Effect of depression on health behavior among myocardial infarction survivors in the United States

Brooke Nicholson, PharmD1; Shawn Morse, PharmD2; Terra Lundgren, PharmD3; Nina Vadiei, PharmD, BCPP4; Sandipan Bhattacharjee, BPharm, MS, PhD5

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Abstract

Introduction: The purpose of this study was to evaluate the effect of depression on health behavior among myocardial infarction (MI) survivors.

Methods: This retrospective, cross-sectional study used publicly available 2015 Behavioral Risk Factor Surveillance System (BRFSS) data. Our study sample includes adults aged 50 years or older who completed the 2015 BRFSS survey and reported having MI. The BRFSS participants with a yes response to the question, Has a doctor, nurse, or other health care professional ever told you that you had a heart attack, also called a myocardial infarction? were identified as MI survivors. The presence or absence of depression among MI survivors was identified using a similar question. Health behaviors, the dependent variable of this study, included physical activity, smoking status, alcohol use, body mass index, last flu immunization, last physical checkup, last blood cholesterol check, heavy drinking, and vegetable and fruit consumption. Univariate (χ² tests) and multivariable (binomial logistic regression) analyses were used to assess the differences in health behaviors between MI survivors with or without depression.

Results: Our final study sample consists of 20,483 older adults with MI among whom 5,343 (26.19%) reported having depression. Multivariable analyses reveal MI survivors with depression are more overweight, have less physical activity, and have higher likelihood of smoking but less odds of consuming alcohol compared to MI survivors without depression.

Discussion: In this nationally representative sample of adults aged over 50 years in the United States, MI survivors with depression exhibited poorer health behaviors compared to those without depression.

Keywords: myocardial infarction, depression, health behavior

Introduction

According to the Centers for Disease Control and Prevention (CDC) estimates, myocardial infarction (MI) is one of the major causes of morbidity and mortality with about 735,000 Americans experiencing an MI each year, among which nearly 210,000 occur among those who had a previous MI. The American Heart Association has identified specific modifiable risk factors for secondary
MI prevention. Mitigating these risks include lowering consumption of cigarettes and alcohol, improving nutrition, and increasing physical activity. Managing aggressive risk factors has been shown to increase survival, minimize recurrent events, and improve quality of life in MI survivors.

According to a recent meta-analysis, the prevalence of depression among MI survivors ranges from 9.17% to 65.88% with a pooled prevalence of 28.70%, making it one of the most common psychiatric comorbidities among MI survivors. A meta-analysis of 29 studies including 16,889 MI survivors observed that there was an increased risk of all-cause mortality, cardiac mortality, and cardiac events with depression among MI survivors. Although other studies have demonstrated that depression is an independent risk factor for increased mortality at 6 months and 18 months post-MI, many health behaviors are detrimental in both diseases. Given the high prevalence of depression and its wide array of negative outcomes among MI survivors, it is critical to examine the effect of depression on health behavior of MI survivors to prevent secondary MI as well as reduce morbidity and mortality in this vulnerable population. Although it is well documented that comorbid depression has been associated with poorer health behaviors among individuals with other chronic conditions, to the best of our knowledge there is no study examining the effect of depression on health behavior of MI survivors to prevent secondary MI as well as reduce morbidity and mortality in this vulnerable population.

Method

Study Design

A retrospective, cross-sectional study design was used.

Data Source

The Behavioral Risk Factor Surveillance System (BRFSS) is a nationwide, health-related telephone survey that conducts approximately 500,000 interviews yearly, making the BRFSS survey the largest health survey globally. The BRFSS collects a wide range of data from US residents that includes health-related risk behaviors, chronic health conditions, use of preventive services, self-perceived health status, and access to health services as well as sociodemographic and environmental factors. A publicly available BRFSS data set was used for this study. The response rates of BRFSS 2015 were 48.2% and 47.2% for the landline and cell phone surveys, respectively. Existing studies have demonstrated high reliability and validity of BRFSS data.

Study Sample

The total number of respondents in the 2015 BFRSS database consists of 441,456 individuals. Our final study sample consists of older adults aged 50 years or older who participated and completed the 2015 BRFSS survey and reported having MI. The University of Arizona Human Subjects Protection Program Institutional Review Board determined that human subjects review was not required for this study.

The BRFSS participants with a yes response to the question, Has a doctor, nurse, or other health care professional ever told you that you had a heart attack, also called a myocardial infarction? were identified as MI survivors. A similar definition of MI has been used by existing studies using BRFSS data.

Variables Measure

Dependent Variables

Health behaviors, the dependent variables of this study, include (1) physical activity, (2) smoking status, (3) alcohol consumption, (4) body mass index (BMI), (5) flu shot during the past 12 months, (6) last physical checkup, (7) last blood cholesterol check, (8) heavy drinker, (9) vegetable consumption, and (10) fruit consumption. Meeting the recommended physical activity was defined as greater than 150 minutes of moderate-to-vigorous physical activity per week. Smoking status was categorized as current smoker or nonsmoker. Alcohol consumption category of yes included MI survivors who reported having at least 1 drink of alcohol in the past 30 days. The BMI was categorized as normal weight or underweight and overweight or obese. The MI survivors responded yes or no to whether they received a flu shot during the past 12 months and whether they received their last physical checkup and blood cholesterol check fewer or more than 2 years ago. Heavy alcohol consumption or heavy drinker were defined as adult men having more than 14 drinks per week and adult women having more than 7 drinks per week. Vegetable consumption was considered yes if the respondents reported consuming vegetables 1 or more times per day and no if they consumed vegetables less than 1 time per day. Similarly, fruit consumption of 1 or more times per day or less than 1 time per day was categorized as yes or no, respectively. Further details about these variables can be found in the BRFSS 2015 data documentation.

Independent Variables

Key Independent Variable

Presence or absence of depression is the key independent variable of this study. Presence of depression was
ascertained when a survey participant responded yes to the question, Has a doctor, nurse, or other health care professional ever told you that you have a depressive disorder, including depression, major depression, dysthymia, or minor depression? Existing studies using BRFSS data have used a similar definition to identify the presence of depression.18,19

Other Independent Variables
Other independent variables consist of various health, socioeconomic, and demographic factors. Health factors include concurrent conditions, such as cancer, arthritis, asthma, cardiovascular disease, diabetes, or hypertension. Other health variables include perceived general health, presence of activity limitations, received needed emotional support, level of physical health, level of mental health, and level of functional health. Socioeconomic factors include education, employment, family income, insurance status, and usual source of care. Demographic factors include age, sex, race/ethnicity, marital status, region of the US residence and metropolitan area. Table 1 shows how these other independent variables were categorized in this study.

Statistical Analysis
Chi-square tests were used for univariate analysis, and binomial logistic regression was used for multivariable analyses to assess the differences in health behaviors between MI survivors with or without depression. The final multivariable logistic regression models adjusted for all independent variables of this study. SAS version 9.4 (SAS Institute Inc, Cary, NC) was used to conduct all analyses, and an a priori $\alpha$ of 0.05 was considered to be statistically significant.

Results

Characteristics of MI Survivors
Distribution of the health, socioeconomic, and demographic factors are presented in Table 1. Our final study sample consists of 20,483 adults with MI among whom 5343 (26.19%) reported having depression. Compared to MI survivors without depression, those with depression were typically more often females, younger (50 to 64 years), separated or divorced, unemployed, without higher education, and with a lower family income. Unsurprisingly, depressed MI survivors showed significantly more health problems (arthritis, asthma, diabetes, hypertension, but not cancer) compared to MI survivors without depression. Moreover, MI survivors reported higher activity limitations and poorer physical and mental health status as well as lower functional health status in comparison to MI survivors without depression.

Health Behaviors of MI Survivors Compared to Non-MI Controls
Health behaviors of depressed MI survivors and nondepressed MI controls are exhibited in Table 2. The MI survivors with depression were more likely to be obese (42.62% vs 35.50%; $P < .0001$), have less physical activity (32.16% vs 45.08%; $P < .0001$), are more current smokers (29.49% vs 15.63%; $P < .0001$), and engage in heavy drinking (3.93% vs 3.25%; $P < .0001$) compared to MI survivors without depression. The MI survivors with depression were also less likely to consume the recommended daily amount of fruit (52.28% vs 57.61%; $P < .001$) and vegetables (69.44% vs 74.06%; $P = .0021$) compared to those without depression. However, MI survivors with depression reported less consumption of any drink compared to those without depression (28.20% vs 37.17%, $P < .0001$).

Multivariable Findings of Health Behaviors
Table 3 demonstrates that, after adjusting for all independent variables, MI survivors with depression were more likely to be overweight or obese (adjusted odds ratio [AOR] = 1.39; 95% confidence interval [CI] 1.17, 1.67; $P = .0003$), be smokers (AOR = 1.65; 95% CI 1.34, 2.03; $P < .0001$), and complete less than the weekly recommended amount of physical activity (AOR = 0.76; 95% CI 0.64, 0.89; $P = .0009$). The MI survivors with depression were found to consume less alcohol (AOR = 0.77; 95% CI 0.64, 0.91; $P = .0003$) than those without depression.

Discussion
The findings of our study demonstrate that MI survivors with depression have higher odds of poor health behaviors (increased BMI, less physical activity, and more smoking) compared to MI survivors without depression. Making appropriate interventions related to health behavior patterns is critical in reducing economic burden and reducing disease state–related morbidity and mortality.

The CDC recommends that, for substantial health benefits, adults should do at least 150 minutes a week of moderate-intensity or 75 minutes a week of vigorous-intensity aerobic activity. One of the approaches to include exercise into the regular activities of an MI survivor is utilizing the cardiac rehabilitation services that encompass several different coordinated and multiple interventions (eg, exercise, education, risk modification, and counseling). A systematic review and meta-analysis of 48 randomized controlled trials (total pooled N = 8940) observed that exercise-based cardiac rehabili-
**TABLE 1:** Sample description of myocardial infarction (MI) survivors with and without depression*

| Predisposing Factors       | MI With Depression | MI Without Depression | P Value |
|----------------------------|--------------------|-----------------------|---------|
| Age                        |                    |                       | <.0001  |
| 50 to 64                   | 2319               | 3800                  |         |
| 65 and older               | 3024               | 11 340                |         |
| Sex                        |                    |                       | <.0001  |
| Female                     | 2895               | 5940                  |         |
| Male                       | 2448               | 9200                  |         |
| Race/ethnicity             |                    |                       | .0028   |
| White                      | 4177               | 12 544                |         |
| Non-white                  | 1068               | 2329                  |         |
| Marital status             |                    |                       | <.0001  |
| Married                    | 2118               | 7761                  |         |
| Widowed                    | 1353               | 4097                  |         |
| Separated/divorced         | 1510               | 2422                  |         |
| Never married              | 346                | 807                   |         |
| Education                  |                    |                       | <.0001  |
| <High school               | 892                | 1856                  |         |
| High school graduate       | 1787               | 5207                  |         |
| Some college               | 1591               | 4063                  |         |
| College graduate           | 1062               | 3958                  |         |
| Employment status          |                    |                       | <.0001  |
| Employed                   | 618                | 2901                  |         |
| Unemployed                 | 4697               | 12 167                |         |
| Family income, $           |                    |                       | <.0001  |
| <25k                       | 2500               | 4648                  |         |
| 25k to 35k                 | 569                | 1770                  |         |
| 35k to 50k                 | 547                | 2018                  |         |
| 50k to 75k                 | 411                | 1788                  |         |
| >75k                       | 414                | 2214                  |         |
| Missing or unknown         | 902                | 2702                  |         |
| Insurance status           |                    |                       | .1277   |
| Yes                        | 5114               | 14 645                |         |
| No                         | 218                | 457                   |         |
| Usual source of care       |                    |                       | .5455   |
| Yes                        | 5071               | 14 305                |         |
| No                         | 253                | 772                   |         |
| Region of the United States|                    |                       | .1109   |
| Northeast                  | 891                | 2555                  |         |
| Midwest                    | 1415               | 4351                  |         |
| South                      | 1831               | 4990                  |         |
| West                       | 1117               | 3053                  |         |
| Metro area                 |                    |                       | .0043   |
| Yes                        | 2389               | 7311                  |         |
| No                         | 1324               | 3853                  |         |
| Cancer                     |                    |                       | .7447   |
| Yes                        | 1616               | 4731                  |         |
| No                         | 3728               | 10 406                |         |

*Source: Ment Health Clin [Internet]. 2020;10(4):222-31. DOI: 10.9740/mhc.2020.07.222*
tation was associated with 20% (odds ratio $= 0.80$; 95% CI 0.68, 0.93) and 26% (odds ratio $= 0.74$; 95% CI 0.61, 0.96) reduction in all-cause mortality and cardiac mortality, respectively, compared to usual care among individuals with coronary heart disease. An existing study\(^23\) has demonstrated that individuals with coronary heart disease and comorbid depression who completed a cardiac rehabilitation program had 73% mortality risk reduction compared to depressed individuals with coronary heart disease who did not complete the cardiac rehabilitation program. Moreover, it has also been observed that improving exercise capacities even by a modest amount is associated with reduction of depression and depresion-related mortality.\(^{23-25}\) Our study found that, in a nationally representative sample in the United States of MI survivors who were depressed were less likely to reach the 150 min/wk of moderate-intensity exercise goal than those without depression. This suggests that those suffering from depression may experience greater difficulty engaging in physical activity. Because symptoms of depression include

| TABLE 1: Sample description of myocardial infarction (MI) survivors with and without depression\(^a\) (continued) |
|---------------------------------------------------------------|---------------------------------------------------------------|
| Predisposing Factors                                         | MI With Depression | N | Weighted % | MI Without Depression | N | Weighted % | P Value |
|---------------------------------------------------------------|---------------------------------------------------------------|
| Arthritis                                                     |                                                               |   |            |                     |   |            |         |
| Yes                                                           | 3924                                                          | 73.29 |          | 8145                                                          | 51.83 |          | <.0001  |
| No                                                            | 1381                                                          | 26.71 |          | 6880                                                          | 48.17 |          |         |
| Asthma                                                        |                                                               |   |            |                     |   |            |         |
| Yes                                                           | 1428                                                          | 28.33 |          | 2113                                                          | 14.34 |          | <.0001  |
| No                                                            | 3877                                                          | 71.67 |          | 12 970                                                       | 85.66 |          |         |
| Diabetes                                                      |                                                               |   |            |                     |   |            |         |
| Yes                                                           | 2342                                                          | 44.09 |          | 5233                                                          | 67.68 |          | <.0001  |
| No                                                            | 2992                                                          | 55.91 |          | 9880                                                          | 32.32 |          |         |
| Hypertension                                                  |                                                               |   |            |                     |   |            |         |
| Yes                                                           | 4191                                                          | 79.57 |          | 11 158                                                       | 73.16 |          | <.0001  |
| No                                                            | 1131                                                          | 20.43 |          | 3920                                                          | 26.84 |          |         |
| Perceived general health                                      |                                                               |   |            |                     |   |            |         |
| Excellent/very good                                           | 530                                                           | 8.15 |          | 3389                                                          | 21.76 |          | <.0001  |
| Good                                                          | 1243                                                          | 19.81 |          | 5263                                                          | 34.44 |          |         |
| Fair/poor                                                     | 3540                                                          | 71.04 |          | 6408                                                          | 43.8 |          |         |
| Activity limitations                                          |                                                               |   |            |                     |   |            |         |
| Yes                                                           | 3902                                                          | 75.3 |          | 6509                                                          | 42.37 |          | <.0001  |
| No                                                            | 1407                                                          | 24.7 |          | 8507                                                          | 57.53 |          |         |
| Received needed emotional support                             |                                                               |   |            |                     |   |            |         |
| Always/usually                                                | 44                                                            | 23.25 |          | 61                                                            | 9.33 |          | <.0001  |
| Sometimes                                                     | 37                                                            | 18.52 |          | 67                                                            | 8.53 |          |         |
| Rarely/never                                                  | 126                                                           | 58.23 |          | 564                                                           | 82.14 |          |         |
| Physical health                                               |                                                               |   |            |                     |   |            |         |
| Good                                                          | 1276                                                          | 21.59 |          | 7418                                                          | 50.23 |          | <.0001  |
| Medium                                                        | 1691                                                          | 32.92 |          | 4005                                                          | 27.91 |          |         |
| Bad                                                           | 2172                                                          | 45.46 |          | 3103                                                          | 21.86 |          |         |
| Mental health                                                 |                                                               |   |            |                     |   |            |         |
| Good                                                          | 1644                                                          | 29.78 |          | 12 041                                                       | 79.51 |          | <.0001  |
| Medium                                                        | 1825                                                          | 32.72 |          | 2125                                                          | 15.09 |          |         |
| Bad                                                           | 1666                                                          | 37.51 |          | 632                                                           | 5.39 |          |         |
| Functional health                                             |                                                               |   |            |                     |   |            |         |
| Good                                                          | 2084                                                          | 37.23 |          | 10 880                                                       | 72.14 |          | <.0001  |
| Medium                                                        | 1414                                                          | 27.19 |          | 2234                                                          | 15.86 |          |         |
| Bad                                                           | 1649                                                          | 35.58 |          | 1719                                                          | 12.00 |          |         |

\(^a\)Based on 20 483 MI survivors aged 50 or older; 5343 (26.19%) reported having depression.
hopelessness and decreased motivation and energy, simply instructing MI survivors suffering from depression on the recommended amounts of physical activity is likely to be ineffective. Interventions to treat depression specifically (eg, pharmacotherapy, psychotherapy) should be considered to help eliminate these symptoms that are a barrier to adhering to the CDC recommended exercise goals. However, it should be kept in mind that another

| Health Behavior Domain | MI With Depression | MI Without Depression | P Value |
|------------------------|--------------------|----------------------|---------|
| **Body mass index**    |                    |                      | .0001   |
| Normal weight/underweight | 1149 (21.84) | 3983 (25.76) |         |
| Overweight             | 1755 (35.55)      | 5738 (38.74)        |         |
| Obese                  | 2231 (42.61)      | 4921 (35.5)         |         |
| **Smoking status**     |                    |                      | .0001   |
| Current                | 1403 (29.49)      | 2143 (15.63)        |         |
| Former                 | 2248 (40.96)      | 7236 (48.67)        |         |
| Never                  | 1661 (35.55)      | 5673 (36)           |         |
| **Heavy drinking**     |                    |                      | .0001   |
| Yes                    | 171 (3.93)        | 422 (3.25)          |         |
| No                     | 1265 (23.26)      | 5078 (33.42)        |         |
| Last 30 d no drink     | 3836 (72.81)      | 9351 (63.33)        |         |
| **Flu shot**           |                    |                      | .7115   |
| Yes                    | 3237 (57.41)      | 9152 (56.83)        |         |
| No                     | 2083 (42.59)      | 5950 (43.17)        |         |
| **Physical checkup, y**|                    |                      | .1581   |
| <2                     | 4858 (91.63)      | 13 994 (93.66)      |         |
| 2 to 4                 | 178 (3.49)        | 392 (2.74)          |         |
| ≥5                     | 172 (3.49)        | 442 (3.06)          |         |
| Never                  | 37 (0.87)         | 81 (0.55)           |         |
| **Cholesterol checkup, y** |          |                      | .1346   |
| <2                     | 4917 (93.25)      | 14 082 (94.59)      |         |
| 2 to 4                 | 113 (2.24)        | 244 (1.77)          |         |
| ≥5                     | 52 (1.04)         | 151 (1.11)          |         |
| Never                  | 110 (2.22)        | 286 (2.03)          |         |
| **Any drink**          |                    |                      | .0001   |
| Yes                    | 1471 (28.2)       | 5612 (37.17)        |         |
| No                     | 3836 (71.8)       | 9351 (62.83)        |         |
| **Fruit consumption**  |                    |                      | .001    |
| Yes                    | 2859 (52.28)      | 8917 (57.61)        |         |
| No                     | 2295 (47.72)      | 5583 (42.39)        |         |
| **Vegetable consumption** |              |                      | .0021   |
| Yes                    | 3597 (69.44)      | 10 682 (74.06)      |         |
| No                     | 1471 (30.56)      | 3522 (25.94)        |         |
| **Physical activity**  |                    |                      | .0001   |
| Recommended            | 1814 (32.16)      | 7043 (45.08)        |         |
| Not recommended        | 785 (14.29)       | 1779 (12.62)        |         |
| None                   | 2544 (50.3)       | 5690 (38.16)        |         |
| Unknown                 | 200 (3.26)        | 628 (4.14)          |         |

*Based on 20,483 MI survivors aged 50 or older; 5343 (26.19%) reported having depression.

*Category denotes missing, do not know, or refused.
possible explanation for not meeting the recommended physical activity level might be the severity of MI and the clinical condition of the MI survivor. Safety concerns about unsupervised exercise in this population have led to the development of medically supervised exercise programs that have minimal risks, and MI survivors should be slowly included in these supervised programs for improved health outcomes.

The American Heart Association/American College of Cardiology (AHA/ACC) recommends weight loss for individuals with coronary artery disease and a BMI ≥ 25 kg/m². This is mainly owing to the fact that overweight and obesity are independent risk factors of metabolic syndrome, and existing literature has shown that, among older adults who are overweight or obese, with and without metabolic syndrome, have an increased cardiovascular event and mortality risk, particularly among males. Hence, metabolic syndrome should be screened for in all MI survivors to prevent negative health outcomes. Furthermore, a study found that, in individuals presenting with a ST-elevated MI and left ventricular dysfunction, BMI appeared to be a significant predictor of inducible-ventricular tachycardia and all-cause mortality. In our study, it was found that MI survivors with depression had a larger BMI than those without depression. As previously mentioned, symptoms of depression include decreased motivation, energy, and sometimes increased appetite. Therefore, it makes sense that MI survivors with depression would be at increased risk of having a higher BMI because these symptoms can lead to more inactivity, overeating, and decreased motivation to make lifestyle changes. However, according to a recent review article, treatment of obesity or depression (among individuals with co-occurring obesity and depression) helps in improving the prognosis of the other condition. Health care providers should also keep in mind that individuals with depression, in many cases, are on antidepressant and/or antipsychotic treatment that can lead to weight gain. Thus, the interaction of depression and obesity is complex and might be more pronounced among MI survivors. So it is critically important to develop appropriate interventions to decrease the higher BMI among MI survivors with depression for improved health outcomes.

The AHA/ACC guidelines for MI survivors recommend a goal of complete smoking cessation utilizing counseling, pharmacological therapy, and formal smoking cessation programs. One of the major reasons for recommending complete smoking cessation among MI survivors is that it has been observed that smoking cessation is associated with 40% and 30% lower risk of all-cause mortality and recurrent MI, death, or heart failure hospitalizations, respectively, among MI survivors. It is concerning that, according to our study findings, MI survivors with depression were more likely to continue smoking than MI survivors without depression. This behavior could be due to lack of emotional and health care–related support in the rehabilitation process of MI, and therefore, education on smoking cessation treatment options should be a part of the treatment plan. An existing study demonstrated that utilization of a proactive strategy to offer intensive smoking cessation intervention using motivational interviewing to hospitalized individuals with acute coronary syndrome who were smokers was significantly associated with the use of smoking cessation counseling and increased chances of smoking abstinence.

### Table 3: Adjusted odds ratios (AOR) and 95% confidence intervals (CI) for multivariable comparison of health behaviors between myocardial infarction (MI) survivors with depression compared to MI survivors without depression

| Health Behavior Domain | AOR 95% CI  | P Value |
|------------------------|------------|---------|
| Flu immunization       |            |         |
| Yes                    | 0.98       | 0.83, 1.16 | .84  |
| No                     | Ref        |         |
| Last physical checkup, y |          |         |
| <2                     | 0.91       | 0.68, 1.23 | .5348 |
| ≥2                     | Ref        |         |
| Last cholesterol check, y |          |         |
| <2                     | 0.75       | 0.56, 1.00 | .0478 |
| ≥2                     | Ref        |         |
| Body mass index        |            |         |
| Overweight/obese       | 1.39       | 1.17, 1.67 | .0003 |
| Normal weight/underweight |        |         |
| Physical activity, min/wk |          |         |
| ≥150                   | 0.76       | 0.64, 0.89 | .0009 |
| <150                   | Ref        |         |
| Smoking status         |            |         |
| Smoker                 | 1.65       | 1.34, 2.03 | <.0001 |
| Nonsmoker              | Ref        |         |
| Alcohol consumption    |            |         |
| Yes                    | 0.77       | 0.64, 0.91 | .0003 |
| No                     | Ref        |         |
| Heavy drinking         |            |         |
| Yes                    | 0.9        | 0.61, 1.29 | .5402 |
| No                     | Ref        |         |
| Vegetable consumption  |            |         |
| Yes                    | 0.84       | 0.71, 1.00 | .0458 |
| No                     | Ref        |         |
| Fruit consumption      |            |         |
| Yes                    | 0.93       | 0.79, 1.09 | .3558 |
| No                     | Ref        |         |

Ref = reference.

*Based on 20,483 MI survivors aged 50 or older; 5343 (26.19%) reported having depression.
at the end of 1 year from hospitalization. Thus, health care providers can use this strategy to reduce or eliminate smoking among MI survivors post–hospital discharge.

The AHA/ACC Foundation recommends moderate consumption of alcohol, defined as up to 1 drink per day for women and up to 2 drinks per day for men, for secondary prevention of MI. Although higher alcohol consumption is associated with higher risk of MI, small-to-moderate amounts of alcohol consumption among MI survivors have been observed to be associated with lower total mortality, reduced chances of major coronary event, and slowing atherosclerosis progression as well as decreased platelet activity and vascular tone. It is reassuring that our study findings indicate that depressed MI survivors were less likely to consume alcohol compared to those without depression as comorbid depression and alcohol consumption is common and is associated with persistence of symptoms. Although our study findings were not able to precisely differentiate individuals who would benefit for their MI survival based on their alcohol consumption, health care providers should screen for alcohol use at routine visits to identify stressors that may be contributing to heavy consumption and refer to treatment services when necessary.

Although it is well established that addressing lifestyle factors, such as exercise, diet, and substance use, are important for reducing morbidity and mortality in post-MI survivors, it is important to recognize that changing these behaviors is difficult. Adhering to the previously mentioned health behavior guidelines requires a considerable amount of time, effort, and motivation. This can be challenging even in the absence of a depression diagnosis, which is exhibited in our findings when many individuals in the post-MI without depression group reported engaging in no physical activity. Therefore, addressing ambivalence for implementing these lifestyle recommendations is a crucial component of the treatment plan. Evidence has shown that more patient-centered approaches lead to better outcomes. Motivational interviewing is an example of a patient-centered approached to care in which the health care provider helps patients explore and resolve existing ambivalence to behavior changes that are discussed. This type of communication strategy should be used in combination with depression treatment in post-MI survivors suffering from depression.

Strengths of this study include a nationally representative sample and measuring a variety of health behaviors. Although the sample representation is conducted nationwide, these data are self-reported (eg, clinical assessment to establish validity of depression and MI diagnosis was not feasible) and are vulnerable to recall bias and overreporting or underreporting engagement of health behaviors in question. Time since MI and the total number of previous MI events was not available within the data set and, therefore, could not be analyzed as a potential confounder. Causal inferences cannot be reached due to the cross-sectional study design.

**Conclusion**

The MI survivors with comorbid depression were more likely to engage in poor health behaviors than MI survivors without depression. It is important to treat comorbid depression in this population to help eliminate symptoms that may hinder the ability to implement lifestyle recommendations for secondary MI prevention. Future studies should investigate the impact of depression treatment and motivational interviewing on health-related behaviors in this population.

**Acknowledgments**

This study used data from a publicly available Behavioral Risk Factor Surveillance System survey. The data can be freely downloaded from the following website: https://www.cdc.gov/brfss/annual_data/annual_2015.html.

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