



Prevalence of depressive symptoms in the older population



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ARTICLE INFO

Article history:

Received 20 November 2015

Received in revised form

9 February 2016

Accepted 9 February 2016

Available online 30 March 2016

Keywords:

NHATS

Depressive symptoms

Regional variation

US health care

Older adults

ABSTRACT

Objectives: Depression is a major health risk factor among the older population, related to significant increases in total per person health care expenditures. Prior studies have shown significant regional variations in some clinical conditions. However, there has not been any study examining depressive symptoms across regions. The purpose of this study was to investigate the prevalence of the older population experiencing depressive symptoms across different regions in the United States.

Methods: Public data were obtained from the 2011–2014 National Health and Aging Trends Study, a longitudinal study that included a nationally representative sample of individuals aged 65 or older. Participants' regions of residence were categorized by Northeast, Midwest, South and West census regions. A composite score of 3 or greater from the Personal Health Questionnaire-2 was used to indicate the presence of depressive symptoms. The comparison of proportion having depression across census regions were analyzed using chi-square tests.

Results: A total of 3863 participants over the age of 65 were included in this study. Of those, 1583 (41.0%) were male and 2757 (71.4%) were White. A majority of the participants (22.1%, $n=852$) were between 70 and 74 years old at the baseline year. Disparities in the prevalence of depressive symptoms were observed across different regions in the United States. From 2011 to 2014, depressive symptoms among this population significantly declined in the South ($p < 0.05$) and increased significantly in the Midwest and West ($p < 0.05$).

Conclusion: Understanding regional variations of depressive symptoms in older adults can inform the public regarding resource allocation and treatment models. By showing which areas of the US are more prone to depressive symptoms, local, state, and federal funding can be appropriated to the areas with the greatest need.

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1. Introduction

From 2000 to 2010, the population of those who are 65 and older rose from almost 35 million to over 40 million in the United States. This represents a growth of 15.1% and outpaces the overall population growth of 9.7%. This increase in the aging population is projected to continue to rise as baby boomers continue to age (Werner, 2011). Aging is associated with changes in physiological and psychological function (Ferrari et al., 2003; MacNee et al., 2014) which can decrease quality of life. With the segment of society aged 65 and older growing so rapidly, it becomes increasingly important to understand the prevalence of health risk

factors among this group.

Depression is a major health risk factor among the older population, affecting older populations both in the U.S. (Song et al., 2014) and other high-income countries (Lopez et al., 2006), with even subclinical levels of depression related to adverse health outcomes among older populations (Jeste et al., 1999). High levels of depressive symptoms are an independent risk factor of all-cause mortality in older populations (Schulz et al., 2000). Major depressive disorder is characterized by at least five of the following nine symptoms nearly every day: depressed mood or irritability, decreased interest or pleasure, significant weight change or change in appetite, sleep disturbances, change in activity, fatigue or loss of energy, feelings of guilt or worthlessness, diminished concentration, and suicidality (American Psychiatric Association, 2013). The American Psychological Association has described three main areas where depression impacts individual functioning, including financial, psychological, and physiological effects (Silk,

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2015). In the U.S., the cost of depression adds approximately \$1045 to \$1700 more per individual each year in ambulatory and inpatient costs over and above those incurred by older patients without depression (Katon et al., 2003). Psychologically, depression impacts learning and memory, associated with a decreased ability to immediately recall new information, as well as a decrease in the amount of new information acquired (Kizilbash et al., 2002). In addition, depression has also been shown to predict quality-of-life when measured after a stressful life event, such as a myocardial infarction (Lane et al., 2000). Clearly, the economic and physical toll of depression is important in considering the health of older populations.

A number of factors have been studied that relate to the effect of depression on physiological health and health behaviors. Depression has a potentially bi-directional relationship with health risk behaviors. Research suggests there is a decreased ability to follow a prescribed medication regimen among the depressed, a factor that can limit the ability to heal and restore health following illness (Penninx et al., 1999). Research has consistently shown the relationship between higher levels of physical activity and lower levels of depression (Dinas et al., 2011; Herring et al., 2012; Mammen and Faulkner, 2013); however, this relationship may be bidirectional as well, particularly in older individuals. Older individuals with depression may be more likely to have a physical disability or more limited mobility (Penninx et al., 1999). Other risk factors for depression include prior depression, life events, loneliness or bereavement, gender, sleep disturbance, and disability (Cole and Dendukuri, 2003; Prince et al., 1997). An important distinction that can differentiate the relevance of risk factors is whether major or minor depression is the focus. Constitutional risk factors like gender, prior health, and disability are more relevant in major depression while situational risk factors like life events and stress are more relevant for minor depression (Beekman et al., 1995). In evaluating the health risk of depression, it is important to consider the effect of minor, as well as major, depression levels.

One risk factor not well studied for depression is the effect of geographical region. In Social Learning Theory (SLT), the environment of an individual has an enormous effect on the determination of human behavior (Akers, 2011). Several studies have strongly linked the imitation of behaviors to the environment of the individual, that is, children are more likely to show aggressive behaviors when raised in an environment where models (e.g., parents, peers, media, etc.) show aggressive behavior frequently (Bandura et al., 1963; Lhermitte et al., 1986). Behavioral imprinting following the repeated observation of a behavior fits with the sensory feedback theory of imitation proposed by O. Hobart Mowrer (Mowrer, 1960). The observer to a specific behavior is more likely to replicate the model's behavior when there is a positive reinforcement associated with the model's behavior. Later, the observer is able to reproduce the perceived positive outcomes by replicating the model's behavior (Wodtke and Brown, 1967). The environmental conditions and context of the location in which an individual lives and interacts likely impacts the behaviors that will be observed and imprinted in said area.

Prior research has found associations between geographical region of residence and health care issues such as out-of-hospital cardiac arrests (Nichol et al., 2008), opioid use among those with back pain (Luo et al., 2004), and cardiovascular diseases (Cooper et al., 2000). These studies have shown a significant difference in health conditions dependent upon the geographic region in which the participant resides. For instance, an emerging trend shows that while the overall rates for coronary heart disease in the United States have been on the decline, there appears to be a clustering of high coronary heart disease in Appalachia and the Mississippi Delta, areas that are generally rural and poor (Addiss et al., 1990;

Cooper et al., 2000; Luo et al., 2004; Nichol et al., 2008). To look into the causes of these clustering effects, some studies have focused primarily on the effectiveness of care given to patients by specific regions. These studies serve to further support the impact on behaviors by geographic region as shown by the clustering effects in various regions. Baicker et al. (2005) found the average use of effective care varies from 30% to almost 60% depending on which region is being examined. In an effort to increase the effectiveness of mental health service delivery, many states have implemented integrated care programs aimed at increasing the communication between primary care physicians and mental health professionals on a wide scale. For example, Minnesota has created the Depression Improvement Across Minnesota, Offering a New Direction (DIAMOND) program and Washington State has instituted the Mental Health Integration Program (MHIP) which includes over 100 community health clinics and 30 community mental health centers throughout Washington (Unützer et al., 2012). While these and other studies show regional differences in uses of health care (Arcury et al., 2005) and occurrences of medical conditions (Kappelman et al., 2007; Lipschultz et al., 2003), to our knowledge there has not been a study that specifically examined the prevalence of depressive symptoms in the older population by geographic region of residence in the United States.

With the average life expectancy being the highest on record (Center for Disease Control and Prevention, 2015), and with the financial costs of depression as well as the demonstrated effect depression has on physiological and psychological health and health behaviors, it is even more important to understand whether residency by geographical region is related to depressive symptoms. The purpose of this study was to examine the prevalence of depressive symptoms across different regions in the United States among older individuals.

2. Methods

2.1. Study Design

Public data were obtained from the 2011–2014 National Health and Aging Trends Study (NHATS), a longitudinal study conducted by Johns Hopkins University's Bloomberg School of Public Health that includes a nationally representative sample of individuals aged 65 or older who are Medicare recipients. Each annual survey is conducted through computer assisted personal interviewing technology with participants from the previous year to document the changes in condition. The NHATS includes information on demographics, health conditions, and specific questions related to physiological processes of aging such as pain, fear of falling, location of care, and disturbance of daily activities by pain. The NHATS also includes specific questions related to psychological aspects of aging including self-reported levels of depressive symptoms, predisposing factors related to depressive symptoms (e.g., age, sex, race/ethnicity, marital status), enabling factors related to depressive symptoms (e.g., Census region) and need factors related to depressive symptoms (e.g., ratings of care and overall health conditions). A total sample of 3863 individuals over the age of 65 completed all pertinent questionnaires in all four years. For additional explanation of NHATS, see <https://www.nhats.org/scripts/aboutNHATS.htm> (National Institute on Aging, 2015). Appendix A contains a comprehensive list of all variables used in this study.

2.1.1. Census region

Participant location was reported as residence in one of the nine divisions for the United States Census: New England, Middle Atlantic, East North Central, West North Central, South Atlantic,

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