. Daumit⁶, Fang LiJuan⁵, Richard W. Goldberg^{4,5},
Karen Wohlheiter⁵, and Lisa B. Dixon^{4,5}

²Sheppard Pratt Health System, Baltimore, Md; ³Department of Epidemiology, University of Maryland School of Medicine, Baltimore, Md; ⁴Mental Illness Research, Education, and Clinical Center, Baltimore VA, University of Maryland School of Medicine, Baltimore, Md; ⁵Department of Psychiatry, University of Maryland School of Medicine, Baltimore, Md; ⁶Welch Center for Prevention, Epidemiology, and Clinical Research, Johns Hopkins University, Baltimore, Md

We examined indices of the health of persons with serious mental illness. A sample of 100 adults with schizophrenia and 100 with major mood disorder were recruited from randomly selected outpatients who were receiving community-based psychiatric treatment. Participants were surveyed about health indicators using items from the National Health and Nutrition Examination Study III and the National Health Interview Survey. Their responses were compared with those of matched samples from the general population surveys. A total of 1% of persons with serious mental illness, compared with 10% from the general population sample, met criteria for all 5 of selected health indicators: nonsmoker, exercise that meets recommended standards, good dentition, absence of obesity, and absence of serious medical co-occurring illness. Within the mentally ill group, educational level, but not a diagnosis of schizophrenia versus mood disorder, was independently associated with a composite measure of health behaviors. We conclude that an examination of multiple health indicators may be used to measure overall health status in persons with serious mental illness.

Key words: schizophrenia/physical health/
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Introduction

Elevated rates of premature death among individuals with schizophrenia and major mood disorders have focused attention on the somatic health problems of per-

sons with serious mental illness.^{1,2} Health problems that have been identified include obesity, smoking, sedentary lifestyle, and co-occurring medical illnesses.^{3,4} Most previous studies have focused on these problems as individual health issues. However, poor health status and mortality risk are determined by the combination of several factors that operate synergistically.⁵ Therefore, it is important to examine multiple health indicators that together determine overall health. Applied at the population level, a multidimensional perspective facilitates the comparison of overall health among populations and the tracking of changes in the overall health of a population over time.^{6–8} The analysis of multiple health indicators may also help to better identify predictors of health care costs.⁹ To our knowledge, a multidimensional perspective has not been applied to the study of the health of persons with serious mental illness.

This study examines the health status of persons with serious mental illness in community-based psychiatric treatment and compares their health status with that of matched individuals from the general population. In addition, within the psychiatric sample we examined the correlates of composite measures of health status and the association between health indicators.

Methods

Sample and Procedures

Participants were selected from outpatients aged 18–65 who were receiving psychiatric care at 2 centers in the Baltimore, Maryland, area: the Department of Psychiatry at the University of Maryland at Baltimore and the Sheppard Pratt Health System in Baltimore and Howard Counties. Participants were selected in order to obtain a total of 100 individuals with schizophrenia, half with schizophrenia, excluding schizoaffective disorder, and half with schizoaffective disorder, and 100 individuals with affective disorder, half with major depression and half with bipolar disorder.¹³ The sample was also selected so that half of participants were from the urban University of Maryland center and half from the suburban Sheppard Pratt center; within the latter sample, patients were drawn equally from 2 suburban sites.

At each site, lists of patients categorized by diagnosis were obtained from the medical information system.

¹To whom correspondence should be addressed;
e-mail: fdickerson@sheppardpratt.org.

Patients were excluded if they had not been seen for a visit within the previous 6 months. Within each diagnostic group, patients were selected in random order until the predetermined number of consenting patients was obtained.

A total of 281 individuals were identified as eligible; of these 6 were not included for clinical reasons on the advice of the treating clinician. Of the remaining 275 eligible individuals, 200 (73%) consented to participate and completed the study. Individuals declined to participate for the following reasons: not interested ($n = 60$); too busy ($n = 9$); other ($n = 6$). Consenters did not significantly differ from decliners in terms of their age, gender, level of education, or diagnosis. A higher percentage of consenters were from the urban than the suburban center (81% vs. 66%, $\chi^2 = 7.5$, $p < .05$). The final sample consisted of 200 individuals who provided written informed consent and were interviewed using an instrument that includes items from the National Health Interview Survey (NHIS)¹⁰ and the National Health and Nutrition Examination Survey III (NHANES III).¹¹

We focused on survey items that are consistent with the leading health indicators for the US population as identified by the Healthy People 2010 program of the Centers for Disease Control¹²: (1) self-report of not smoking a cigarette in the previous 30 days; (2) frequency of leisure physical activity, which was used to calculate whether exercise met recommended standards (defined as ≥ 20 times per month)¹³; (3) self-report of height and weight from which the body mass index (BMI, kg/m^2) was calculated and categorized as obese if $\text{BMI} \geq 30$; (4) absence of co-occurring lifetime serious medical illness from the following chronic conditions: arthritis, asthma, chronic bronchitis, emphysema, diabetes, congestive heart failure, hypertension, stroke, cancer; (5) self-report of teeth in good, very good, or excellent condition; and (6) absence of injury requiring medical treatment in the previous 90 days. Items 1–5 were from the NHANES III, and item 6 from the NHIS.

We created several composite measures with the items that were drawn from the NHANES III: whether the person met criteria for 2 important health behaviors (non-smoker and exercise, items 1 and 2); and whether the person met criteria for 3 important health outcomes (no obesity or co-occurring medical illness and good dentition, items 3, 4, and 5). We selected these composites in order to separate indicators that reflected more lifestyle choices (eg, behaviors) from those that are intermediate health outcomes. The third summary measure was whether the person met the criteria for all 5 items used in the composites. We operationally defined an individual as in the unhealthy category when any one of the composite constituent health items was rated as unhealthy, even if 1 or more of the constituent items was missing. The institutional review boards of the participating institutions approved the study.

The mean age of the psychiatric sample was 44.0 (SD = 8.9); a total of 105 (52.5%) were female and 112 (56%) were Caucasian. Among the non-Caucasians, 71 of 88 (81%) were African American; 6 of 88 (7%) were Asian or Pacific Islanders; 5 of 88 (6%) were Native American; and 6 of 88 (7%) identified themselves as “other.” The mean years of education was 12.7 (SD = 3.0). By design, half of the sample had a chart diagnosis of schizophrenia and the other half a major mood disorder. The mood disorder group was on average older than the schizophrenia group (45.7 years, SD = 8.3 vs. 42.3 years, SD = 9.2; $t = 2.65$ [$df = 198$, $p < .009$]); more female (68% vs. 37%; $\chi^2 = 18.05$ [$df = 1$], $p < .0001$); and more Caucasian (65% vs. 47%; $\chi^2 = 5.86$ [$df = 1$], $p < .02$).

To compare responses of our sample with the general US population, we randomly selected respondents from the NHANES III and NHIS datasets who were matched to study participants by gender, age (within 3 years), and race. Asian individuals and Pacific Islanders in our sample (6 of 200) were excluded from comparisons of NHANES III items because Asian/Pacific Islanders could not be identified from NHANES III ethnicity data. The Native Americans in the study sample (5 of 200) were also not included in the analyses because there were few match candidates. The matched datasets included 191 of the 200 study participants for the NHIS and 185 of the 200 for the NHANES III items. Except for a few cases, there were 15 matches from the NHANES III and the NHIS per study participant. Because of difficulty in matching the ethnicity of some of the psychiatric study participants, the NHIS matches were based on 191, and the NHANES on 185, study participants; a total of $N = 3052$ comprised the total sample for the comparisons with the NHIS and $N = 2890$ from the NHANES III.^{14,15} The sample sizes for particular comparisons varied slightly due to missing values in either the psychiatric sample or in the matched sample.

Data Analysis

For each health item and for the composite measures, the proportion of individuals in the psychiatric and general population samples who met the criterion was compared with a chi-square test, which is equivalent to testing for a difference of proportions. We also computed 95% confidence interval for the difference between the 2 groups. To control error across multiple significance tests, we controlled the “false discovery” rate at 0.05 (5%) using a recently developed method.¹⁶

Within the psychiatric sample, bivariate analyses were performed between each of the composite health status measures in which more than 10% of the sample was categorized as healthy and demographic variables of age, gender, education (high school graduate or not), race (Caucasian vs. non-Caucasian), and diagnosis (schizophrenia vs. mood disorder). A t -test was used for the

Table 1. Health Status Variables: Prevalence in Group With Serious Mental Illness (SMI) and in General Population Comparison Groups

Health Status Definition ^a	Proportion in SMI Sample	Proportion in Comparison Group	Difference in Proportions	95% CI for Difference in Proportions	Chi-square <i>p</i> value ^c
Not current smoker	.39 (73/185)	.66 (1781/2704)	-0.26	(-0.34, -0.19)	<i>p</i> < .0001
Exercise meets standards	.39 (72/185)	.39 (1051/2705)	-.0006	(-0.07, 0.07)	<i>p</i> = 1.00
Body mass index < 30	.54 (92/169)	.77 (2015/2627)	-0.22	(-0.30, -0.15)	<i>p</i> < .0001
No lifetime medical co-occurring illness ^b	.38 (70/185)	.56 (1518/2705)	-0.18	(-0.26, -0.11)	<i>p</i> < .0001
Teeth in good, very good, or excellent condition	.43 (72/169)	.56 (1505/2704)	-0.13	(-0.21, -0.05)	<i>p</i> = .0012
No injury in past 90 days that resulted in medical treatment	.89 (170/191)	.97 (2782/2861)	-0.08	(-0.13, -0.04)	<i>p</i> < .0001
Composite Variables					
Health behaviors: Nonsmoker and exercise that meets standards	.17 (31/185)	.27 (737/2705)	-0.10	(-0.16, -0.05)	<i>p</i> = .0024
Health outcomes: Body mass index < 30, no co-occurring illness, and good dentition	.11 (20/181)	.28 (764/2683)	-0.17	(-0.22, -0.13)	<i>p</i> < .0001
Overall health: Nonsmoker, exercise that meets standards, body mass index < 30, no co-occurring illness, and good dentition	.01 (2/184)	.10 (273/2697)	-0.09	(-0.11, -0.07)	<i>p</i> < .0001

^aAll items and comparison groups taken from the NHANES III, except injury item and comparison group, which were from the NHIS. The psychiatric sample was based on *n* = 185 for the items matched to the NHANES and *n* = 191 for the items matched to the NHIS.

^bMedical conditions included were arthritis rheumatoid, osteoarthritis, asthma, chronic bronchitis, emphysema, diabetes, congestive heart failure, hypertension, stroke, heart failure, and cancer.

^cSignificant differences (*p*-values = .0024 or less) remained significant after controlling the false discovery rate at 5% (.05).

age variable to compare those who met the composite criteria with those who did not, and continuity adjusted chi-square analysis was used for the dichotomous variables. We then performed logistic regression analyses on each composite health status measure, including age and gender and those variables that were significantly associated with the dependent variable in bivariate analyses.

To quantify the association between health status items within the group with serious mental illness, we calculated odds ratios and 95% confidence intervals between each unique pair of dichotomous health status items and between the 2 composite indicators.

Results

Compared with the matched comparison group from the general population, the sample of persons with serious mental illness had a significantly lower proportion of individuals who were nonsmokers, had teeth that were in at least good condition, had a BMI that was in the non-obese range, were free of injury in the past 90 days, and did not have a serious medical comorbidity, as shown in Table 1. The groups did not differ significantly in the proportion that exercised at recommended levels. The mentally ill and the general population group differed significantly on the 3 composite health measures. A total

of 17% of the psychiatric sample, compared with 27% of the matched general population sample, met criteria for the composite of health behaviors (nonsmoker and exercise that meets standards) (χ^2 [1 *df*] = 9.23, *p* < .003); 11% versus 28% met criteria for the composite of health outcomes (nonobesity, no co-occurring serious medical disorder, and good dentition) (χ^2 = 25.03, *p* < .0001) and 1% versus 10% met criteria for the composite of all 5 health items (χ^2 [1 *df*] = 15.26, *p* < .0001).

With regard to the health behavior composite measure, relatively more Caucasians (23 of 112) versus non-Caucasians (8 of 88) and more persons with a mood disorder (22 of 100, 22%) versus schizophrenia (9 of 100, 9%) were both nonsmokers and exercised at recommended levels within the psychiatric sample (χ^2 ([1 *df*] = 4.09, *p* = .043; χ^2 [1 *df*] = 5.50, *p* = .02, respectively). Relatively more persons who completed high school (30 of 145, 21%) versus those who did not complete high school (1 of 54, 2%) also met the criteria for this composite measure (χ^2 [1 *df*] = 9.23, *p* = .0024). Results of a logistic regression analysis indicate that the education variable remained significant when controlling for race and diagnosis along with age and gender (Wald χ^2 [1 *df*] = 6.60, *p* = .01). None of the demographic variables were significantly associated with the health outcomes composite measure (BMI < 30, good dentition, and the absence

Table 2. Odds Ratios and 95 % Confidence Intervals of Association Between Health Status Items in Sample With Serious Mental Illness

Health Status Indicator	Not Current Smoker	Exercise Meets Standards	Body Mass Index < 30	No Co-occurring Medical Illness	Teeth in at Least Good Condition	No Injury in Past 90 Days
Not current smoker	—	1.17 (0.65, 2.10) n = 200	0.55 (0.30, .997)* n = 184	1.19 (0.67, 2.13) n = 200	1.85 (1.04, 3.32)* n = 199	0.46 (0.20, 1.08) n = 200
Exercise meets standards	—	—	1.02 (0.56, 1.87) n = 184	0.90 (0.50, 1.63) n = 200	1.57 (0.87, 2.82) n = 199	0.49 (0.21, 1.15) n = 200
BMI <30	—	—	—	2.27 (1.22, 4.22)** n = 184	1.27 (0.70, 2.30) n = 183	0.90 (0.36, 2.26) n = 184
No co-occurring medical illness	—	—	—	—	2.49 (1.38, 4.50)** n = 199	1.35 (0.55, 3.30) n = 200
Teeth in at least good condition	—	—	—	—	—	0.98 (0.42, 2.32) n = 199
No injury in past 90 days	—	—	—	—	—	—

Note: The full sample of N = 200 individuals with serious mental illness was used for these analyses; the numbers used for each comparison vary slightly, as shown in the table.
p* < .05; *p* < .01.

of a serious medical comorbidity). Bivariate analyses were not performed between the overall health composite measure and demographic variables because less than 10% of the sample was categorized as healthy on this measure.

As shown in Table 2, there was a significant association between nonsmoking status and good dentition; persons who were nonsmokers were almost twice as likely, in relative odds terms, to have good dentition as were smokers (odds ratio = 1.85, 95% CI = 1.04, 3.32, *p* < .05). The absence of obesity was also positively associated with the absence of a co-occurring serious medical illness; persons who were not obese were more than twice as likely, in relative odds terms, not to have a co-occurring medical illness than those who were obese (odds ratio = 2.27, 95% CI = 1.22, 4.22, *p* < .01). Good dentition was also associated with the absence of a co-occurring medical illness; persons with teeth in at least good condition were almost 2 1/2 times as likely, in relative odds terms, not to have a co-occurring medical illness than those with fair or worse dentition (odds ratio = 2.49, 95% CI = 1.38, 4.50, *p* < .01). A significant inverse association was found between the absence of obesity and nonsmoking; nonsmokers were only about half as likely, in relative odds terms, to have a BMI in the nonobese range (odds ratio = 0.55, 95% CI = 0.30, .997, *p* < .05) than were smokers. None of the other associations between individual health items was significant, as shown in Table 1, nor was the association between the health behaviors and the health outcomes composites (odds ratio = 0.49, 95% CI = 0.11, 2.21, *n* = 187).

Discussion

The relatively small proportion of persons with serious mental illness from our sample that was categorized as healthy on the individual health items and composite measures underscores the overall poor health status of this group. Problems of smoking, obesity, and co-occurring medical problems have been previously documented among persons with serious mental illness.¹⁻⁴ Physical injuries have also been noted to be prevalent among persons with serious mental illness and a cause of excess mortality in this group.^{1,17,18} Our data do not define the types of physical injury among persons in our sample or how they relate to mortality risk; these remain important topics for further investigation.

A very low percentage, 1%, of our psychiatric sample, met the criteria for the composite measure of 5 health items. Of note, while the comparison group from the general population had a higher percentage that met this composite's criteria, only a small minority, 10 %, were categorized as healthy. These results are consistent with 2 recent studies that assessed a composite of 4 healthy lifestyle factors among persons in the general US population: BMI < 25; nonsmoker; consumption of at least 5 fruits and vegetables daily; and moderate or vigorous physical exercise. A strikingly low percentage of persons in each study was adherent to all 4 indicators: 3% in one⁷ and 6.8% in the other⁸ study. The health items in these studies were similar to those that we used, although our BMI cutoff of 30 was more liberal and allowed persons who had a BMI of 25-29.9, in

the overweight range, to be categorized as healthy. Also, we included items about co-occurring medical illnesses and about dentition that the other studies did not. The recent general population studies show a much lower rate of smoking than found in our sample of persons with mental illness; however, adherence to recommended exercise is poor across all groups, and fewer than half of the general population samples in these studies had a body mass index that was in the healthy range. Thus, it appears that the overall health of persons with serious mental illness falls below an already suboptimal level of overall health in the general population. The use of composite indicators highlights the extent to which deviance from standards of health is a pervasive problem, one that is amplified further among persons with serious mental illness.

The reasons that persons with serious mental illness have poorer health status than persons in the general population are not known with certainty but likely include several interrelated factors. Psychotropic medications, such as some second-generation antipsychotic agents, have been associated with weight gain, incident diabetes, and other side effects that may adversely affect health status.¹⁹ Psychiatric disorders themselves, apart from medication treatment, may predispose individuals to glucose intolerance²⁰ and to cigarette smoking.²¹ In addition, persons with serious mental illness often have symptoms of depression and emotional withdrawal, which may contribute to their limited motivation for positive health behaviors and attention to health problems. Finally, the reduced socioeconomic status of many persons with serious mental illness may reduce their access to medical care and resources such as those related to dental treatment and physical fitness.^{22,23}

Within the psychiatric sample, we found that educational level was associated with the composite item measuring health behaviors; significantly more high school graduates than those who did not graduate from high school were classified as healthy on this measure. Our results are consistent with studies of persons in the population at large in which a higher educational level has also been associated with lifestyle choices of not smoking and of participating in exercise.^{7,24,25} Education was not associated with the health outcomes composite, suggesting some specificity to the impact of education on health measures in this population.

Limitations of our study include the fact that our sample was from only 1 geographic region, while the NHANES III and NHIS comparison groups were nationwide. However, estimates of the prevalence of persons who meet basic health indicators do not differ markedly between individuals in Maryland and individuals nationwide, based on data from the Behavioral Risk Factor Surveillance System.²⁶ Another limitation of our study was that it was based on self-report data. Also, we were unable to include all health behaviors that are important

to overall health status, such as nutritional intake of fruits and vegetables. At the current time, there is not consensus about the items that should be included in a composite health measure. The components of such a composite indicator may be interrelated, although the extent of overlap is dependent on the specific factors that are included. In studies of the general population, the magnitude of the relationship among these factors is not large,⁷ but this issue has not been systematically investigated in previous studies of persons with serious mental illness.

In our own sample we found that only 3 of 12 pairwise associations between health status items were significant and positive, indicating that individuals' health status on different indicators is relatively independent. This finding argues for examining multiple health indicators in order to assess overall health status in persons with serious mental illness, as has been studied in the general population.^{7,8} An examination of multiple health indicators may also lead to more accurate measures of overall health severity in persons with mental illness. This issue is an urgent one given the consistently higher rate of premature death found among persons with serious mental illness, a phenomenon that is likely related to a combination of health risks.¹ Measures that take into account multiple indicators might also be used to calculate risk adjustment for modeling health care costs in this population, a method that has been used in non-mentally ill samples.⁹ Finally, a clinical approach that is focused on a combination of health indicators is consistent with a more comprehensive strategy to promote better health among persons with serious mental illness. Our results underscore the need to improve health services and to develop and finance services that promote health behaviors for persons with serious mental illness.

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