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Implications of two-stage depression screening for identifying persons with thoughts of self-harm☆

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Abstract

Objective—Persons with thoughts of self-harm may need evaluation for suicide risk. We examine the prevalence of thoughts of self-harm and whether persons with thoughts of self-harm are identified when two-stage depression screening is used.

Methods—Data are from the 2005–2010 National Health and Nutrition Examination Surveys. Persons responding positively to question nine of the Patient Health Questionnaire-9 (PHQ-9) are identified as having thoughts of self-harm. We compare two depression cutoff scores for the Patient Health Questionnaire-2 (PHQ-2) to see what percentage of persons with thoughts of self-harm would be identified as needing further screening with the PHQ-9.

Results—The prevalence of thoughts of self-harm was 3.5%. Persons 12–17 years old, poor and reporting fair or poor health were more likely to report thoughts of self-harm. A cutoff score of three on the PHQ-2 identified 49% of persons with thoughts of self-harm for further screening with the PHQ-9. A cut point of two increased the proportion of persons with thoughts of self-harm continuing for further screening to 76%.

Conclusions—Using a lower cutoff score, two, the PHQ-2 captures more persons with thoughts of self-harm. One quarter of persons with self-harm thoughts may not be identified for further screening when two-stage screening is used.

Keywords

Depression; Self-harm; Screening; PHQ-9; NHANES

1. Introduction

Suicide is the 10th leading cause of death for all ages [1]. Suicidal ideation, plans and attempts are strongly associated with an increased risk of completed suicide. Nonsuicidal

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self-injury (NSSI) and passive death wishes are also associated with suicidal behavior [2–6]. In addition, passive death wishes have been found to be related to all-cause mortality among older patients [7].

Thoughts of self-harm are indicative of emotional distress and are strongly associated with mental illnesses, especially major depression [8–11]. Many authors have recommended that persons with thoughts of self-harm be evaluated to assess suicide risk and need for referral to mental health services [3,6,12,13].

The Patient Health Questionnaire-9 (PHQ-9) is a nine-item instrument commonly used to screen for depression in primary care settings [14]. It is modeled after the nine Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for major depression [15]. The last criterion in the DSM-IV is thoughts of death wishes or thoughts of hurting yourself in some way. Positive answers to this question could mean that the respondent has passive death wishes, thinks of or engages in NSSI or engages in suicidal behavior, which includes suicidal ideation, plans or attempts. The term *thoughts of self-harm* as used in this report includes all of these.

Almost half of persons who commit suicide, especially older individuals, have seen their primary care provider in the month before the suicide [16], providing a potential opportunity for their identification. Studies have used the ninth question of the PHQ-9, in the context of using the full instrument to screen for depression, to identify suicidal thoughts [17,18].

Most studies that describe the characteristics of persons who endorse the ninth question of the PHQ-9 describe special populations: persons with cancer [18] or congestive heart failure [19], older recipients of home delivered meals [20] or primary care patients already identified as having psychiatric illness [21]. The National Health and Nutrition Examination Survey (NHANES) provides the opportunity to describe persons in the general population who answer the ninth question of the PHQ-9 positively.

Some primary care practices that screen for depression use a two-stage screening process [22–24]. The Patient Health Questionnaire-2 (PHQ-2) [25], consisting of the first two questions on the PHQ-9 that assess depressed mood and little interest or pleasure in doing things, is given first, and persons who screen positive are then given the remaining seven questions. As the PHQ-2 does not include the question on self-harm, it is important to know what proportion of people with thoughts of self-harm would screen positive for depression on the PHQ-2, then go on for further screening with the remaining seven questions of the PHQ-9 and, thereby, be identified as having thoughts of self-harm. Of particular interest are persons who have not seen a mental health professional in the past year. Such persons would be much less likely to have been previously assessed for thoughts of self-harm than would persons who had seen a mental health professional at least once. This study examines the prevalence of thoughts of self-harm in different population subgroups and the implications of two-stage screening for depression for identifying persons with thoughts of self-harm both in the total population and among those who have not seen a mental health professional in the past year.

2. Methods

2.1. Data source

The data used in this study come from the NHANES, an ongoing series of cross-sectional examination surveys designed to provide nationally representative estimates of the US civilian noninstitutionalized population. Briefly, the NHANES sample is selected using a complex, stratified, multistage design, and survey participants are interviewed in the home and then undergo a standardized physical examination in a mobile examination center (MEC). Specific subgroups of the population, including adolescents, adults over 60 years of age, African-Americans and Hispanics, are oversampled in some years. Data from multiple 2-year cycles are combined for reliable estimates. The NHANES protocol was approved by the National Center for Health Statistics Ethics Review Board. Written consent was obtained for persons 18 and older and written informed assent for youths 12–17 years. Examined persons received remuneration for their participation in the survey depending on their age and examination content. Further details of the design and content of the NHANES have been published elsewhere [26]. This report is based on data from 2005 to 2010.

Depression was assessed using the PHQ-9, a screening instrument that asks about the frequency of depression symptoms over the last 2 weeks [14]. For each question, response categories “not at all,” “several days,” “more than half the days” and “nearly every day” were given a score of 0–3. The PHQ-9 was asked during the private interview in the MEC. Questions were administered in English or Spanish; proxy interviews and interpreters were not permitted.

A total of 28,860 persons 12 and older were selected to participate in NHANES; 21,997 (76.2%) completed the household interview, of whom 96.7% also completed the health examination component. Analyses for this study included 19,143 persons (66.3%) who had no missing data for questions 1, 2 and 9 of the PHQ-9.

2.2. Measurement

Thoughts of self-harm were measured using the ninth question of the PHQ-9: “Over the last two weeks, how often have you been bothered by the following problems: Thoughts that you would be better off dead or of hurting yourself in some way?” Any score greater than zero (not at all) was considered a positive answer to the question on self-harm [14]. Any respondent answering positively to the question on self-harm was referred to the examining physician at the MEC for evaluation.

The PHQ-2 score has a range of 0–6. The depression cutoff score for the PHQ-2 suggested by Kroenke et al. is three [25]. We examine the cut point of three and a lower cut point of two, as has been done in other studies [27–30].

We examined the prevalence of thoughts of self-harm by demographic variables including age group (12–17, 18–39, 40–59 and 60 or more years), gender, race/ethnicity (Mexican American, non-Hispanic Black, non-Hispanic White and other), poverty status (less than 100% of the income to poverty ratio, 100% to less than 200% of the income to poverty ratio and greater than or equal to 200% of the income to poverty ratio), marital status (married or

living with partner, widowed/separated/divorced and never married) and education (less than high school, high school diploma and more than high school). We also looked at the association of self-harm thoughts with self-rated health and contact with a mental health professional. Marital status and education were examined only in the subgroup ages 20 and over. Contact with a mental health professional was assessed using the following question: "During the past 12 months, have you seen or talked to a mental health professional such as a psychologist, psychiatrist, psychiatric nurse, or clinical social worker about your health?" Self-rated health was assessed in the MEC on the same day as the PHQ-9 was given. Other covariates were assessed as part of the household interview.

2.3. Data analysis

NHANES sample examination weights, which account for the differential probabilities of selection, nonresponse and noncoverage were used for all analyses. Standard errors of the percentages were estimated using Taylor series linearization, a method that incorporates the sample design and weights. Data analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC) and SUDAAN version 9.0 (RTI, Research Triangle Park, NC).

Overall differences between groups were evaluated using the chisquare statistic. If the chi-square test was significant, differences between subgroups were evaluated using the *t* statistic. Logistic regression models were used to examine the crude and adjusted odds ratios (ORs) for thoughts of self-harm in the different groups.

3. Results

A total of 3.5% of the noninstitutionalized population ages 12 and over reported thoughts of self-harm (Table 1). Approximately 5.7% of persons ages 12–17 years old reported thoughts of self-harm, more than any other age group. Only 2.2% of persons 60 years and older reported thoughts of self-harm. Nine percent of persons who rated their health as fair or poor reported thoughts of self-harm. Persons living at or near poverty had higher rates of thoughts of self-harm than persons living at 200% or above of the poverty income ratio. Among persons ages 20 and over, persons who were married or living with a partner were less likely to have thoughts of self-harm than persons who were not married. Persons with less than a high school education were more likely to have thoughts of self-harm than others.

A total of 8% of noninstitutionalized Americans reported having seen a mental health professional in the past year. Among persons with thoughts of self-harm, one quarter reported any contact with a mental health professional in the past year. Mexican Americans were much less likely than all other race/ethnic groups to have seen a mental health professional (data not shown). The rate of thoughts of self-harm in the population without any contact with a mental health professional in the past year was 2.8% (Table 1).

In the model adjusting for all covariates except marital status and education, sex was not significantly associated with thoughts of self-harm (Table 1). Although crude ORs showed that non-Hispanic White persons were less likely than any other race/ethnic group to report thoughts of self-harm, these differences disappeared in the adjusted model. Persons living at or near the poverty level had more than twice the odds of thoughts of self-harm. Persons

who rated their health as fair, poor or good had higher odds of thoughts of self-harm than persons reporting very good or excellent health. Among persons with thoughts of self-harm, 49% screened positive for depression based on the PHQ-2 at the recommended cut point of three and would go on for further screening with the remaining seven questions of the PHQ-9. When a lower cut point of two was used to indicate PHQ-2 depression, 76% of persons with thoughts of self-harm screened positive and would be administered the full PHQ-9 (Table 2). Using the cut point of two, only 68% of persons ages 12–17 or over 60 with thoughts of self-harm screened positive while nearly 80% of persons ages 18–59 screened positive.

Among persons with thoughts of self-harm who reported no contact with a mental health professional, 46% screened positive on the PHQ-2 at the cut point of three, and 73% screened positive at the cut point of two (Table 3). In a trend similar to that observed in the total population, 67% of persons ages 12–17 and 60 and over screened positive at the cut point of two compared to 76% of persons ages 18–59.

The percentage of persons in the total population who scored positive for depression based on the PHQ-2 increased from 7.2% to 16.7% when the cut point went from three to two (data not shown). Among persons without thoughts of self-harm, the percentage scoring positive on the PHQ-2 was 5.7% and 14.6% with cutoffs of three and two, respectively (Table 2).

4. Discussion

This study shows that thoughts of self-harm are highest among 12–17 year olds, of whom 5.7% had thoughts of self-harm in the past 2 weeks. In the 2011 Youth Risk Behavior Survey (YRBS), 15.8% of high school students reported seriously considering suicide over the last year [31]. The different reference period (2 weeks vs. 1 year) and, perhaps, the context (the YRBS is an anonymous pencil-and-paper survey, while, in the NHANES, the PHQ-9 is administered by an interviewer) may explain the difference in rates, but both surveys demonstrate that thoughts of self-harm are of real concern in this population. Although we found no difference by gender in the rate of thoughts of self-harm, other studies have found higher rates of suicidal ideation and suicide attempts in females [32], and rates of completed suicide are higher in men [1].

In our study, fair or poor self-rated health was strongly related to thoughts of self-harm, and even persons with good self-rated health had twice the odds of thoughts of self-harm as persons reporting very good or excellent health. A study by Benjamins et al. demonstrated a relationship between poor self-rated health and completed suicide, but fair or good self-rated health was not related to completed suicide [33].

Our results differed from those of Corson et al. who also examined the percentage of persons with thoughts of self-harm who were identified by the PHQ-2 at the cut points of two and three. They found that a much higher percentage was identified, 73.8% at the cut point of three and 92.5% at the cut point of two [29]. The difference may be, at least in part, explained by the higher prevalence of depression among the Veterans Administration (VA)

population than among the civilian, noninstitutionalized population. Another study, based in a mental health services program for “safety-net” populations, found an even higher percentage, 90.1% of persons with thoughts of self-harm were identified by a PHQ-2 cutoff of three. Everyone in this population, however, had been identified as having psychiatric illness, and the prevalence of thoughts of self-harm was 45% [21].

After stratifying the results by age, we found that the PHQ-2 performed slightly worse at identifying persons with thoughts of self-harm in persons ages 12–17 or 60 and over than it did in adults ages 18–59. Interestingly, Kroenke et al. found that the PHQ-2 did slightly worse at identifying persons with major depression among persons 60 years and over than among persons 18–59 years [25]. A version of the Patient Health Questionnaire designed specifically for adolescents [34] includes irritability in the first question along with depressed, down or hopeless mood because irritability is sometimes a symptom of depression among adolescents [15]. It would be interesting to know if the PHQ-2 would have identified a larger percentage of 12–17 year olds with thoughts of self-harm in the present study if irritability had been included in the first question.

Studies examining the validity of the ninth question of the PHQ-9 generally focused on the percentage of people endorsing the question who were experiencing active suicidal ideation. We were unable to locate a study estimating the size of this subgroup in the general population. One study found that one third of cancer patients, a higher risk population, who endorsed the PHQ-9 self-harm question reported suicidal ideation in the subsequent interview [35]. Corson et al. also found that one third of VA patients, another high-risk group, who endorsed the self-harm question of the PHQ-9 reported active suicidal ideation in follow-up interviewing [29]. In a study of coronary artery disease patients, 20% of those who answered Question 9 positively reported thoughts about committing suicide [36]. A larger proportion of the persons endorsing Question 9 may be experiencing passive death wishes. This group is also important to identify as they too may benefit from mental health services [5,7,8,37].

Although many studies have examined the usefulness of Question 9 of the PHQ-9 for screening for suicidal ideation [18–20], it is important to note that the US Preventive Services Task Force (USPSTF) concluded that there was insufficient evidence to recommend either for or against screening for suicide risk in the general population [38]. The USPSTF does, however, recommend screening for depression for both adolescents [39] and adults [40] when appropriate follow-up supports are in place. Such depression screening often includes an item regarding suicidal ideation.

4.1. Limitations

This study has some limitations. The self-harm question from the PHQ-9 does not discriminate between passive death wishes, NSSI or suicidal ideation or attempts. In addition, because NHANES is a general population survey, rates of depression and thoughts of self-harm may be lower than in a primary care setting. It is unclear how the context in which the question is asked, by an unknown interviewer versus by the person's own doctor, would affect the answer. The question about a mental health professional asks only about

seeing or talking to a mental health professional within the past year with no information on whether or not the respondent is or was actually in treatment.

5. Conclusions

In order to refer patients with thoughts of self-harm to appropriate mental health care, some physicians may choose to screen for thoughts of self-harm and should be aware of the effect of two-stage depression screening on identifying persons with thoughts of self-harm. In a two-stage screening process, using a cut point of three for the PHQ-2 results in missing half the persons with thoughts of self-harm. Lowering the cut point for the PHQ-2 to two reduces the specificity of the screening but captures 50% more persons who will respond positively to the PHQ-9 question on thoughts of self-harm in the second stage of screening. In two-stage depression screening, even with a cut point of two, one quarter of persons with thoughts of self-harm may not be identified. One-stage screening with the full PHQ-9 offers the opportunity to ask all patients directly about thoughts of self-harm.

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Table 1

Prevalence of and crude and adjusted ORs for thoughts of self-harm by baseline characteristics in the noninstitutionalized population ages 12 and over: NHANES 2005–2010

Characteristics	Prevalence of thoughts of self-harm % (se)	Crude OR for thoughts of self-harm OR (95% CI)	Adjusted[e] OR for thoughts of self-harm OR (95% CI)
Total with thoughts of self-harm (n = 827)	3.5 (0.1)		
Age			
12– 17	5.7 (0.5)	1.0	1.0
18– 39	3.0 (0.2)	0.5 (0.4– 0.7)	0.5 (0.4– 0.6)
40– 59	4.0 (0.4)	0.7 (0.5– 1.0)	0.6 (0.4– 0.9)
60+	2.3 (0.2)	0.4 (0.3– 0.5)	0.4 (0.3– 0.5)
Male	3.1 (0.2)	0.8 (0.6– 1.0)	0.9 (0.7– 1.1)
Female	3.8 (0.2)	1.0	1.0
Race/Ethnicity			
Mexican American	5.0(0.5)	1.8 (1.3– 2.3)	1.1 (0.8– 1.4)
Non-Hispanic Black	4.1 (0.3)	1.4 (1.2– 1.8)	1.0 (0.8– 1.2)
Other[a]	5.4 (0.5)	1.9 (1.4– 2.6)	1.4 (1.0– 1.9)
Non-Hispanic White	2.9 (0.2)	1.0	1.0
Poverty[b,c]			
< 100% poverty	7.4 (0.6)	3.9 (3.1– 4.8)	2.4 (1.9– 3.1)
100– < 200% poverty	5.2 (0.4)	2.7 (2.1– 3.4)	2.1 (1.5– 2.8)
> = 200% poverty	2.0 (0.1)	1.0	1.0
Self-rated health			
Fair/Poor	9.0 (0.5)	6.1 (4.7– 7.9)	4.7 (3.6– 6.1)
Good	3.4 (0.3)	2.1 (1.6– 2.9)	1.9 (1.4– 2.7)
Very good/excellent	1.6 (0.2)	1.0	1.0
Contact with mental health professional in past year			
Yes	11.1 (0.9)	4.4 (3.4– 5.5)	3.6 (2.8– 4.6)
No	2.8 (0.2)	1.0	1.0
Marital status[d]			
Married/Living with partner	2.4 (0.2)	1.0	
Never married	4.3 (0.4)	1.8 (1.4– 2.3)	
Separated/Divorced/Widowed	4.9 (0.4)	2.1 (1.7– 2.5)	
Education[d]			
Less than high school	5.5 (0.4)	2.4 (1.8– 3.1)	
High school or GED	3.2 (0.4)	1.4 (1.0– 1.8)	
More than high school	2.4 (0.2)	1.0	

CI=confidence interval.

[a]Other race/ethnicity includes other Hispanics.

[b]Poverty status was defined using the poverty income ratio, an index calculated by dividing the family income by a poverty threshold based on the size of the family.

[c] Estimates by poverty status were based on 17,764 persons who also reported their family income.

[d] Marital status and education are presented only for persons aged 20 and over.

[e] Model adjusts for all variables in the table except marital status and education.

Table 2

Percentage of persons with and without thoughts of self-harm who score positive on the PHQ-2 at two different cut points: NHANES 2005–2010

Characteristics	Thoughts of self-harm % (se) *n* = 827	No thoughts of self-harm % (se) *n* = 18316
Total population		
PHQ-2 cut point of 3	48.7 (2.5)	5.7 (0.3)
PHQ-2 cut point of 2	75.9 (2.2)	14.6 (0.4)
Ages 12– 17		
PHQ-2 cut point of 3	36.3 (5.1)	4.7 (0.5)
PHQ-2 cut point of 2	68.1 (3.4)	13.6 (0.8)
Ages 18– 39		
PHQ-2 cut point of 3	49.7 (4.3)	5.4 (0.3)
PHQ-2 cut point of 2	78.8 (3.5)	14.5 (0.6)
Ages 40– 59		
PHQ-2 cut point of 3	56.3 (4.2)	6.4 (0.5)
PHQ-2 cut point of 2	80.0 (3.5)	16.1 (0.8)
Ages 60+		
PHQ-2 cut point of 3	41.1 (5.2)	5.6 (0.4)
PHQ-2 cut point of 2	67.8 (4.9)	12.8 (0.6)

Table 3

Percentage of persons who did not see or talk with a mental health professional in the past year, with and without thoughts of self-harm, who score positive on the PHQ-2 at two different cut points: NHANES 2005–2010

Characteristics	Thoughts of self-harm % (se) *n* = 651	No thoughts of self-harm % (se) *n* = 17071
Total population		
PHQ-2 cut point of 3	45.6 (2.6)	4.9 (0.2)
PHQ-2 cut point of 2	73.2 (2.5)	13.1 (0.4)
Ages 12– 17		
PHQ-2 cut point of 3	37.5 (5.4)	4.1 (0.5)
PHQ-2 cut point of 2	66.7 (4.0)	12.7 (0.8)
Ages 18– 39		
PHQ-2 cut point of 3	48.8 (4.2)	4.5 (0.3)
PHQ-2 cut point of 2	76.2 (3.7)	12.7 (0.6)
Ages 40– 59		
PHQ-2 cut point of 3	50.1 (4.6)	5.3 (0.5)
PHQ-2 cut point of 2	76.5 (4.7)	14.1 (0.8)
Ages 60+		
PHQ-2 cut point of 3	38.5 (5.4)	5.3 (0.4)
PHQ-2 cut point of 2	67.2 (4.9)	12.4 (0.6)