Linking Mental and Physical Health:

Results from the Wisconsin Behavioral Risk Factor Survey

Wisconsin Department of Health Services

Prepared in collaboration between the Bureau of Health Information and Policy, Division of Public Health; and the Bureau of Prevention, Treatment and Recovery, Division of Mental Health and Substance Abuse Services

April 2009

Linking Mental and Physical Health: Results from the Wisconsin Behavioral Risk Factor Survey

Wisconsin Department of Health Services
- Division of Public Health, Bureau of Health Information and Policy
- Division of Mental Health and Substance Abuse Services, Bureau of Prevention, Treatment and Recovery

April 2009

Foreword

This report, *Linking Mental and Physical Health: Results from the Wisconsin Behavioral Risk Factor Survey*, presents information about the relationship between mental health and physical health among Wisconsin adults for the years 2006-2007.

The source of data for this report is the Wisconsin Behavioral Risk Factor Survey (BRFS), a telephone survey of state residents ages 18 and older carried out in conjunction with the U.S. Centers for Disease Control and Prevention (CDC). The Behavioral Risk Factor Surveillance System encompasses BRFS programs in all 50 states, the District of Columbia and U.S. territories.

The Wisconsin BRFS is managed by the Wisconsin BRFS Coordinator in collaboration with the CDC's Behavioral Surveillance Branch. Wisconsin BRFS telephone interviews are conducted by the University of Wisconsin Survey Center.

Funding for this report was obtained through a supplemental Mental Health Data Infrastructure Grant provided by the federal Center for Mental Health Services (CMHS) within the Substance Abuse and Mental Health Services Administration (SAMHSA). The Wisconsin Bureau of Prevention, Treatment and Recovery (BPTR) in the Division of Mental Health and Substance Abuse Services (DMHSAS) is the grant recipient agency that initiated this project. The report is the result of collaboration between DMHSAS and the Division of Public Health (DPH).

The Wisconsin Department of Health Services produced this publication. It was developed and written by Anne Ziege, Ph.D., Wisconsin BRFS Coordinator, Bureau of Health Information and Policy, Division of Public Health; and Tim Connor, M.S., M.A., University of Wisconsin Population Health Institute, serving as a consultant to BPTR. In the DPH Bureau of Health Information and Policy, Pat Nametz edited the report; Chris Hill, Chief of the Population Health Information Section, provided supervision; and Patricia Guhleman, Bureau Director, provided overall direction.

Comments, questions, and requests for additional information may be addressed to:

Anne Ziege, Ph.D.
Bureau of Health Information and Policy
Division of Public Health
Wisconsin Department of Health Services
P.O. Box 2659
Madison WI 53701-2659
Telephone: (608) 267-9821
E-mail: Anne.Ziege@dhs.wisconsin.gov

Tim Connor, M.S., M.A.
University of Wisconsin Population Health Institute
Suite 760, 610 Walnut Street
Madison WI 53726-2397
Telephone: (608) 261-6744
E-mail: tgconnor@wisc.edu

Suggested citation:

Wisconsin Department of Health Services, Division of Public Health and Division of Mental Health and Substance Abuse Services. ***Linking Mental and Physical Health: Results from the Wisconsin Behavioral Risk Factor Survey*** (P-00066). Prepared by the Bureau of Health Information and Policy, Division of Public Health; and the Bureau of Prevention, Treatment and Recovery, Division of Mental Health and Substance Abuse Services. April 2009.

Note: This report is available online at http://dhs.wisconsin.gov/stats/brfs.htm.

Table of Contents

Executive Summary

In recent years, the interaction between mental health and physical health has achieved prominence in global, national and state-level discussions about health care provision and funding. A growing body of research indicates that mental health problems contribute to premature death, providing supporting evidence for efforts to increase mental health screening in primary care and integrate mental and physical health care in service delivery settings.

Using data from the Wisconsin Behavioral Risk Factor Survey (BRFS), this report examines links between mental health conditions and chronic disease risks, functioning and quality of life among Wisconsin adults. The Behavioral Risk Factor Surveillance System, of which Wisconsin BRFS is a component, is a system of representative health surveys carried out annually in all U.S. states and territories in collaboration with the Centers for Disease Control and Prevention.

Key findings:

- The prevalence of current serious psychological distress (SPD) among Wisconsin adults is approximately 3 percent (2007), and the prevalence of current depression is approximately 7 percent (2006).
- *Health Risks and Chronic Diseases*: Controlling for age and other relevant factors, Wisconsin adults with SPD or depression are 2-3 times more likely to smoke and to be physically inactive than those without SPD or depression. Adults with SPD are 3-5 times more likely than those without SPD to have chronic diseases, including asthma and cardiovascular disease, but the association between depression and chronic diseases is less evident.
- *Functional Limitations*: Adults with SPD or depression are 3-6 times more likely to have functional limitations, such as being unable to work, due to mental health and/or physical health problems, compared to those without SPD or depression. Adults with SPD are more frequently limited in their activities than adults with chronic physical diseases.
- *Quality of Life*: Adults with SPD or depression are significantly more likely to have self-reported fair or poor health, to be dissatisfied with life and to perceive that they have little or no social support, compared to those without SPD or depression.

The strong link between mental health conditions and chronic physical diseases, functional impairment and overall quality of life indicates that mental health warrants attention as a "primary" health issue. Efforts to integrate mental health care with primary health care must increase in order to address the effects of mental health on overall health status. The Wisconsin Department of Health Services is leading efforts to integrate mental and physical health care, and encourages providers to make formal commitments to health care integration within their organizations.

What We Know About the Relationship Between Mental Health and Physical Health

Studies documenting higher morbidity and mortality and inefficient use of medical services (i.e., reliance on urgent care, emergency services and hospitalization) among persons with chronic mental illness have been available for many years [17, 18, 19]. Results from a recent eight-state study suggest that the number of years of potential life lost (YPLL) associated with major mental illness is 25 years or more, on average, among clients in publicly funded mental health treatment [9]. YPLL is a measure of premature mortality defined as death prior to life expectancy (in years).

Leading causes of death for mental health clients in six of the eight states in the study are similar to those among general state and national populations, i.e., deaths are primarily from natural causes such as heart disease and cancer. Standard mortality ratios indicate, however, that actual numbers of deaths are 1.9 to 4.2 times higher than expected numbers of deaths among mental health clients in publicly funded treatment [9].

Research suggests links between psychological distress and increased prevalence of chronic diseases such as asthma, diabetes and arthritis [1, 2, 6, 8]. Evidence also indicates increased cardiovascular disease risk due to higher prevalence(s) of smoking, physical inactivity and obesity among those with mental health problems compared to the general population. Over-consumption of alcohol poses an additional health risk [4, 6, 7].

Studies also find elevated cancer incidence and higher cancer fatality rates in the mental health population, which could reflect inadequate screening [9]. Medication side effects may play a role in increased physical morbidity and mortality among persons treated for schizophrenia and other major mental illnesses [12, 34]. In addition, up to 75 percent of persons with active mental health problems receive no mental health treatment of any kind – a problem in and of itself [13].

There are undoubtedly multiple interacting reasons for these phenomena. These reasons include poverty, unsafe living conditions, chronic stress, poor self-care, limited use of preventive services, poor adherence to medical and psychiatric treatment, impaired ability to recognize symptoms of physical illness (making them difficult to differentiate from psychiatric symptoms), and many other barriers to receiving adequate medical care [17, 19].

In light of the elevated risks associated with mental health problems, an adequate model of human health necessarily encompasses both physical and mental health, and addresses the

relationship between the two. Mental health is significant both in its own right and in its influence on physical health, risk of early death and overall quality of life.

Until recently, state-level data sources addressing both mental and physical health have been scarce. For the first time in 2006 and 2007, the Wisconsin Behavioral Risk Factor Survey (BRFS) included questions on mental health for the general population of Wisconsin. The Wisconsin BRFS is part of a national surveillance system that focuses primarily on physical health issues. The 2006-2007 BRFS survey data provide a unique opportunity to examine the relationship of mental health to physical health among adults in Wisconsin and compare it with regional and national benchmarks. This report presents the survey results, then briefly discusses implications for integration of treatment.

Increasing Emphasis on Health Care Integration

The mounting research literature on the impact of co-occurring mental and physical health care needs is translating into increased efforts in the public sector to integrate these two aspects of health care. Agency vision statements, funding priorities and program objectives all increasingly reflect greater emphasis on the relationship between mental health and physical health, and integration of services to best address co-occurring needs.

At the global level, the World Health Organization (WHO) has made the integration of mental health and primary care one of its fundamental health care recommendations [20]. To facilitate integration, WHO calls for the use of existing health care infrastructure, additional funding, specialized training of primary care staff in the area of mental health disorders, and better referral and coordination between multiple levels of care.

Nationally, the President's New Freedom Commission on Mental Health received a directive in 2003 to conduct a comprehensive study of the problems and gaps in the nation's mental health system and issue recommendations for improvement. In its final report, the Commission identified six primary goals for the transformation of the mental health system in America, one of which is to promote the understanding that mental health is essential to overall health [17]. In a follow-up report issued by the Substance Abuse and Mental Health Services Administration (SAMHSA) outlining federal action steps to transform the mental health care system, the U.S. Department of Health and Human Services committed to ensuring that issues critical to mental health services are considered as part of any dialogue on health care reform [21].

In Wisconsin, the Department of Health Services (DHS) launched a new initiative in 2008 titled "The Integration of Physical Health, Mental Health, Substance Use, and Addiction." The Department issued an official statement identifying supporting facts demonstrating the links among physical health, mental health, and addiction disorders; the cost benefits of integrating health care services; and the practices health care systems can use to integrate services to best serve consumers with co-occurring needs. State and local partners of DHS have been asked to address the initiative's objectives by signing a commitment form to work on health care integration and share information on their progress throughout the year. Within DHS, the Division of Mental Health and Substance Abuse Services (DMHSAS) has actively promoted screening for depression in primary care settings since 2003. Wisconsin's medical workforce recently collaborated with Mental Health America to devote an entire issue of the Wisconsin Medical Journal to educating physicians about identification and treatment of mental health disorders [22].

The Behavioral Risk Factor Surveillance System and Mental Health Modules

This report uses Wisconsin Behavioral Risk Factor Survey data from the years 2006 and 2007 to describe the individual-level burden of mental health problems and their relationship to physical health in the state's adult population.

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing, state-based system of health surveys of adults 18 and older conducted in all 50 states, the District of Columbia and three U.S. territories (Puerto Rico, Guam and the Virgin Islands). State and territory health departments collaborate with the Centers for Disease Control and Prevention's (CDC) Behavioral Surveillance Branch to maintain consistency and quality in BRFS data collection. State BRFS data sets are weighted to account for sampling design and population characteristics, and are representative of state adult populations living in households with landline telephones. (Note: As of 2009, BRFS conducts interviews with cell phone-only household respondents in all states and territories.) National-level BRFS estimates are medians of the distributions of state and territory prevalence estimates.

As part of a new collaboration between CDC and the Substance Abuse and Mental Health Services Administration (SAMHSA), BRFSS recently began fielding two separate, optional mental health modules in alternating years. The Anxiety and Depression Module, begun in 2006, asks whether the respondent has ever been diagnosed with a depressive disorder or an anxiety disorder, and measures current depression using the PHQ-8, a shortened version of the Patient Health Questionnaire [10]. The Mental Illness and Stigma Module, begun in 2007, measures serious psychological distress (SPD), along with two attitude questions to assess stigma associated with mental illness and one question each on activity limitation and receipt of medication or treatment for a mental health condition.

The BRFS Mental Illness and Stigma Module measures SPD using the K-6 non-specific psychological distress scale [14], a shortened version of the CIDI-SF.[1] The K-6 scale was developed to measure serious mental illness (SMI), but subsequently was found to better indicate serious psychological distress (SPD). Serious mental illness is defined as the presence of a DSM-IV diagnosis and serious functional impairment in one or more major life areas [11]. SPD is a non-specific category of distress characterized by a DSM-IV mood or anxiety disorder and a

[1] Composite International Diagnostic Interview Short Form, World Health Organization: Kessler, Andrews, Mroszek, Ustun and Wittchen, 1998 (http://www.hcp.med.harvard.edu/wmhcidi/instruments_papi.php).

lesser degree of functional impairment than SMI [14]. SPD is considered to be an indicator of possible SMI, with similar but less strict inclusion criteria [11].

BRFS uses the past 30 days as the reference period for the K-6 (SPD) questions, as follows:

About how often during the past 30 days did you …?

1. Feel nervous
2. Feel hopeless
3. Feel restless or fidgety
4. Feel so depressed that nothing could cheer you up
5. Feel that everything was an effort
6. Feel worthless

Response categories: ***all of the time, most of the time, some of the time, a little of the time, none of the time.***

Additional questions:

1. During the past 30 days, for about how many days did a mental health condition or emotional problem keep you from doing your work or other usual activities?

2. 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?

K-6 scores range from 0 to 24, with SPD defined as a K-6 score of 13 or higher. For this report, K-6 scores were calculated using an algorithm provided by CDC to state BRFS programs.

The Patient Health Questionnaire (PHQ) is a multi-purpose mental health screener. The PHQ-9 and the PHQ-8 contain the depression items from the PHQ and are identical except that the PHQ-8 omits a question on suicidal ideation for telephone interviewing.

The PHQ-8, included in the BRFS Anxiety and Depression Module, is scored for this report as a measure of current depression using a computer algorithm provided to state BRFS programs by CDC. PHQ-8 scores range from 0 to 24, with scores of 10 or higher indicating moderate to severe current depression.

The PHQ-8 (depression) questions are as follows:

Over the last 2 weeks, how many days have you…

1. Had little interest or pleasure in doing things?
2. Felt down, depressed or hopeless?

3. Had trouble falling asleep or staying asleep?
4. Felt tired or had little energy?
5. Had a poor appetite or ate too much?
6. Felt bad about yourself or that you were a failure or had let yourself or your family down?
7. Had trouble concentrating on things such as reading the newspaper or watching TV?
8. Moved or spoken so slowly that other people could have noticed, or the opposite – been so fidgety or restless that you were moving around a lot more than usual?

Two additional questions in the BRFS Anxiety and Depression Module ask whether the respondent has ever been diagnosed with a depressive disorder or an anxiety disorder.

In order to be a valid screening tool, a scale that targets a specific disorder (e.g., depression) must both correctly identify cases with the disorder and rule out cases without the disorder. Scale sensitivity and specificity are measurable characteristics that indicate how well a scale distinguishes between cases and non-cases. To measure sensitivity and specificity, scale scores and related diagnostic information for the same cases are compared to determine the level of congruence between them.

The sensitivity and specificity of the PHQ-8 have been tested against diagnostic information using a cut point of 10, where sensitivity is the proportion of cases with a diagnosed depressive disorder and a PHQ-8 score ≥ 10, and specificity is the proportion of cases without a depression diagnosis and a PHQ-8 score of less than 10. Results indicate PHQ-8 sensitivity of 88 percent and specificity of 88 percent for major depression [10].

As a caution, it should be noted that several other national surveys include questions about mental health, and the "recall" time frames they use to ask about symptoms vary considerably. For example, in assessing serious psychological distress (SPD), the National Survey on Drug Use and Health (NSDUH) asks respondents to recall their worst month in the past 12 months, resulting in a higher SPD prevalence estimate than BRFS obtains using a past-30-days recall period. Strictly speaking, the NSDUH measures past-year SPD, whereas BRFS measures current SPD.

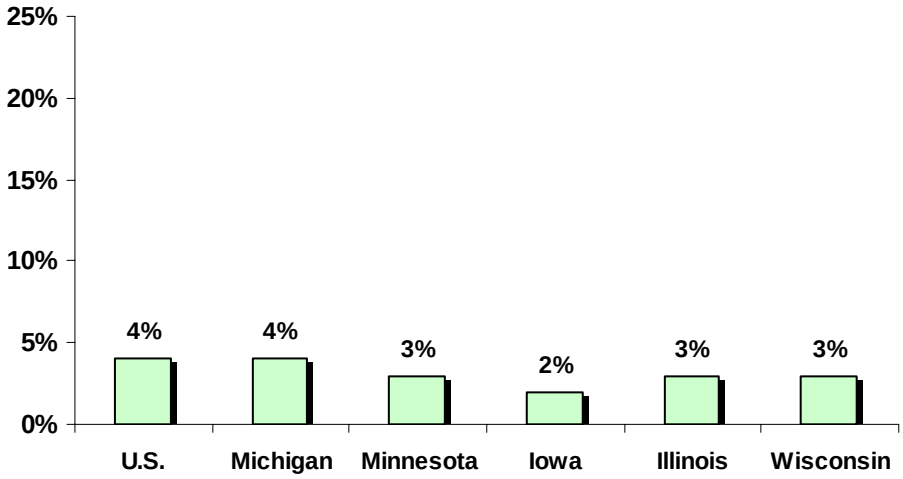
Similarly, some surveys ask respondents to recall depression symptoms across the previous 12 months or the past 30 days, while BRFS uses a two-week recall period for depression symptoms. Variations such as these generally produce quite different prevalence estimates and make direct comparisons of results impossible. Care is therefore advised in making cross-survey comparisons of prevalence estimates for mental health problems, and other estimates as well.

The Wisconsin BRFS has fielded both mental health modules: Anxiety and Depression in 2006 and Mental Illness and Stigma in 2007. All results presented – for other states as well as Wisconsin – are weighted to represent state adult populations. Wisconsin BRFS sample sizes for the analyses in this report were 5,201 cases in 2007 and 4,831 cases in 2006. The Wisconsin results presented in this report are shown with 95% confidence intervals. Confidence intervals around percentage estimates indicate precision and show the range of values within which the true population value falls in 95 of 100 possible measurements. Wide confidence intervals, associated with small numbers of cases and large standard errors, indicate less precision. Differences between two estimates are statistically significant if their accompanying confidence intervals do not overlap. Conversely, if the confidence intervals for estimates overlap, the difference is not statistically significant.

Estimating the Prevalence of Mental Health Conditions in Wisconsin: Serious Psychological Distress (SPD) and Depression

Of the 54 states and U.S. territories that conduct BRFS, 37 used the BRFS Mental Illness and Stigma module in 2007. The provisional national SPD prevalence is 4 percent—the median of the participating states and territories [15].

Figure 1. Prevalence of serious psychological distress (SPD) in Wisconsin, surrounding states and the U.S. (provisional), 2007



Source: 2007 Behavioral Risk Factor Surveillance System.

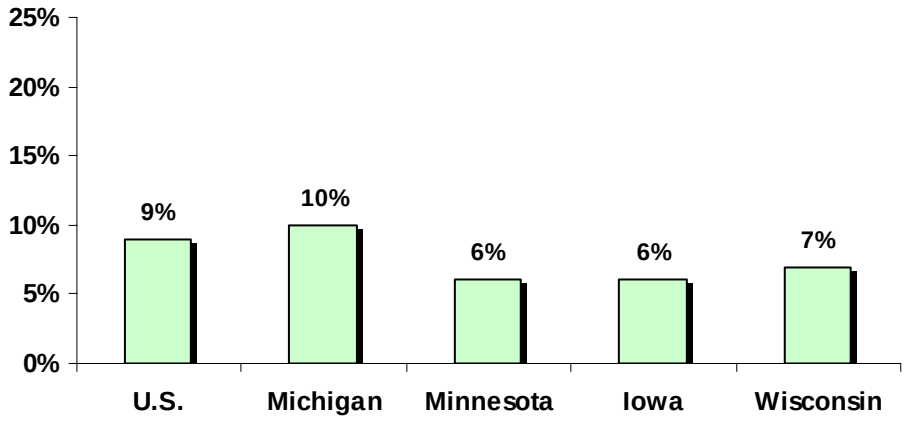
Wisconsin's SPD prevalence is lower than the national median at approximately 3 percent. Rounded prevalence estimates in adjacent states are similar to Wisconsin's, with Minnesota, Iowa and Illinois also at 3 percent or less, and Michigan slightly higher at 4 percent.[2]

Thirty-eight states and territories fielded the BRFS Anxiety and Depression Module in 2006. Results for the U.S. and states in the upper Midwest, including Wisconsin, are shown in Figure 2. The provisional U.S. prevalence for current moderate-to-severe depression, indicated by a PHQ-8 score of 10 or higher, is 8.7 percent. The prevalence in Wisconsin, approximately 7 percent, is slightly higher than in Iowa and Minnesota (6% each) and lower than the prevalence in Michigan (10%). Illinois did not use the Anxiety and Depression Module in 2006.[3]

[2] Reproduced from the presentation: "Provisional Mental Illness and Stigma Module Analysis, 2007: Serious Psychological Distress," Satvinder Dhingra and Tara Strine, 2008 Behavioral Risk Factor Surveillance System Conference, Orlando, Florida.

[3] Surrounding-state and U.S. depression estimates reproduced from Strine, et al., 2008, "Depression and Anxiety in the United States: Findings from the 2006 Behavioral Risk Factor Surveillance System," *Psychological Services*: 39-12.

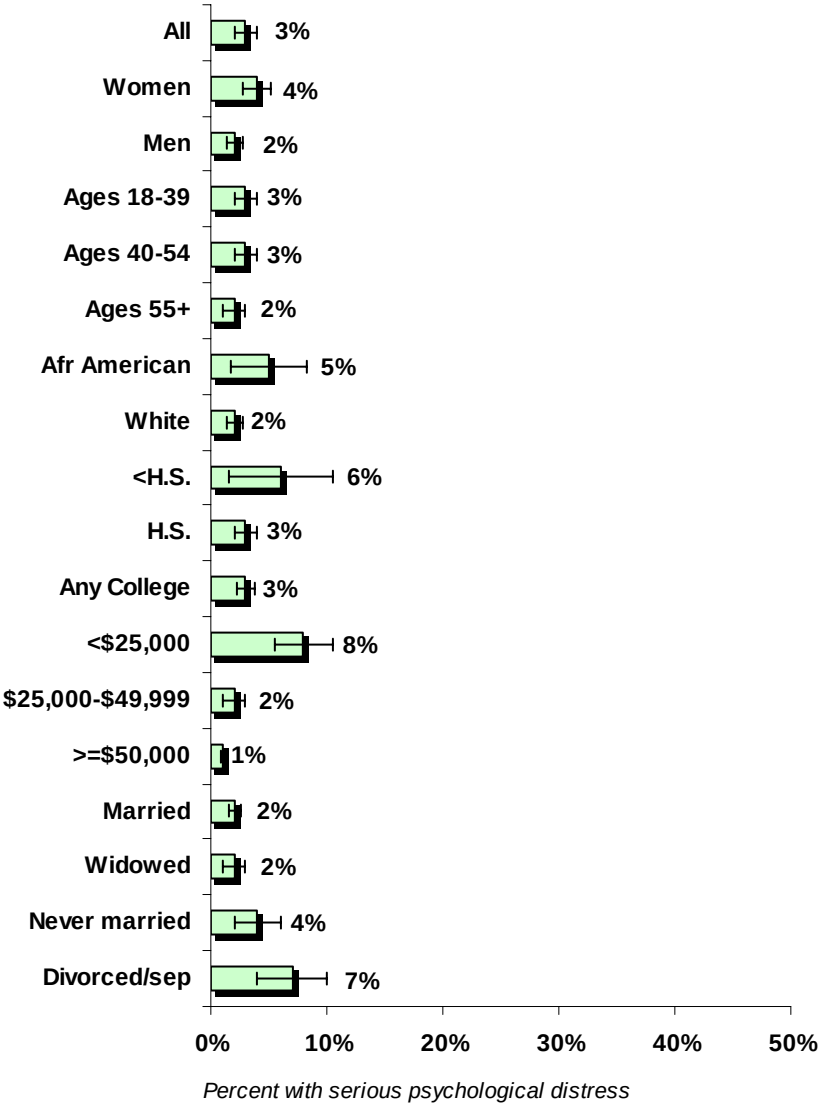
Figure 2. Prevalence of current depression in Wisconsin, surrounding states and the U.S. (provisional), 2006



Source: 2006 Behavioral Risk Factor Surveillance System.

Figure 3 shows the Wisconsin SPD prevalence by sex, age, race/ethnicity, education, income and marital status. *Race/ethnicity categories are limited to African American and white due to insufficient numbers of cases for other groups*. Results for SPD are based on a small number of cases – 155 – resulting in large confidence intervals, indicated by lines that cross the bars and extend beyond them. Sex, race/ethnicity, education, income and marital status all show differences in SPD prevalence by subgroup; however (possibly due to the small number of cases), only the differences by income level and marital status are statistically significant. Adults who are divorced or separated have a higher SPD prevalence than those who are married or widowed, as do those with annual household incomes less than $25,000 compared to persons with higher incomes.

Figure 3. Prevalence of serious psychological distress (SPD) by selected demographic characteristics: Wisconsin, 2007

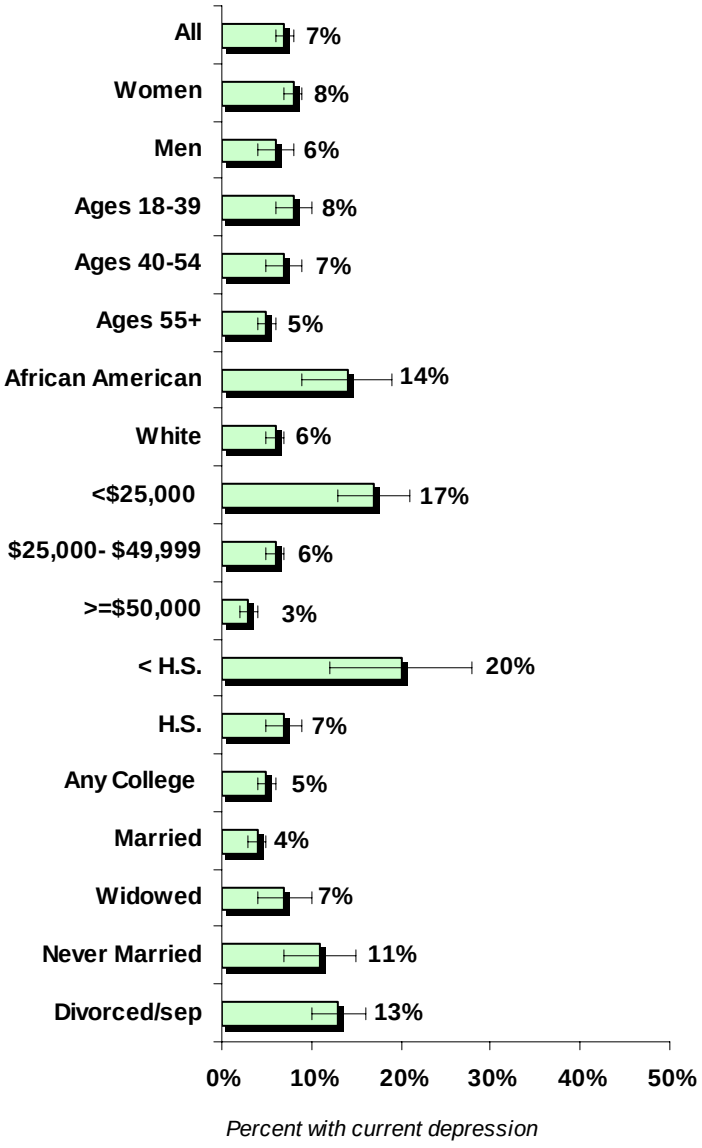


Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Note: All percentages are rounded to the nearest whole percent.

A growing body of research points to social and economic characteristics as important factors that divide populations with respect to physical health outcomes, and mental health issues show a similar pattern, as suggested by the SPD results in Figure 3. The relationships between depression and socioeconomic variables are clearer than with SPD, however, possibly due to the larger number of depression cases identified (334 cases).

As with serious psychological distress, current depression shows differences in prevalence by race/ethnicity, education level, income and marital status (Figure 4), but with depression these differences are all statistically significant. This may be due to the narrower confidence intervals, which reflect the larger number of cases for the depression subgroup.

Figure 4. Prevalence of moderate to severe current depression by selected demographic characteristics: Wisconsin, 2006



Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Note: All percentages are rounded to the nearest whole percent.

African Americans are more likely to be currently depressed than whites, and persons with less than a high school education are more likely to be depressed than those with a high school education or more. Persons who are divorced or never married are more likely to be depressed than those who are married, and persons with low incomes – defined as less than $25,000 for the household – are more likely to be depressed than those with higher household income levels.

One aspect of disease burden for the individual is the proportion of time its negative effects are experienced [16]. For example, a health condition that results in 10 or 12 days of bad health or activity limitation per month imposes a greater burden than a condition associated with one or two bad days per month.

The BRFS includes separate questions about the number of days of bad mental and physical health the respondent has experienced in the past 30 days.[4] Data from the bad mental health days question can be used to calculate a measure of frequent mental distress (FMD), defined as 14 or more days in the past 30 days when mental health was not good. BRFS advocates the use of a 14-day threshold in keeping with clinical definitions of mood disorders such as anxiety and depression [16].

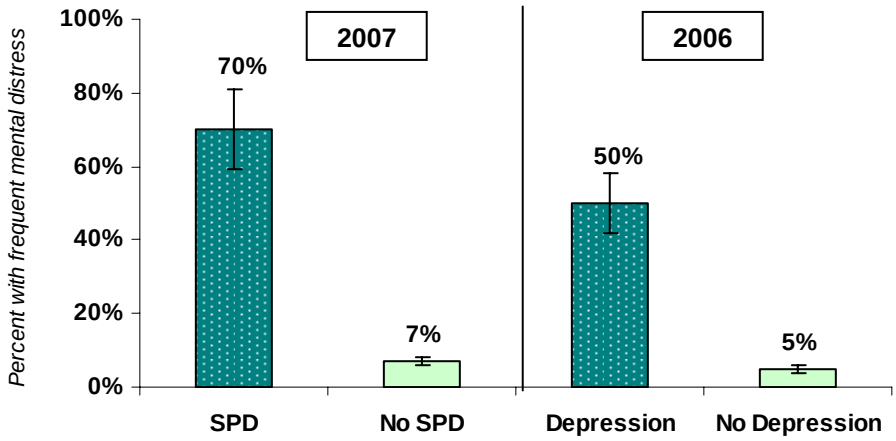
Figure 5 shows the prevalence of frequent mental distress among Wisconsin adults with serious psychological distress and depression, and Figure 6 shows the average number of bad mental health days in the past 30 days. Among adults with SPD, 70 percent meet the threshold for frequent mental distress, while among those with depression, 50 percent meet that threshold (Figure 5).

The average of 19 bad mental health days among adults with SPD – versus 3 days among those without SPD – suggests serious difficulty in terms of ongoing mental distress (Figure 6), as does the average of 15 bad mental health days among adults with depression versus 2 such days among adults without depression.

Both the prevalence of frequent mental distress and the average number of bad mental health days are high among adults with SPD and adults with depression. The level of distress experienced by those with SPD appears to be somewhat greater than among those with depression, however.

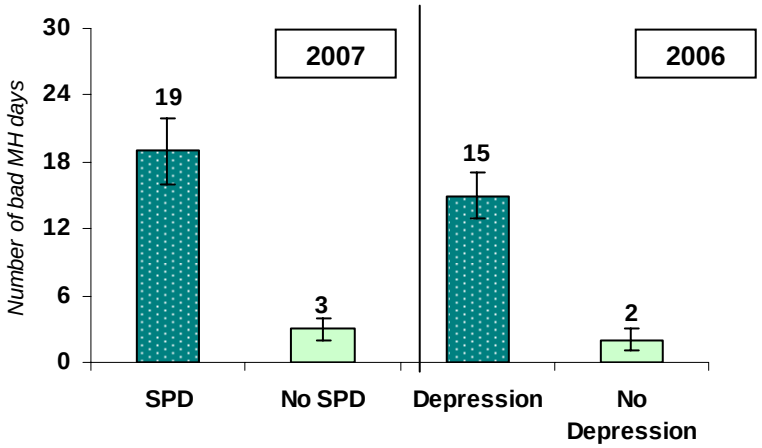
[4] "Now thinking about your *mental health*, which includes stress, depression and problems with emotions, for how many days during the past 30 days was your mental health not good?"

Figure 5. Prevalence of frequent mental distress* among Wisconsin adults with serious psychological distress (SPD) and current depression



Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.
*Frequent mental distress: 14 or more days in the past 30 days when mental health was not good.

Figure 6. Average number of bad mental health days in the past 30 days among Wisconsin adults with serious psychological distress (SPD) and current depression

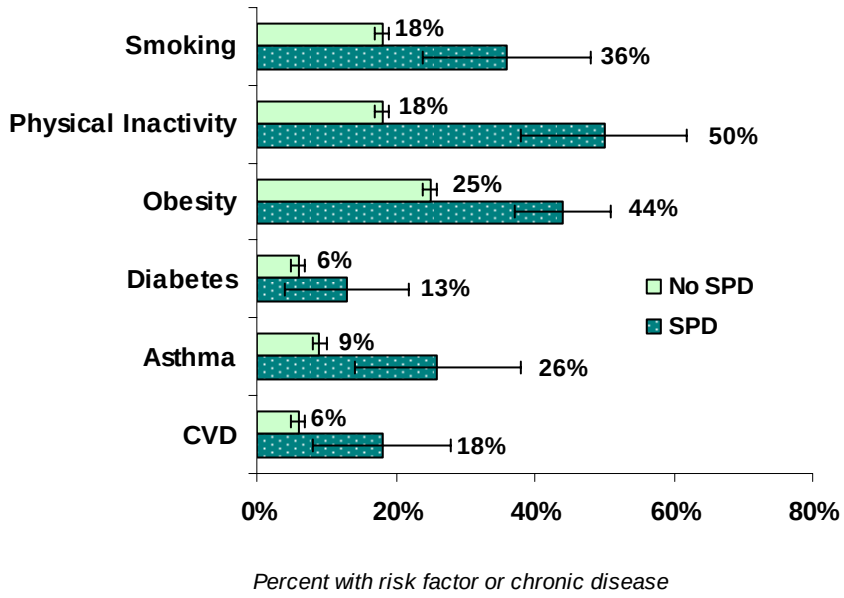


Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.

Examining the Relationship between Physical Health and Mental Health

As noted earlier, demonstrated links exist between mental health problems and chronic disease morbidity and mortality. Figure 7 shows prevalence estimates of major chronic diseases and health risks for Wisconsin adults with serious psychological distress (SPD) compared to the population without SPD. For this figure, cardiovascular disease includes ever having had a heart attack, ever having had a stroke, or ever having been diagnosed with coronary heart disease. For every disease and risk factor the prevalence is higher among those with serious psychological distress, and with the exception of diabetes, all differences between the SPD and non-SPD populations appear to be statistically significant**.** Note, however, that Figure 7 (and other bar charts in the report) show relationships between pairs of variables but do not take into account other health-related factors that could contribute to the apparent relationships. Adjusted odds ratios are presented in Table 1 and subsequent tables to address this issue.

Figure 7. Prevalence of health risks and chronic diseases by serious psychological distress (SPD) status



Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Notes: The estimate of diabetes prevalence for the SPD group has a large standard error and may be unreliable. CVD is cardiovascular disease, defined as ever having had a heart attack or stroke or a diagnosis of coronary heart disease.

Adjusted odds ratios (AORs) are calculated using logistic regression for categorical outcome variables. AORs indicate statistical association between two variables – an independent variable and an outcome variable – controlling for possible confounding factors, and stated in terms of the

odds of an event for a group-of-interest relative to a reference group. Odds ratios greater than 1.0 reflect positive association, those less than 1.0 indicate negative association, and odds ratios of exactly 1.0 indicate the absence of a relationship between the variables of interest. If the 95% confidence interval for an odds ratio does *not* contain a value of 1.0, statistical significance is indicated; a lack of statistical significance is suggested if the confidence interval includes 1.0.

In Table 1, adjusted odds ratios of risks and chronic diseases for serious psychological distress confirm that the associations between SPD and the set of risk and disease variables are statistically significant. *Wisconsin adults with SPD are more than twice as likely to smoke or have asthma, approximately three times as likely to be obese or physically inactive, and more than four times as likely to have cardiovascular disease as those without SPD* (reference group is "No SPD").

Table 1. Adjusted odds ratios of selected risks and chronic diseases for serious psychological distress (SPD)[5]

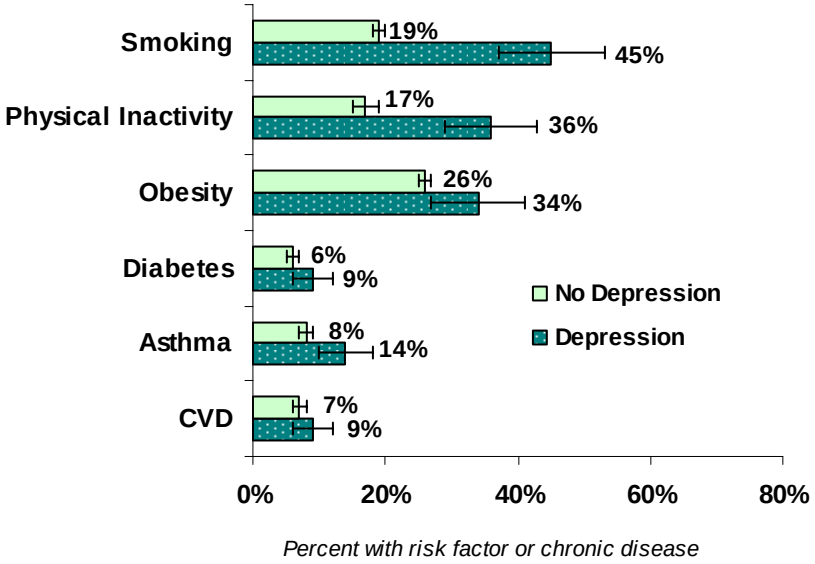
	AOR	95% CI
Smoking	**2.4**	1.4 - 4.1
Physical Inactivity	**2.9**	1.9 - 7.7
Obesity	**2.9**	1.7 - 5.0
Diabetes	2.3	0.7 - 8.0
Asthma	**2.6**	1.2 - 5.8
Cardiovascular Disease	**4.6**	1.6 - 13.4

Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Reference group: No SPD.
Note: Bolded results are statistically significant.

Figure 8 shows estimates for chronic diseases and related risk factors for adults with and without current depression. Differences indicate higher prevalence of smoking, obesity and lack of exercise among those currently depressed compared to those with no depression. The adjusted odds ratios in Table 2 indicate, however, that only the differences in smoking and lack of exercise are statistically significant: *Wisconsin adults with current depression are more than twice as likely to smoke and approximately twice as likely to be physically inactive as those without depression*. Differences are suggested in Figure 8 for asthma, diabetes and cardiovascular disease prevalence between those with and without current depression but do not reach statistical significance, as reflected in the adjusted odds ratios shown in Table 2.

[5] Risks (smoking, lack of exercise and obesity) are adjusted for education, age, sex, income, marital status and race (African American/white). Physical inactivity is also adjusted for health status. Chronic diseases are adjusted for education, age, sex, income, marital status, race, smoking status and obesity status.

Figure 8. Prevalence of health risks and chronic diseases by current depression status



Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Note: CVD is cardiovascular disease, defined as ever having had a heart attack or stroke or a diagnosis of coronary heart disease.

Table 2. Adjusted odds ratios of selected risks and chronic diseases for current depression[6]

	AOR	95% CI
Smoking	**2.8**	1.8 - 4.2
Physical Inactivity	**1.6**	1.1 - 2.5
Obesity	1.3	0. 9 - 1.9
Diabetes	1.2	0.7 - 2.0
Asthma	1.4	0.9 - 2.4
Cardiovascular Disease	1.5	0.9 - 2.5

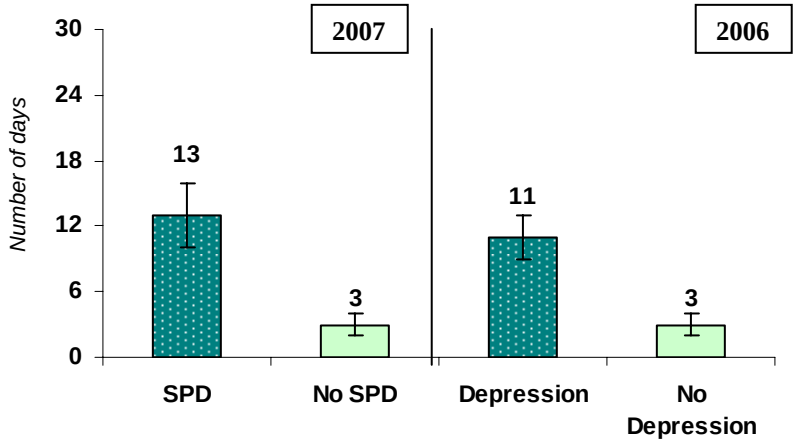
Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Reference group: No depression.
Note: Bolded results are statistically significant.

BRFS asks respondents to estimate the number of bad physical health days they experienced in the past 30 days. Consistent with the higher prevalence of two of the three chronic diseases included in the present analysis, adults with serious psychological distress average a large number of bad physical health days – 13 in the past 30 days – compared to those without SPD (Figure 9). While adults with depression do not appear more likely to have asthma, diabetes or cardiovascular disease than those without depression (Table 2), the results suggest that they

[6] Risks (smoking, lack of exercise and obesity) are adjusted for education, age, sex, income, marital status and race (African American/white). Physical inactivity is also adjusted for health status. Chronic diseases are adjusted for education, age, sex, income, marital status, race, smoking status and obesity status.

experience a significantly larger number of bad physical health days (Figure 9), presumably from a cause or causes not reflected in these data.

Figure 9. Average number of bad physical health days in the past 30 days by serious psychological distress (SPD) status and depression status



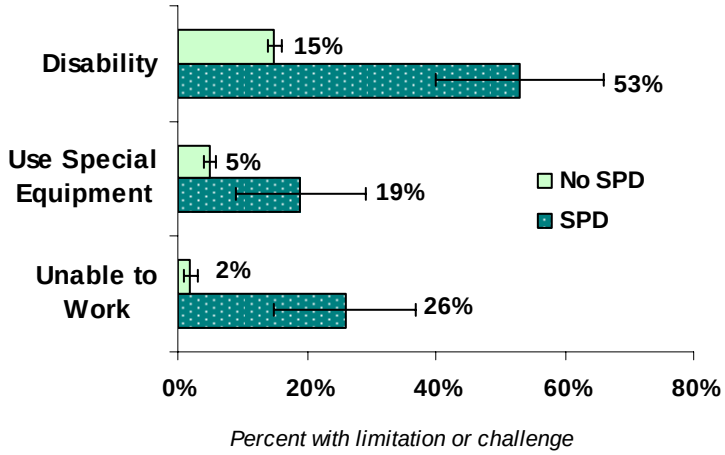
Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.

SPD, Depression and Functional Impairment

Moderate-to-serious difficulty functioning in one or more major life areas is a characteristic of serious psychological distress, as previously noted. BRFS does not ask directly about functional status but it includes several questions that can be used as indirect, or proxy, indicators of functioning. Figure 10 compares indicators of functional impairment among Wisconsin adults with SPD versus those without SPD, and indicates high levels of difficulty in the SPD group.

Wisconsin adults with SPD are significantly more likely than those without SPD to indicate that they have a disability, that they have a health problem requiring use of special equipment, and that they are unable to work (Figure 10). Adjusted odds ratios indicate that the differences by SPD status for disability status and inability to work are statistically significant, but the difference in use of special equipment is not. *Adults with SPD are approximately five times more likely to have a disability and six times more likely to be unable to work than those without SPD* (Table 3).

Figure 10. Prevalence of functional challenges by serious psychological distress (SPD) status



Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Note: Disability includes the presence of any limitation due to physical, mental or emotional problems. Use of special equipment refers to the presence of a health problem that requires special equipment, including for occasional use.

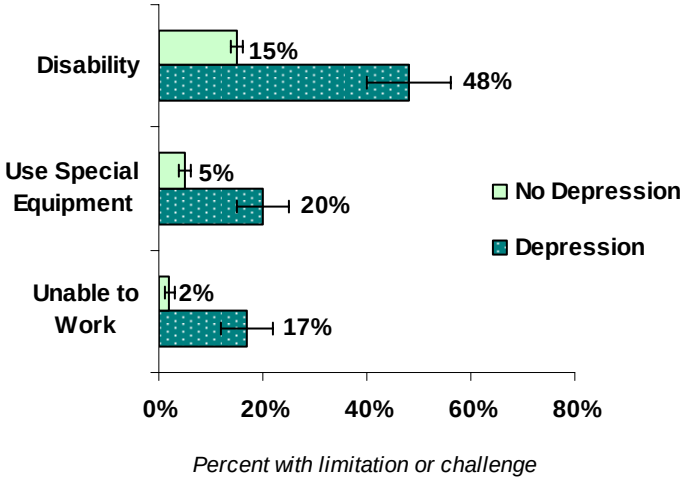
Table 3. Adjusted odds ratios of functional challenges for serious psychological distress (SPD)[7]

	AOR	95% CI
Disability	**5.2**	2.7 - 9.9
Use Special Equipment	2.8	0.9 - 9.0
Unable to Work	**6.3**	2.2 - 17.9

Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Reference group: No SPD.
Note: Bolded results are statistically significant.

Figure 11 shows the prevalence of functional challenges by depression status, and Table 4 presents corresponding adjusted odds ratios of functional challenges for current depression. A large proportion of those with current depression have a disability (48%); clear differences by depression status are also apparent in prevalence of disability and inability to work (Figure 11). The adjusted odds ratios for functional challenges indicate that the differences in all three areas, including use of special equipment, are statistically significant. *Adults with depression are approximately three times as likely as those without depression to have a health condition requiring use of special equipment, more than three times as likely to have a disability and approximately five times as likely to be unable to work* (Table 4).

Figure 11. Prevalence of functional challenges by current depression status



Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Note: Disability category includes the presence of any limitation due to physical, mental or emotional problems. Use of special equipment refers to presence of a health problem that requires special equipment, including for occasional use.

[7] All are adjusted for education, age, sex, race (African American/white) and health status. Disability and use of special equipment are also adjusted for income, but inability to work is not.

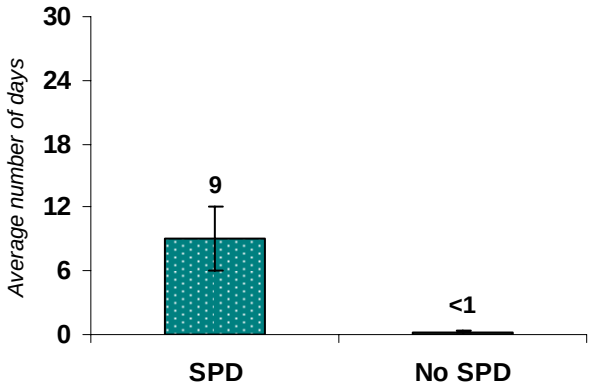
Table 4. Adjusted odds ratios of functional challenges for current depression[8]

	AOR	95% CI
Disability	**3.7**	2.5 - 5.4
Use Special Equipment	**3.1**	1.9 - 4.9
Unable to Work	**5.1**	3.0 - 8.6

Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Reference group: No depression.
Note: Bolded results are statistically significant.

The extent to which a condition or disease interferes with, or limits, usual activities is a reflection of the level of burden it imposes on the individual who experiences it. Mental health problems are associated with a substantial burden measured in activity limitation days. Figure 12 shows – by SPD status – the average number of days in the past 30 when a *mental health* condition or problem interfered with usual activities, used here as a measure of activity limitation due specifically to a mental health condition or problem. While the average is less than one day among those without serious psychological distress, it is nine days for adults with SPD – nearly one-third of the time in the past month. Data on this measure are not available by current depression status.

Figure 12. Average number of days in the past 30 days when *a mental health condition* interfered with work or other activities, by serious psychological distress (SPD) status

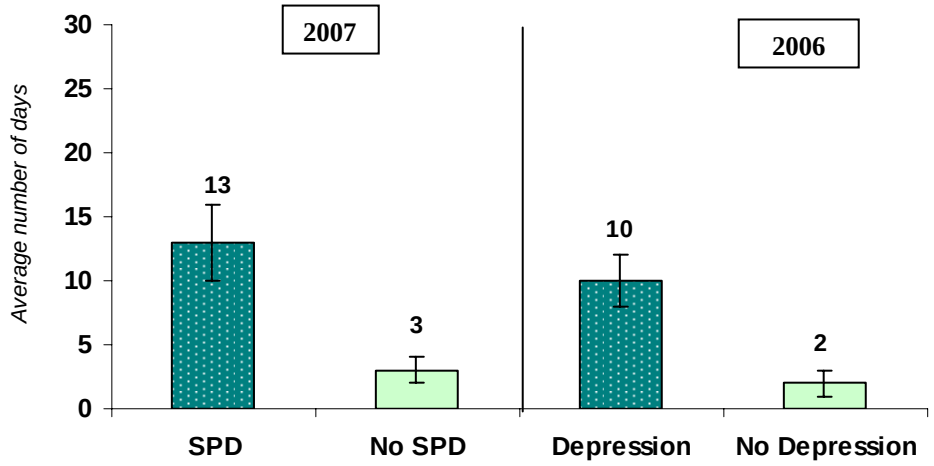


Source: Wisconsin Behavioral Risk Factor Survey, 2007.

[8] All are adjusted for education, age, sex, race (African American/white) and health status. Disability and use of special equipment are also adjusted for income, but inability to work is not.

In Figure 13, activity limitation may be due to *either physical or mental* health problems.[9] The relevant BRFS question asks for "the number of days when poor physical or mental health kept you from doing your usual activities," and is used here as a second measure of activity limitation. The average number of activity limitation days in the past 30 days among Wisconsin adults with serious psychological distress is 13, compared with 3 days among those without SPD. Among adults with current depression the average number of activity limitation days is 10, versus an average of 2 days among those without depression. On this measure, the SPD and depression populations appear to be different, as they are for the set of chronic diseases discussed earlier. While the number of activity limitation days among adults with depression is substantial, the extent of limitation appears to be slightly less than it is among those with SPD.

Figure 13. Average number of days in the past 30 days when poor *physical or mental health* prevented usual activities, by serious psychological distress (SPD) status and current depression status

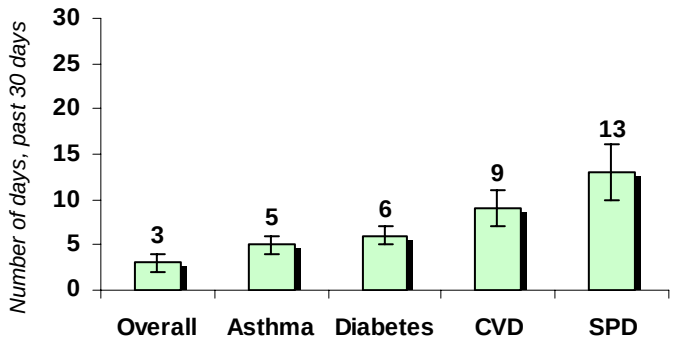


Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.

To provide context, Figure 14 shows a comparison of activity limitation days for those with SPD versus those who do not have SPD but who have chronic physical diseases. The average number of activity limitation days among those with SPD (13) exceeds the average for Wisconsin adults with diabetes, asthma and cardiovascular disease. Again, the diseases and conditions are treated separately in Figure 14. Where SPD and chronic physical diseases co-occur, their combined effects are likely to increase overall disability and make disease management and risk factor modification more difficult. (The small sample size for the SPD group does not permit meaningful comparison of people who have both SPD and chronic diseases, i.e., co-morbidity, with those having SPD alone.)

[9]BRFS question: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your *usual activities*, such as self-care, work or recreation?"

Figure 14. Average number of days in the past 30 days when poor *physical or mental health* prevented usual activities: SPD versus selected chronic diseases and overall population average



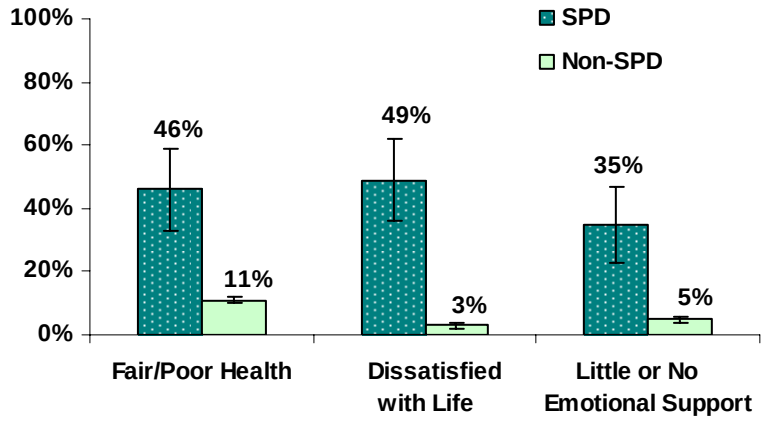
Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Note: CVD is cardiovascular disease, defined as ever having had a heart attack or stroke or a diagnosis of coronary heart disease.

SPD, Depression and Overall Quality of Life

Quality of life is a broad, multi-dimensional construct that encompasses subjective assessments of health, happiness and overall life satisfaction [16]. The BRFS includes questions tapping health status and global life satisfaction, as well as a question about availability of social support. Viewed together, the three measures provide a rough outline of quality of life among Wisconsin adults.

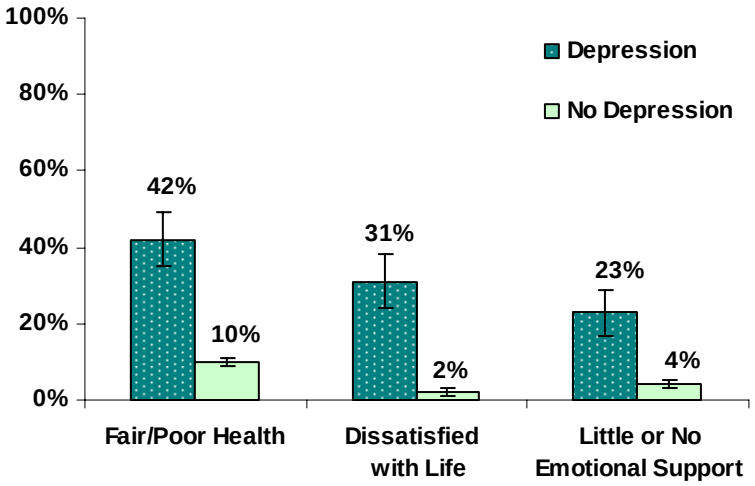
Figure 15 shows three indicators of diminished quality of life: prevalence of fair/poor health, dissatisfaction with life and perceived lack of social/emotional support. Striking differences are apparent on all three measures by SPD status, suggesting poorer quality of life among adults with serious psychological distress. The three measures also show considerable difference by depression status, although the overall picture appears slightly less bleak among those with depression (Figure 16) than among those with SPD.

Figure 15. Prevalence of fair or poor health, dissatisfaction with life and inadequate social/emotional support by serious psychological distress (SPD) status



Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Note: Dissatisfied with life includes the responses "dissatisfied" or "very dissatisfied" to the question "In general, how satisfied are you with your life?" Little or no social/emotional support includes responses of "rarely" or "never" to the question "How often do you get the social and emotional support you need?"

Figure 16. Prevalence of fair or poor health, dissatisfaction with life and inadequate social/emotional support by depression status



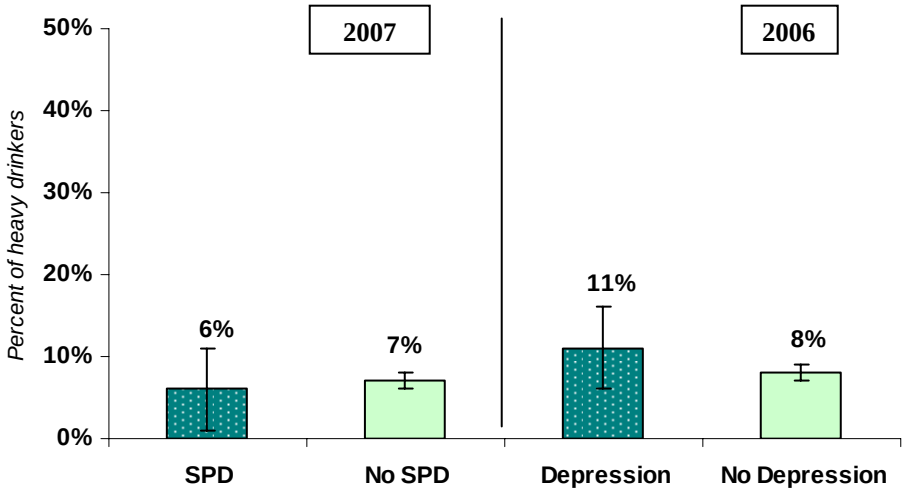
Source: Wisconsin Behavioral Risk Factor Survey, 2006.
Note: Dissatisfied with life includes the responses "dissatisfied" or "very dissatisfied" to the question "In general, how satisfied are you with your life?" Little or no social/emotional support includes responses of "rarely" or "never" to the question "How often do you get the social and emotional support you need?"

Excessive Alcohol Consumption and Mental Health

Mental health and substance abuse disorders frequently co-occur [27]. The BRFS asks a series of questions on alcohol use, making it possible to assess the prevalence of heavy drinking and binge drinking in the adult population. Data on other types of substance abuse are not available from BRFS.

Figure 17 shows the prevalence of heavy drinking by SPD status and depression status among Wisconsin adults. Heavy drinking is defined as a past-month average of more than two alcohol drinks per day for men and more than one alcohol drink per day for women. There appears to be a higher prevalence of heavy drinking among those who are depressed versus the non-depressed, but the confidence interval around the estimate for the depressed group is too large to conclude that the difference is statistically significant.

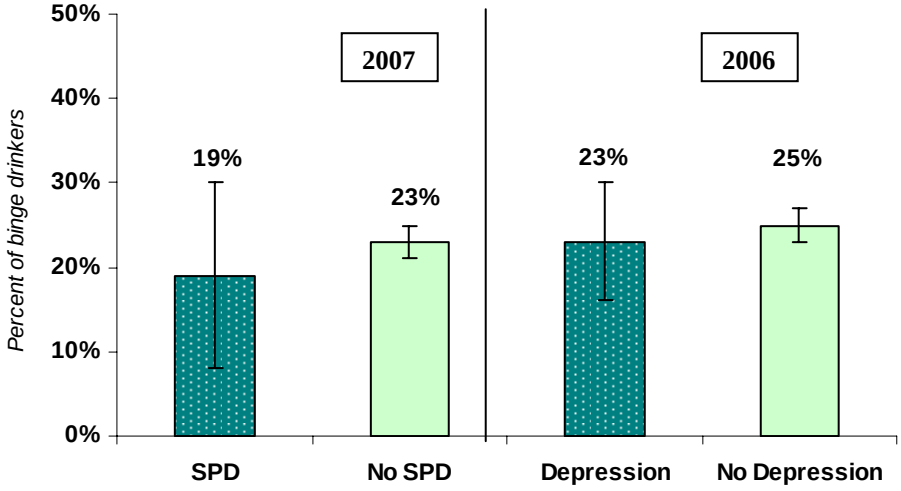
Figure 17. Prevalence of heavy drinking by SPD status and depression status



Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.
Note: Heavy drinking is defined as an average of more than 2 drinks per day for men and more than 1 drink per day for women.

Binge drinking is defined as more than five drinks on one occasion in the past month for men and more than four drinks on one occasion for women. Wisconsin consistently has the highest prevalence of binge drinking among adults in the nation, based on BRFS data and other health survey data. There do not appear to be differences in binge alcohol consumption based on SPD or depression status, however (Figure 18).

Figure 18. Prevalence of binge drinking by SPD status and depression status



Source: Wisconsin Behavioral Risk Factor Survey, 2006 and 2007.
Note: Binge drinking is defined as more than 5 drinks on one occasion for men and more than 4 drinks on one occasion for women.

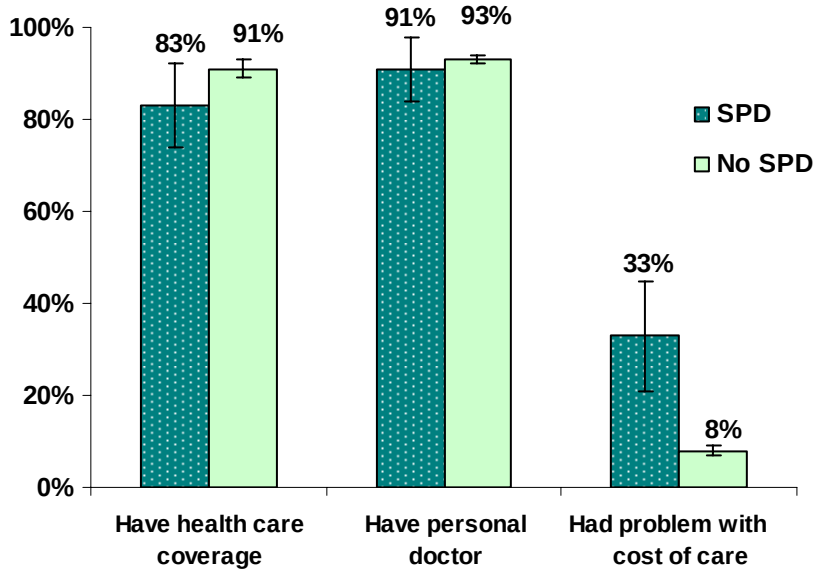
Accessing Needed Health Care Services

The results from the 2006 and 2007 Wisconsin BRFS communicate a common message concerning mental health: The overall health of people with mental health needs is further diminished by their increased risk for physical health problems. A logical implication is that a large proportion of adults with mental health disorders have a high need for both mental health care and primary physical health care services.

BRFS asks about health care access via a direct question about health insurance status and two additional questions to determine: 1) whether the respondent has a doctor s/he regards as a personal health care provider, and 2) whether the respondent has refrained from getting needed medical treatment at any time in the past 12 months due to the cost of care.

Figure 19 shows results for the three questions by SPD status. The proportion of the SPD population with health care coverage and the proportion who have a doctor they view as a personal provider are not statistically different from the corresponding proportions in the population without SPD. *Nevertheless, approximately 33 percent of those with SPD went without care due to cost at some point in the past year. In contrast, 8 percent of those without SPD went without care due to cost.* This suggests a higher prevalence of incomplete health care coverage, or perhaps intermittent coverage, among the SPD population.

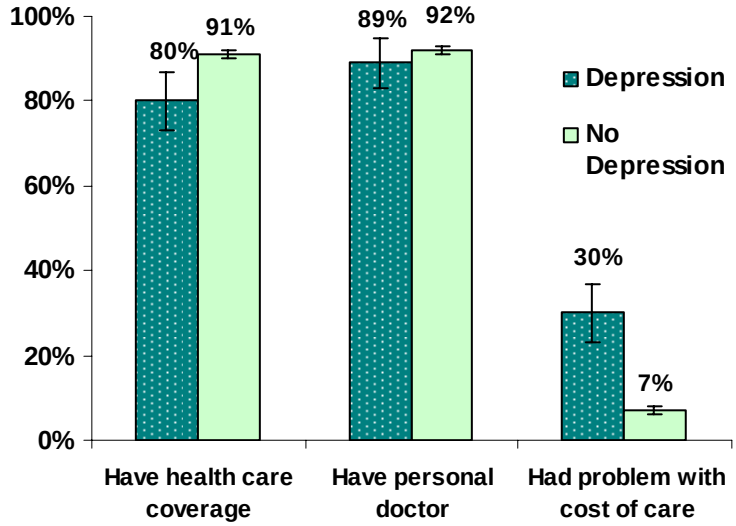
Figure 19. Health care access by serious psychological distress (SPD) status



Source: Wisconsin Behavioral Risk Factor Survey, 2007.
Note: Problem with cost of care is the proportion who answered "yes" to the question "Was there a time in the past 12 months when you needed to see a doctor but could not because of cost? "

As Figure 20 shows, results for the same set of health care access questions by depression status are similar to the results by SPD status, except that the difference in current health care coverage between those with and without depression appears to be statistically significant. *Issues with health care cost are also apparent among adults with depression – 30 percent went without care due to cost at some point in the past 12 months, versus 7 percent among adults without depression*.

Figure 20. Health care access by depression status

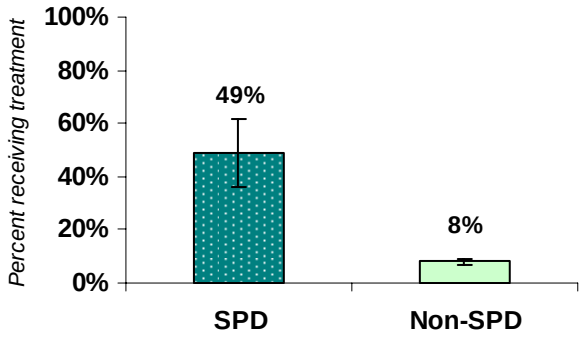


Source: Wisconsin Behavioral Risk Factor Survey, 2006.

As Figure 21 indicates, slightly less than half (49%) of adults with serious psychological distress currently receive some type of mental health treatment or medication. Together, Figures 19 and 21 suggest significant under-treatment for mental health problems among adults with SPD.

Figure 20 suggests a similar pattern for adults with depression in terms of overall health care. Data on receipt of mental health treatment among adults with depression are not available.

Figure 21. Current receipt of mental health treatment or medication by serious psychological distress (SPD) status



Source: Wisconsin Behavioral Risk Factor Survey, 2007.

People with mental health disorders may have difficulty accessing primary care and/or mental health care services for a variety of reasons, foremost among them issues of cost and coverage. In Wisconsin, the prevalence of SPD among adults with annual household incomes below $25,000 is four times that of people making $25,000-$49,999 (8% vs. 2%), and people with low incomes are less likely to have health insurance. In addition, incomplete health care coverage among those with low incomes may result in more frequent and larger out-of-pocket payments. For those who have health insurance, lack of parity between physical and mental health care coverage can result in under-treatment for mental health conditions and out-of-pocket expenses when treatment coverage limits are exceeded.

Finally, people with co-occurring physical and mental health disorders are more likely to avoid treatment or discontinue it early, denying themselves the complete set of services they need [27]. Stigma associated with mental health conditions may play a role in such decisions for adults whose providers over-emphasize the mental health diagnosis, or label, in the treatment process and fail to incorporate the client's strengths. Fear of discrimination and isolation from family, friends and society more generally also influences clients' decisions to access, or remain in, treatment.

Limitations of the Data and the Report

While BRFS began incorporating cell phone sampling in all states as of 2009, "regular" BRFS sampling for random-digit-dial (RDD) landline telephone administration excludes persons who are institutionalized or homeless, or who do not have a landline telephone. Individuals who are homeless or in mental health institutions, correctional facilities, and nursing homes are more likely than the general population to have mental health conditions. Because of the exclusion of these groups, 2006 and 2007 BRFS may underestimate the prevalence of mental health conditions, and of co-occurring mental and physical health disorders, for the Wisconsin adult population.

In addition, 2007 Wisconsin BRFS results indicate that 17 percent of adults with SPD experienced interruption of telephone service for two weeks or more in the past year, compared to only 3 percent of the overall adult population with landline phones. This disparity, which could conceivably affect probability of selection to the sample, may indicate sample under-coverage of the SPD population, leading to under-estimation of SPD prevalence. It should be noted, however, that the National Health Interview Survey (NHIS), a face-to-face household survey, found a 30-day national SPD prevalence of 3 percent in the non-institutionalized population for the period 2001-2004, similar to BRFSS [28].

The computer scoring algorithm for the PHQ-8 depression scale excludes cases with any missing responses for the eight scale questions; to date, there are no guidelines for imputing missing data for the PHQ-8. The PHQ-8 estimates of current depression may therefore be slightly low.

Small sample sizes for the SPD and depression subgroups do not permit subdivision of these groups by demographic characteristics, which might also be of interest in examining the relationship of SPD to health risks, chronic diseases, functioning and quality of life.

While the current report focuses on the physical health problems of people with mental health conditions, another approach to examining the links between mental and physical health would be the opposite—examining the mental health conditions experienced by those with physical health problems. The two approaches are slightly different and could produce different results.

Finally, although the BRFS data presented here reveal strong associations between mental health conditions and some physical health disorders, causal inferences are not possible, as BRFS data are cross-sectional and do not examine the time order of relationships between and among health conditions and other variables.

Summary

Examining BRFS results for depression and serious psychological distress (SPD) simultaneously highlights the differences and similarities between them in the adult population. As noted earlier, SPD, as measured by the K-6 scale, is a non-specific measure that potentially covers a broad spectrum of mental health conditions; whereas the PHQ-8 depression scale specifically identifies moderate to severe depression.

The two disorders—SPD and depression—are not compared statistically here because the data are from separate survey years; however, the results suggest that the implications for mental and physical health are somewhat more severe among adults with SPD than among those with depression. This suggests that SPD has more in common with serious mental illness (SMI) than with depression in terms of its effects on overall health and quality of life. In addition, the estimate of SPD prevalence (3%) is likely to be low, as noted earlier.[10]

Serious psychological distress is clearly associated with, and in some ways rivals, chronic physical disease as a source of health-related burden and diminished quality of life. The results indicate that serious psychological distress in Wisconsin's adult population is associated with elevation of chronic disease risk factors such as smoking, obesity and lack of exercise, and a higher prevalence of diagnosed asthma and cardiovascular disease. Wisconsin adults with SPD also experience as much or more activity limitation as those with chronic physical conditions such as asthma, diabetes and cardiovascular disease.

Subject to the limitations of the measures available from BRFS, Wisconsin adults with SPD also appear to experience impaired functioning. Compared to adults without SPD, those with SPD are more likely to have a disability and to be unable to work. Adults with SPD are also more likely to be dissatisfied with life, to have little or no social support, and to have fair or poor health, suggesting poor overall quality of life.

The results are more mixed for adults with current depression. Functional challenges are prevalent among those with depression, as are elevated levels of fair/poor health, dissatisfaction with life and inadequate social support, although these problems appear to be slightly less frequent among adults with depression than among those with SPD. Estimates of chronic disease prevalence are higher among adults with current depression, but the differences are not

[10] Note also that the National Survey on Drug Use and Health (NSDUH) finds a *past-year* SPD prevalence rate in Wisconsin of 11.8 percent, compared to the 3 percent *past-month* SPD prevalence identified using BRFS. As noted earlier, the timeframe used in the scale questions is of critical importance.

statistically significant in this sample. The lack of significant association between depression and chronic diseases in the Wisconsin BRFS data is inconsistent with other results from national and state studies using the 2006-2007 BRFS data [23, 24]. The lack of findings for Wisconsin may be related to the small number of depression cases available for analysis. A more complete explanation may be possible in the future if additional BRFS data on depression are collected.

Nonetheless, Wisconsin adults with both types of disorders experience high levels of disability, including physical disability. Among those with SPD, disability appears to be—as noted—at least partly related to higher prevalence of chronic diseases. The greater need for use of special equipment among adults with depression suggests that they may experience more disability from pain-related conditions and disorders that affect mobility, such as arthritis, than those with SPD. There are established links between depression and arthritis [6]; however, the prevalence of arthritis and related disorders among people with depression cannot be measured with the 2006 BRFS data used in this report.

Afterword: Implications for Integrated Care

The consequences of inadequate treatment of co-occurring mental and physical health conditions can be substantial. As noted at the beginning of this report, research indicates that adults with major mental illnesses who received treatment in the publicly funded mental health system die 25 or more years earlier, on average, than the general population, primarily from natural causes [9]. To address this issue, the treatment and prevention of chronic physical diseases among adults with mental health conditions require accessible integrated health care systems.

Several models of integrated health care systems exist and each has strengths and barriers to implementation. The degree of integration achieved by the models varies based on several factors, including the physical location of providers and services, the extent of integration of administrative functions, and the extent of coordination in decision-making by providers. Four models of integrated health care are described below [29, 25]:

1) *Separate mental health and primary care agencies that collaborate.*
The least integrated model is one in which separate mental health and primary care agencies refer clients to each other when co-occurring needs are identified. The agencies have no co-located staff, no integrated financial system, and no integrated policies or procedures, but staff may receive training on integrated care. Mental health needs are treated by the mental health agency staff and physical health needs are treated by the primary care staff in separate locations at separate times, but agencies share information about co-occurring needs in a particular client and coordinate care as much as possible.

2) *Primary care agencies that provide mental health services.*
In this model, mental health staff from a separate agency are located within a primary care agency and work directly with primary care staff. Staff follow policies and procedures from their respective agencies, although some adjustments in policies are usually made to accommodate integrated care. Clients are likely to have mild to moderate mental health needs and typically initiate clinic contact for a physical health problem. Depression is likely to be the most frequently identified mental health need, and treatment generally takes place within the context of the client's physical health care.

3) *Mental health agencies that provide primary physical care services.*
Location of physical health services within mental health agencies allows service providers to treat clients with serious mental health disorders. Such clients are likely to

seek help for their mental health needs at a mental health agency, and physical health needs are addressed secondarily. Programs under this model are more likely to develop physical health prevention and co-occurring treatment specialties that target the specific high-risk needs of mental health clients.

4) *Unified mental health/primary care agencies that operate as one administrative entity.* In a unified program of care, physical and mental health services are co-located and administered by one organization or one program with multiple collaborating organizations. All of the advantages described above for co-located models regarding integrated service delivery also apply to this model. Cost savings are more likely in a unified program, as all administrative and financial functions are consolidated, services are delivered more efficiently, and earlier identification and treatment of co-occurring health needs are more likely to reduce the need for services in the future.

While various models of health care integration have their respective strengths, each must address barriers to integration of services for clients with co-occurring needs. At or near the top of the list of barriers is health care financing. In an integrated system, mental health and primary care staff must work closely together to coordinate diagnoses and care plans. Currently, the public primary care and mental health service systems are funded separately, requiring integrated agencies to manage multiple sets of revenue and billing policies. As a consequence, the most successful integrated models have often been large HMOs, which are able to blend their funding.

The collaboration required between mental and physical health care providers also requires additional training for both groups of professionals. Although primary care providers are not expected to make mental health diagnoses and vice versa, the two types of providers must understand the diagnoses and treatments in each field. Differing processes of care provision can also be a barrier to integration. Unlike physical health care, mental health treatment often emphasizes case management and interdisciplinary collaboration among agencies in areas such as criminal justice, employment, social services, and substance abuse.

General resistance to change can be an issue for providers, but physicians and nurses who are unaccustomed to working with people with serious mental health disorders may also be uncomfortable and lack confidence in working with them. Conversely, fear of stigma and negative past experiences create strong reservations among some mental health clients about discussing their mental health conditions with physicians. Clients' mental health needs are sometimes dismissed by physicians and the resulting treatment approach is overly medical.

Information-sharing is also a technological and confidentiality issue. Federal and state statutes concerning the sharing of mental health records impose strict requirements regarding client consent and record handling, which may make merging such records with primary care records more difficult. Billing and client record information systems may be incompatible.

Variation in capacity between the primary care and mental health systems also has the potential to create conflict. While primary care systems in general need more physicians, mental health system staffing and overall capacity is even more challenged. Most people with serious physical health conditions get some level of care to address their need, but long waiting lists and the inability of clients to access services at all are more common in the mental health system. If mental health service capacity cannot keep pace with need, collaboration within an integrated system may begin to break down as the futility of identifying mental health needs and making referrals for mental health treatment becomes apparent.

While the barriers to integrated care in the current health care system are evident, the financial costs related to inadequate treatment of mental health conditions, and lack of treatment integration, sometimes go unrecognized.

The annual cost to society associated with depression was estimated at $30 billion to $44 billion in 2003 [33]. Similarly, the total annual cost associated with schizophrenia in the United States has been estimated at $62.7 billion [30]. These estimates include direct costs such as treatment and medication, criminal justice system costs, and capital costs for mental health facilities, along with indirect costs such as loss of productivity in the workplace for clients and their family members.

On a more positive note, some studies have found that integrating primary care services into mental health programs is cost-neutral, as increases in outpatient expenditures are offset by declines in inpatient and emergency room use [31, 32]. Such experiences offer hope that integrated mental health and primary care services are not only necessary for clients, but feasible to implement within health care systems.

References

1. McVeigh, K. H., F. Mostashari, and L. E. Thorpe. 2004. "Serious psychological distress among persons with diabetes – New York City, 2003." *Morbidity and Mortality Weekly Report*, Centers for Disease Control and Prevention, November 26, 2004, 53(46): 1089-1092.

2. Strine, T. W., E. Ford, L. Balluz, D. Chapman and A. Mokdad. 2004. "Risk behaviors and health-related quality of life among adults with asthma: The role of mental health status." *Chest* 126:1849-1854, American College of Chest Physicians.

3. Nuru-Jeter, A. and T. A. LaVeist. 2002. "Social risk factors for psychological distress: A test of the multiple jeopardy hypothesis." Abstracts from the Academy of Health Services Research Health Policy Meetings, 2002, 19: 32, Johns Hopkins Bloomberg School of Public Health.

4. Strine, T. W., D. Chapman, R. Kobau, L. Balluz and A. Mokdad. 2004. "Depression, anxiety and physical impairments and quality of life in the U.S. non-institutionalized population." *Psychiatric Services* 55: 1408-1413.

5. Okoro, C., T. Strine, L. McGuire, L. Balluz and A. Mokdad. 2007. "Employment status and frequent mental distress among adults with disabilities." *Occupational Medicine*, Volume 57, Number 3, May 2007, Oxford University Press.

6. Chapman, D., G. Perry and T. W. Strine. 2005. "The vital link between chronic disease and depressive disorders." *Preventing Chronic Disease* [serial online], January 2005 (URL: http://www.cdc.gov/pcd/issues/2005/jan/04_0066.htm).

7. Ahluwahlia, I. B., K. Mack and A. Mokdad. 2004. "Mental and physical distress and high-risk behaviors among reproductive-age women." *Obstetrics and Gynecology* 104: 477-483.

8. Feldman, J. M., M. Siddique, E. Morales, B. Kaminski, S. E. Lu and P. Lehrer. 2005. "Psychiatric disorders among high-risk inner-city patients." *Psychosomatic Medicine* 67: 989-006.

9. Colton, C. and R. Manderscheid. 2006. "Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states." *Preventing Chronic Disease* (April 2006); 3(2):A42.

10. Kroenke, K., T. W. Strine, R. Spitzer, J. Williams, J. Berry and A. Mokdad. 2008. "The PHQ-8 as a measure of current depression in the general population." *Journal of Affective Disorders* (2008) 10.1016/j.jad.2008.06.026.

11. Aldworth, J., J. Chromy, M. Foster, D. Heller and S. Novak. 2005. *2004 National Survey on Drug Use and Health - Serious Psychological Distress Report,* Substance Abuse and Mental Health Services Administration. Prepared by RTI International, Research Triangle Park, North Carolina.

12. Osby, U., L. Brandt, N. Correia, A. Ekborn and P. Sparen. 2001. "Excess mortality in bipolar and unipolar disorders in Sweden." *Archives of General Psychiatry* 58 (9):844-850.

13. Wang, P., P. Berglund and R. Kessler. 2000. "Recent care of common mental disorders in the United States: Prevalence and conformance with evidence-based recommendations." *Journal of General Internal Medicine* 15: 284-292.

14. Kessler, R., P. Barker, L. J. Colpe, J. Epstein, J. Gfroerer, E. Hiripi, M. J. Howes, S. T. Normand, R. Manderscheid, E. Walters and A. Zaslavsky. 2003. "Screening for serious mental illness in the general population." *Archives of General Psychiatry* 60: 184-189.

15. Dhingra, S. and T. Strine, "Provisional mental illness and stigma module analysis, 2007: Serious Psychological Distress." Presentation at the 2008 Behavioral Risk Factor Surveillance System Conference (March 15-19, 2008), Orlando, Florida.

16. *Measuring Healthy Days*, Centers for Disease Control and Prevention monograph, Atlanta, Georgia: November 2000 (URL: http://www.cdc.gov/hrqol/pdfs/mhd.pdf).

17. Dickerson, F. B., S. W. McNary, C. H. Brown, J. Kreyenbuhl, R. W. Goldberg, and L. Dixon. 2003. "Somatic healthcare utilization among adults with serious mental illness who are receiving community psychiatric services." *Medical Care* 41: 560–570.

18. Felker, B., J. J. Yazel, and D. Short. 1996. "Mortality and medical comorbidity among psychiatric patients: A review." *Psychiatric Services* 47:1356– 1363.

19. Osborn, D. P. J. 2001. "The poor physical health of people with mental illness." *Western Journal of Medicine* 175: 329–332.

20. World Health Organization. 2007. *Integrating Mental Health Services into Primary Health Care.* (URL: http://www.who.int/mental_health/policy/services/en/index.html; Mental Health Policy, Planning and Service Development Information, Sheet 3.)

21. Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services. 2005. *Transforming Mental Health Care in America*. *Federal Action Agenda: First Steps*. DHHS Pub. No. SMA-05-4060. Rockville, Maryland.

22. *Wisconsin Medical Journal*, 2004, Volume 103, No. 6 (entire issue).

23. Strine, T. W., A. H. Mokdad, L. S. Balluz, J. T. Berry, O. Gonzalez, R. Crider, and K. Kroenke. 2008. “Depression and anxiety in the United States: Findings From the 2006 Behavioral Risk Factor Surveillance System.” *Psychiatric Services* 59: 1383-1390.

24. Salvail, F. R., and J. M. Smith. 2007. *Prevalence of Anxiety and Depression among Hawaii’s Adults Derived from the HBRFSS Data 2006*. Department of Health, State of Hawaii.

25. Bazelon Center for Mental Health Law. 2004. *Get It Together: How to Integrate Physical and Mental Health Care for People with Serious Mental Disorders.* June 2004.

26. Pincus, H.A. 2003. "The future of behavioral health and primary care: Drowning in the mainstream or left on the bank?" *Psychosomatics* 44: 1-11.

27. Brooks, A. J., and P. E. Penn. 2003. "Comparing treatments for dual diagnosis: Twelve-step and self-management and recovery training." *American Journal of Drug and Alcohol Abuse*, 29:59–383.

28. Pratt, L. A., A. N. Dey and A. J. Cohen. 2007. "Characteristics of adults with serious psychological distress as measured by the K-6 Scale: United States, 2001-2004." *Advance Data from Vital and Health Statistics*, Publication Number 382. National Center for Health Statistics, U.S. Department of Health and Human Services.

29. Butler, M., R. L. Kane, D. McAlpine, R. G. Kathol, S. S. Fu, H. Hagedorn, T. J. Wilt. 2008. *Integration of Mental Health/Substance Abuse and Primary Care*, No. 173. Prepared by the Minnesota Evidence-Based Practice Center under Contract No. 290-02-0009, AHRQ Publication No. 09- E003. Rockville, Maryland. Agency for Healthcare Research and Quality.

30. McEvoy J. P. 2007. “The costs of schizophrenia.” *Journal of Clin. Psychiatry, Supp.* 14:4-7.

31. Druss, B. G., R. M. Rohrbaugh, C. M. Levinson and R. Rosenheck. 2001. "Integrated medical care for patients with serious psychiatric illness: A randomized trial." *Archives of General Psychiatry* 58(9):861-868.

32. Weisner, C., J. Mertens, S. Parthasarathy, C. Moore and Y. Lu. 2001. "Integrating primary medical care with addiction treatment: A randomized controlled trial." *Journal of the American Medical Association* 286 (14):1715-1723.

33. Stewart, W. F., J. A. Ricci, E. Chee, S. R. Hahn and D. Morganstein. 2003. "The cost of lost productive work time among U.S. workers with depression." *Journal of the American Medical Association* 289(23):3135-3144.

34. Llorente, M. D. and V. Urrutia. 2006. "Diabetes, Psychiatric Disorders and the Metabolic Effects of Antipsychotic Medications." *Clinical Diabetes* 24: 18-24. American Diabetes Association, Inc.

Appendix A
BRFS variables in this report: Number of cases (n), weighted percentages, and confidence intervals

	2006			2007		
	%	±	n	%	±	n
Total			4,831			5,021
Male	49%	1%	1,960	49%	2%	1,925
Female	51%	1%	2,871	51%	2%	3,096
Ages 18-39	39%	2%	1,228	38%	2%	1,200
Ages 40-54	30%	1%	1,557	30%	2%	1,584
Ages 55+	31%	2%	2,003	32%	1%	2,188
African American	4%	1%	411	4%	1%	588
White	90%	1%	4,151	90%	1%	4,111
< High School	7%	1%	379	7%	1%	398
High School	33%	1%	1,642	33%	2%	1,720
Some College	29%	2%	1,430	29%	2%	1,391
College Degree/Higher	31%	1%	1,373	31%	2%	1,488
<$25,000	20%	1%	1,054	20%	1%	1,204
$25,000-$49,999	36%	1%	1,581	35%	2%	1,660
$50,000+	44%	2%	1,598	45%	2%	1,639
Married	63%	2%	2,717	63%	2%	2,780
Widowed	7%	1%	562	6%	1%	566
Divorced/Separated	7%	1%	598	9%	1%	742
Never Married	19%	2%	750	20%	2%	825
Member of Unmarried Couple	3%	1%	104	2%	0.5%	78
Current Depression	7%	1%	324	--	--	--
No Depression	93%	1%	3,904	--	--	--
SPD	--	--	--	3%	1%	155
No SPD	--	--	--	97%	1%	4,383
Obese	27%	2%	1,304	25%	2%	1,370
Physically Inactive	19%	1%	1,062	20%	1%	1,203
Current Smoking	21%	1%	993	19%	2%	991
Diabetes	6%	1%	417	6%	1%	473
Cardiovascular Disease	7%	1%	449	7%	1%	445
Asthma	9%	1%	437	9%	1%	481
Disability	17%	1%	1,038	16%	1%	995
Unable to Work	3%	1%	220	3%	0.5%	259
Use Special Equipment	6%	1%	390	6%	1%	414
Fair or Poor Health	12%	1%	724	12%	1%	841

Source: Wisconsin Behavioral Risk Factor Survey, Bureau of Health Information and Policy, Division of Public Health, Wisconsin Department of Health Services.

Note: Approximately 10% of respondents do not report their income; the denominator for income is all cases with data. Education, income and race may not reflect true population proportions, as Wisconsin BRFS data are not currently weighted for these characteristics. (They are weighted for age and sex.)

Appendix B
Technical Notes and BRFS Questions for Non-Mental-Health Items

Adjusted Odds Ratios

Adjusted odds ratios used in the report were calculated using the SAS Survey logistic regression procedure. Logistic regression is a multivariate technique for use with categorical outcome variables. It allows significance testing of relationships between variables of interest for an identified group versus a reference group while holding possible confounding variables constant. In this report, the reference group for the adjusted odds ratios is "No SPD" for the odds ratios testing variables by SPD status and "No Depression" for the odds ratios by depression status.

All outcome variables in the regressions were coded in binary form as 0 and 1, with 1 denoting the presence of a health condition (e.g., cardiovascular disease) and 0 denoting its absence. Education and age were used in ordinal form, with six ordered categories for education and three ordered categories for age. Income was coded 0 and 1, with 1 denoting low income, defined as less than $25,000 per year. Marital status was coded 0 and 1, with 0 denoting married and 1 denoting not married. Sex was coded 1 for male and 0 for female, and race/ethnicity was coded 1 for African American and 0 for white. Race/ethnicity was restricted to African American and white due to insufficient numbers of cases among other groups.

BRFS Questions – Non-Mental-Health Items Used in the Report

Asthma (current):
1. Have you ever been told by a doctor, nurse or other health professional that you had asthma?
2. Do you still have asthma?

Cardiovascular Disease:
Has a doctor, nurse or other health professional ever told you that you had any of the following:
… a heart attack, also called a myocardial infarction?
… angina or coronary heart disease?
… a stroke?

Diabetes:
Have you ever been told by a doctor that you have diabetes? [If yes and respondent is female: Was this only when you were pregnant?]

Disability:
Are you limited in any activities because of physical, mental or emotional problems?

General Health Status:
Would you say that in general your health is excellent, very good, good, fair or poor?

Education Level:
What is the highest grade or year of school you completed? Never attended school or only kindergarten, grades 1 through 8, grades 9 through 12, grade 12 or GED, college or technical school 1 year to 3 years, college 4 years or more (college graduate).

Employment:
Are you currently: employed for wages, self-employed, out of work for more than 1 year, out of work for less than 1 year, a homemaker, a student, retired, or unable to work?

Health Care Cost:
Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?

Health Care Coverage:
Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?

Income:
Is your annual household income from all sources: less than $10,000; $10,000 to < $15,000; $15,000 to <$20,000; $20,000 to <$25,000; $25,000 to <$35,000; $35,000 to <$50,000; $50,000 to <$75,000; $75,000 or more?

Life Satisfaction:
In general, how satisfied are you with your life – very satisfied, satisfied, dissatisfied, or very dissatisfied?

Marital Status:
Are you: married, divorced, widowed, separated, never married, or a member of an unmarried couple?

Obesity:
Body Mass Index ≥ 30, calculated by CDC using height and weight reported in response to the following questions:
1. About how much do you weigh without shoes?
2. About how tall are you without shoes?

Personal Health Care Provider:
Do you have one person you think of as your personal doctor or health care provider?
[If "no": Is there more than one or is there no person you think of as your personal doctor or health care provider?]

Physical Exercise (Inactivity)
1. During the past month, other than your regular job, did you participate in any physical activities or exercise such as running, calisthenics, golf, gardening, or walking for exercise?

Race/ethnicity:
1. Are you Hispanic or Latino?
2. Which one or more of the following would you say is your race – white, black or African American, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native?

Smoking:
1. Have you smoked at least 100 cigarettes in your entire life?
2. Do you now smoke cigarettes every day, some days, or not at all?

Social/Emotional Support:
How often do you get the social and emotional support you need – always, usually, sometimes, rarely, or never?

Use of Special Equipment:
Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed or a special telephone? [Include occasional use or use in certain circumstances.]

P-00066 (April 2009)

Linking Mental and Physical Health: Results from the Wisconsin Behavioral Risk Factor Survey

Wisconsin Department of Health Services
P-00066 (04/09)