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The Association between the Use of Mind-body Therapies

and U.S. Adults with Depressive Symptoms,

National Health Interview Survey 2012

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ABSTRACT

BACKGROUND

The use of complementary and alternative medicine (CAM) has dramatically increased over the years since 1990. It is one of the fastest growing fields in healthcare and it is widely used today in the United States. Most people utilizing CAM approaches are seeking ways to improve overall health and well-being to relieve symptoms associated with body aches such as neck and back pain, stiffness, chronic illnesses, anxiety and depression, and side effects of conventional medicine. Symptoms of depression can lead to major depression, which is consequentially a major public health problem in the United States. In 2014, more than 1 out of 20 Americans have been reported to have moderate/high depressive symptoms. While depression is treatable with western medication, many have found that the use of mind and body approaches such as mediation, chiropractic/osteopathic manipulation, and yoga show great benefit in improving the cognitive symptoms of depression without medication side effects.

OBJECTIVES

The objective of this study was to assess the association between the use of mind-body therapy and depressive symptoms. The analyses presented focus on determining whether mind-body therapy users are more or less likely to be depressed.

METHODS

This study used a secondary and cross-sectional data from the 2012 National Health Interview Survey, a nationally representative household interview survey. The Adult Sample and the Adult Alternative datasets were used, and consisted of 34,525 participants. The sample

was exclusive to adults ≥ 18 years of age. Analyses were conducted with 11,143 adults with depressive symptoms. The dependent variables were defined as self-reported response of emotional distress, the independent variable as Mind-Body Therapies users. SAS 9.4 was used to conduct descriptive, binomial, multinomial logistic regression analyses, and generalized linear mixed model. The level of significance of 0.05 was used to determine statistical significance.

RESULTS

In the weighted unadjusted model, the association between the use of at least one mind-body therapy and depressive symptoms was statistically significant, with an odd ratio of 1.51 and 95% CI (1.26, 1.81). The number of mind-body therapies used [OR= 1.13, 95% CI (1.09, 1.17)] and the most commonly used mind-body therapies [OR= 1.51, 95% CI (1.27. 1.81)] also yielded statistically significant association with depressive symptoms. In the weighted adjusted binomial logistic regression model, only the number of mind-body therapies used [OR=1.09, 95% CI (1.06, 1.18)] yielded a statistically significant association with depressive symptoms.

CONCLUSION

A negative association was found between the use of mind-body therapy and mental health among U.S. adults in all unadjusted models. Mind-body therapies users were found to be more depressed individuals. These results support the literature reviews that mind-body therapies users are more likely to be depressed.

KEYWORDS

Complementary and Alternative Medicine; Mind-Body Therapies; Mindfulness Intervention; Depressive Symptoms; Depression; Psychological distress; Mental Health; Mental Treatment; Multilevel Modeling; NHIS 2012

The Association between the Use of Mind-body Therapies and

U.S. Adults with Depressive Symptoms,

National Health Interview Survey 2012

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Emilie Seena

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INTRODUCTION

Complementary and Alternative Medicine (CAM) is a group of diverse medical and healthcare systems and products, referred to as a non-mainstream Western (NIH, 2016). It is often categorized into two subgroups: mind and body practices such as meditation, yoga, chiropractic/osteopathic manipulation, and natural products such as supplements and herbs (NIH, 2016).

The first nationally representative survey on the use of CAM was first conducted in 1990, where prevalence, costs, and patterns of the use of CAM were analyzed (Institute of Medicine, 2005). Results from the survey indicated that Americans spent an annual approximate of $10.3 billion out of pocket on CAM, in comparison with an annual approximate cost of $12.8 for all hospitalizations in the United States (Institute of Medicine, 2005). A follow-up survey was conducted and indicated an increase in the prevalence of CAM usage by 25% from 1990 to 1997 (Institute of Medicine, 2005). In 2002, the National Health Interview Survey, which conducts a study on the health of the nation since 1957, started including questions regarding CAM usage (NIH, 2017). Today, NHIS survey includes questions regarding CAM usage every five years.

CAM is one of the fastest growing fields in healthcare and is widely used today in the United States. The use of CAM has become prevalent over the past years with approximately 38.3% of adults in the United States reported using CAM in 2007 (Hernandez- Reif, Horton, Vaughn, Pollard, Juarez, Kendrick, & Burns-Nader, 2015; NIH, 2017). Most people utilizing CAM approaches are seeking ways to improve overall health and well-being to relieve symptoms

associated with body aches such as neck and back pain, stiffness, chronic illnesses, anxiety and depression, and side effects of conventional medicine (Barnes, & Bloom, 2008).

The popularity of mind and body practices has significantly grown over the years, especially yoga, where the number of people practicing yoga doubled in 2012 (NIH, 2016). The 2012 NHIS define mind-body practices as yoga, meditation, chiropractic and osteopathic manipulation, meditation and massage therapy as the most popular mind and body practices used by adults (NIH, 2016). Other mind-body therapies include acupuncture, guided imagery, tai chi, qi gong, Pilates, progressive relaxation, Alexander techniques, and Trager psychophysical integration (NIH, 2016). Although the amount of research varies depending on the type of CAM, there have been many studies which have documented the health benefits of practices such as yoga, meditation and acupuncture (NIH, 2016). CAM users were found to practice mind-body therapies, especially meditation for mental health, behavioral self-regulation, and integrative medical care (Burke, Lam, Stussman, & Yang, 2017). Today, many accredited medical schools have begun introducing mindfulness-based interventions in their academic curriculum (Barnes, Hattan, Black, & Schuman-Olivier, 2016). Incorporating mind-body integrative medicine within medical training and residency programs not only increases options for patients care but also medical field's research and practices, which can potentially benefit physician and patients in the future (Barnes, Hattan, Black, & Schuman-Olivier, 2016).

Most people seek out CAM modalities due to mental health problems such as depression, anxiety, and stress (Pilkington, Kirkwood, Rampes, & Richardson, 2005). Depression is one of the most common but serious mental disorders in the United States (NIH, 2016). In 2014, more than 1 out of 20 Americans were reported to have moderate to high depressive

symptoms (CDC, 2014). An individual who suffers from depression is also more likely to suffer from anxiety disorder or vice versa. Anxiety disorders affect approximately 18.1% of the U.S. population every year (Anxiety and Depression Association of America, 2017). Although both depression and anxiety are highly treatable, many individuals do not seek treatment (ADAA, 2017). While there is growing scientific evidence about CAM, it is often recommended to use CAM as a complement to conventional medicine to treat mental illnesses such as depression and anxiety disorder (ADAA, 2017). While CAM is often recommended as a complement to conventional medicine, physicians often do not recommend using St. John's Wort with certain antidepressants as it can lead to life-threatening increase of serotonin (NIH, 2017). A major concern with CAM usage is that many people do not consult with a mental health provider or primary care physician before selecting CAM modalities or discontinuing conventional medicine (ADAA, 2017).

Most findings in the literature with respect to the effect of mind and body practices on depressive symptoms consistently report potential benefits for mental health. However, questions remain about which therapies and/ or which combination of therapies are most effective, and what intensity and frequency a therapy needs to be used in order to see effect on mental health related symptoms. The analysis presented focuses on selected mind and body approaches in NHIS 2012 and its relationship with depressive symptoms.

REVIEW OF THE LITERATURE

Depressive Symptoms

Depressive symptoms are defined as the feeling of sadness, emptiness, hopelessness, and anxiety (Mirowsky & Ross, 2002). These feelings are often a normal response to life's stressors, and most people have sad mood at some point in life (National Institute of Mental Health, 2016). However, a persisting emotion of sadness or loneliness that interferes with daily life may become a severe condition. Many prior studies use the terms "depressive symptoms" and "depression" interchangeably as depressive symptoms are part of the feelings of depression. Depression is a serious medical illness that causes inability to function at work and home (National Institute of Health, 2016). Major depressive disorder is the leading cause of disability, affecting approximately 6.7% of the U.S. population age 18 and older (ADAA, 2017). Studies suggested that genetic, biological, environmental, and psychological factors are the main causes of depression (NIH, 2016). Depression can occur at any age; however, studies have found that the prevalence of depression increases with age (NIH, 2016; Fekadu, Shibeshi, & Engidawork, 2017). Women are also more likely to be diagnosed with depression than men. One of the reasons is that men and women may perceive "depression" differently. Men often feel depressed based on tiredness, irritability, and anger; while women define depressed as sadness, worthlessness, and guilt (National Institute of Mental Health, 2016). The leading cause of depression is often associated with other conditions and behaviors, including other mental disorders such as anxiety disorder, and chronic conditions such as arthritis and asthma. (Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015; American Psychiatric Association, 2013).

When depression is not adequately treated, it can become a severe chronic disease (Greenberg, et al., 2015; American Psychiatric Association, 2013).

Depression in Older Adults

The risk of depression increases with age (CDC, 2017), in part because of the psychological/emotional impact of one's to deteriorating condition of health. The prevalence rate of depression varies considerably depending on several factors. For example, the prevalence of depression in community sampled adults age 65 and older ranges from 1% to 5%, and increases for those living in home healthcare and hospital to 13.5% and 11.5% respectively (CDC, 2017). Although major depression is not prevalent in late life, recent meta-analyses showed that the prevalence of clinical depressive symptoms is high in older adults, with rates for sub-threshold depressive symptoms (those failing to reach diagnostic criteria) ranged from 4.5% to 37.4%. (Rodda, Walker, & Carter, 2011). It appears that older adults are more likely to experience depression with less independence or a greater medical assistance need environment.

There are two types of age of onset of disorder: early-onset depression and late-onset depression. For individuals who have already experienced mental illness earlier in life, this is referred to as early-onset depression; while those whose first encounter with mental illness in old age is called late-onset depression (Fiske, Wetherell, & Gatz, 2009). More than half of the older adults are diagnosed with depression in old age, and less than half are diagnosed before old age (Brodaty, Luscombe, Parker, Wilhelm, Hickie, Austin, & Mitchell, 2001). Early onset depression was found to be related to family history of depression (Heun, Papassotiropoulos, Jessen, Maier, & Breitner, 2001). The leading cause of late-life depression consists of a complex

multidirectional interaction of biologic, psychological and social factors (Rehan, & Steffens, 2014).

Depression in older adults has become a serious public health concern as the number of older adults increased by 15.1% between 2000 and 2010 (Rehan, & Steffens, 2014). Treatments for depression in old age include behavioral therapy, cognitive-behavioral therapy, cognitive bibliotherapy, problem-solving therapy, brief psychodynamic therapy, and life review/ reminiscence therapy (Fiske, et al., 2009).

Chronic Conditions and Depressive Symptoms

Depression can occur along with other serious illness, such as diabetes, cancer, heart diseases, etc. Depression can make these conditions worse and vice versa. Studies showed that individuals with chronic diseases and comorbid depression reported significantly higher numbers of medical symptoms compared to those with only chronic illness alone (Katon, Lin, & Kroenke, 2007). The risk of depression increases between 25-33% with chronic illnesses (Morewitz, 2006). Depression is difficult to diagnose in clinical diagnosis because feeling depressed is often assumed to be normal for an individual dealing with a serious chronic disease (Morewitz, 2006). In addition, physical symptoms of depression such as disturbed sleep, impaired appetite, and lack of energy may be a result of an already existing disease (Turner, & Kelly, 2000). The most common chronic conditions associated with depression include arthritis, asthma, diabetes, cancer, coronary heart disease (CHD), chronic obstructive pulmonary disease (COPD), stroke, and obesity/BMI (Chapman, Perry, & Strine, 2005). While all these chronic conditions are manageable with medications, side effects are a concern as it may affect patients' mood and trigger depression (NIH, 2017). These chronic illnesses' therapeutic

treatment may be beneficial to target a specific condition, but with comorbid depression, the treatment may harm the patients.

<u>Arthritis</u>

Arthritis is a leading cause of disability in the United States, affecting 54.4 million of adults (CDC, 2017). It is one of the most common chronic condition and a common cause of chronic pain. According to CDC's definition, arthritis includes more than 100 disease and conditions, including osteoarthritis, rheumatoid arthritis, fibromyalgia, gout, and lupus. Patients may experience joint pain, aching, stiffness, and swelling. Rheumatoid arthritis (RA) seem to be the most common type of arthritis associated with depression (Dickens, McGowan, Clark-Carter, & Creed, 2002; Covic, Cumming, Pallant, Manolios, Emery, Conaghan, & Tennant, 2012). Depression was found to be highly prevalent in RA and associated with poorer RA outcomes such as increased pain, more comorbidities, and increased mortality levels (Matcham, Rayner, Steer, & Hotopf, 2013).

<u>Asthma</u>

Asthma is a chronic lung disease that inflames and narrows the airways and affects more than 22.2 million people in the US (NIH, 2014; Anupama, Bollinger, & Teodor, 2008). Asthma has often been considered an illness in which mood and emotions contribute to symptom exacerbation (Zielinski, Brown, Nejtek, Khan, Moore, & Rush, 2000). Although mood disorders are common among asthma patients, these symptoms are often unrecognized and untreated (Nejtek, Brown, Khan, Moore, Wagner, & Parantie, 2001). Asthma is often controlled through pharmacotherapy: controller medication, which is taken on a daily basis, and rescue medication, which is used for acute exacerbations (Kewalramani, Bollinger, & Postolache,

2009). Although these treatments are useful for treating asthma, adverse events such as

exacerbations of depression or anxiety symptoms need to be monitored closely (Kewalramani,

Bollinger, & Postolache, 2009). The prevalence of depressive disorders among individuals with

asthma is not well determined, however, several studies have found that depression may

increase the risk of death among asthma patients or that depression is associated with an

increase of asthma symptoms. These results are not consistent as other studies have found no

correlation between diagnosis of depression and asthma (Zielinski, et al., 2000).

Cancer

      Cancer is life-threatening and a feared diagnosis. A cancer diagnosis is a stressful, and

life-changing event that can impact most patients, family, and friends, emotionally. Feelings of

depression such as hopelessness, helplessness, sadness, anger are very common among cancer

patients (ACS, 2016). Depression affects more than 10% of patients among cancer patients

(Smith, 2015). Therapeutic treatment such as antidepressant medication and psychological

treatments can be used to manage depressive symptoms. However, these treatments may have

different harms and benefits for cancer patients (Walker, Sawhney, Hansen, & Ahmed, 2013).

Diabetes

      The increased prevalence of depression among diabetes is reported in several

community studies. Comorbid diabetes and depression are clinically challenging to treat as both

conditions are worsened by one another (Holt, de Groot, & Golden, 2014). Diabetic patients

have twice the risk of having depressive symptoms (Vickers et al., 2006), which can cause other

complications such as diabetic retinopathy, skin complication, and swollen feet (American

Diabetes Association, 2017). Type 2 diabetes patients who uses insulin were found to have a

higher rate of depression amongst those who takes noninsulin medication or dietary and

lifestyle intervention only (Li, Ford, Strine, & Mokdad, 2007). Depression is frequently

disregarded in people with diabetes due to the fact that both conditions may be driven by

shared underlying biological and behavioral mechanism such as hypothalamic-pituitary-adrenal

axis activation, inflammation, sleep disturbance, inactive lifestyle, poor dietary habits, and

environmental and cultural risk factors (Holt, de Groot, & Golden, 2014). Treatment for

depression such as psychological intervention and antidepressants are effective in treating

depression but have mixed effects on glycemic control in diabetic patients (Holt, de Groot, &

Golden, 2014).

Coronary Heart Disease (CHD)

Heart disease is the leading cause of death in the United States with 1 out 4 people

dying from it (CDC, 2017). Coronary Heart Disease is the most common type of heart disease,

where plaques build up inside the coronary arteries and prevent oxygen-rich blood to the heart

(NIH, 2016). Depression is a highly prevalent risk factor for CHD with 9.3% of individuals with

cardiac disease compared to 4.8% with no comorbid disease (Edgede, 2007). A systematic

review reported that 20% of CHD patients met criteria for a major depressive disorder, and 47%

experienced depressive symptoms (Bush, Ziegelstein, Patel, Thombs, Ford, Fauerbach, & Bass,

2005). Depression was also found to be three times as high after an acute myocardial infarction

(AMI), especially among women (Thombs, Bass, Ford, Stewart, Tsilidis, Patel, Fauerbach, Bush,

& Ziegelstein, 2006; Kessler, 2003; Pilote, Dasgupta, Guru, Humphries, McGrath, Norris, Rabi,

Tremblay, Alamian, Barnett, Cox, Ghali, Grace, Hamet, Ho, Kirkland, Lambert, Libersan,

O'Loughlin, Paradis, Petrovich, & Tagalakis, 2007).

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease is a very common lung disease that affects over 30 million of Americans (COPD Foundation, 2017). COPD has a significant impact on the quality of life such as restriction of activities, sleeping problems, and limitation of social life (Yohannes, & Alexopoulos, 2015). These restrictions highly affect mental health. Around 40% patients are affected by depressive symptoms or major depression (Stage, Middelboe, Stage, & Sorensen, 2006). Depression contributes to a substantial burden to reduce adherence to treatment due to overlapping symptoms (Yohannes, & Alexopoulos, 2015; Stage, et al., 2006).

Stroke

Although the comorbidity of stroke and depression has been understudied, post-stroke depression (PSD) is a concern that has often been overlooked and untreated (Narushima, & Robinson, 2002). Post-stroke depression is a common psychiatric disorder as a consequence of stroke, and it can greatly reduce the quality of life of a patient. According to epidemiological studies, one-third of patients experience early- or late-onset of depression (Gaete, & Bogousslavsly, 2014). Studies showed that 30% of patients experience minor depression and 25% experience major depression following stroke (Alajbegovic, Djelilovic-Vranic, Alajbegovic, Nakicevic, Todorovic, & Tiric-Campara, 2014). Stroke patients with PSD suffer from higher mortality rate and slower functional recovery (Paolucci, 2008). PSD is often not diagnosed appropriately due to somatic symptoms caused by medical illness and cognitive impairment (Paolucci, 2008). PSD is potentially treatable; however, there has not been enough antidepressant agent or nonpharmacological interventions' benefits observed (Gaete, & Bogousslavsly, 2014).

<u>Underweight, Overweight and Obesity/ BMI</u>

Obesity has long been a public health concern. It is a complex health issue that is associated with poor mental health, reduced quality of life, and it is the leading cause of death in the United States (CDC, 2017). It also contributes to diabetes, heart disease, stroke, and cancer (CDC, 2017). According to CDC, 43% of adults with depression are obese, and as the obesity rate increases, the severity of depressive symptoms also increases (CDC, 2014). In all age groups, women with depression were more likely to be obese than women without depression (CDC, 2014). Treatments and interventions are available for both conditions, and it was found that weight loss may improve mood (Society for the Study of Ingestive Behavior, 2009).

Studies show that BMI classification (underweight, normal, overweight and obesity) and depression demonstrate a U-shaped relationship, where there is a higher prevalence of depression among underweight and obese patients (Carey, Small, Yoong, Boyes, Bisquera, & Sanson-Fisher, 2014).

Physical and Strength activities and Depressive Symptoms

There is a substantial number of studies showing the positive effects of physical activity on mood, anxiety, and general well-being. Most depressed patients first seek treatment from their primary health care provider, where they receive pharmacologic therapy alone (Craft, & Perna, 2004). Behavioral interventions such as exercising has shown to reduce the risk of developing depression, and to alleviate symptoms of depression (O'Neal, Dunn, & Martinsen, 2000). While most studies focused on the relationship between aerobic physical activity and depression, resistance-training has also been assessed and has shown to reduce symptoms of

depression as well (Craft, & Perna, 2004). Both aerobic exercise and strength training was found

to be sufficient to reduce symptoms of depression (Craft, & Perna, 2004). Also, exercising was

found to be comparable to standard care approaches, where individuals who met CDC' s

recommendation had a similar beneficial effect on depressive symptoms as antidepressant

treatments (Dinas, Koutedakis, & Flouris, 2010).

Mind-Body Therapies and Depressive Symptoms

CAM modalities such as acupuncture, yoga, meditation, and stress and relaxation

techniques have shown to decrease psychological distress, like depressive symptoms and

anxiety (Deckro, Ballinger, Hoyt, Wilcher, Dusek, Myers, Greeberg, Rosenthal, & Benson., 2002).

With the increased use of CAM, it was found that 24% adults who have anxiety/ depression use

mind-body medicine therapies among the 34 million mind-body therapy users (D'Silva,

Poscablo, Habousha, Kogan, & Kligler, 2012). Women are often found to practice mind-body

therapies more often than men. Women with higher levels of education and higher income

were found to use CAM at the greatest (NIH, 2017). Mind-body therapies include progressive

muscle relaxation, meditation, hypnosis, guided imagery, yoga, and biofeedback. These

approaches have been shown to be effective in reducing stress and anxiety, as well as chronic

pain. However, levels of evidence vary (Hassed, 2013). The mind, emotions, and attention play

an important role in patients experiencing chronic pain, stress, and fear (Hassed, 2013). The use

of mind-body therapies can alleviate depression severity by improving one's emotional state

and mental health (Hassed, 2013). It helps patients focus their physical movement to train

attention or produce mental relaxation (Hassed, 2013). A well-known and often popular mind-

body therapy is yoga. Studies have found that yoga has improved mood and well-being by helping people master anxiety through self-care (Brown, Gerbarg, Philip, & Muskin, 2009).

Gaps in Knowledge and Limitations of Previous Studies

As the popularity of the use of mind-body therapies continues to grow, additional research is needed to determine the number of mind-body therapies necessary to see an effect on depressive symptoms. Previous studies have consistently reported that mind-body therapies help improve mental health. However, very few studies have specified how frequent mind-body therapies are used. Most studies analyzed the efficacy of mind-body modalities for stress reduction and pain reduction with a chronic condition. Moreover, existing reviews tend to focus their research on the prevalence use of CAM in a specific clinical population (Bishop, & Lewith, 2010). This study assessed the association between the use of mind-body therapy and depressive symptoms, where the number of mind-body therapies one has ever practiced was considered in the analyses.

OBJECTIVE

The objective of this study was to assess the association between the use of mind-body therapy and depressive symptoms. The analyses presented focus on determining whether mind-body therapy users are more or less likely to be depressed.

<u>Research Questions and Hypotheses</u>

Questions:

1. Is there an association between the use of mind-body therapy and depressive symptoms?

2. Is the frequency of the use of mind-body therapy associated with depressive symptoms?

Hypotheses:

1. There is a positive association between the use of mind-body therapy and depressive symptoms.

2. There is a positive association between the frequency use of mind-body therapy and depressive symptoms

METHODS

Data source

This study used the 2012 National Health Interview Survey (NHIS), a cross-sectional interview survey. The NHIS is part of the National Center for Health Statistics (NCHS), which is part of the Centers for Disease Control and Prevention (CDC). The NHIS is a source of information on the health of the noninstitutionalized population of the United States that began in 1957 as the result of the National Health Survey Act of 1956. It is an ongoing, nationwide, household interview survey about the overall health and health behaviors of a sampled population in the United States.

The NHIS sampling plan consists of a multistage sampling, stratification and clustering of addresses located in the primary sampling units (PSU's), which represents county and small neighboring counties, or a metropolitan statistical area. Individuals are randomly selected, and information is collected with the Sample Adult Core and the Sample Child Core questionnaire. Questionnaires consist of Core questions and Supplemental questions. Core questions addresses basic demographic information and health status on each household member. Supplemental questionnaire addresses new public health data such complementary and alternative medicine (CAM), Healthy People 2020, Children's Mental Health, and Healthcare Utilization. NHIS has an oversampled population of Black, Hispanic, and Asian aged 65 or older, which means that they have a higher chance to be selected, so that these population groups are adequately representative as the population in the United States.

NHIS datasets are available to the public on the CDC website in ASCII format. These datasets are downloadable and output files available for use in several statistical software

packages. Sample syntax are also available for SAS, SPSS, and Stata. For this study, the Sample

Adult file and the Adult Alternative Medicine file were used and analyses were conducted using

SAS 9.4.

NHIS is a secondary data and is a pre-approved public data source that did not require

the Institutional Review Board (IRB) approval determined by Georgia State University IRB policy.

Study Population

The study population of interest are adults in the United States who use mind-body

therapies.

Study Sample and Variables

The study sample includes all participants in the Sample Adults and the Adult

Complementary and Alternative Medicine datasets. The total study consisted of 34,525

participants aged 18 years and older. Only individuals who responded to all questions regarding

having depressive symptoms and using at least one mind-body therapy: "During the past 30

days, how often did you feel so sad that nothing could cheer you up, nervous, restless or

fidgety, hopeless, that everything was an effort, and worthless?" and "Have you EVER

practice/use chiropractic or osteopathic manipulation, yoga, meditation (mantra meditation,

mindfulness meditation, spiritual meditation), massage, guided imagery, progressive relaxation,

tai chi, qi gong, acupuncture, biofeedback, hypnosis, or Alexander Technique?" were included

in the analyses. The total eligible sample adults for the present analysis consisted of 11,143

participants. Among the 11,143 participants, 62% reported moderate to high symptoms of

depression and 52% reported having none to low symptoms of depression while indicating the use of at least one mind-body therapy.

Outcome of Interest

NHIS used the Kessler 6 (K6) screening scale, which is a standardized and validated measure of non-specific psychological distress, to assess depressive symptoms, the dependent variable in this study. K6 is composed of 6 questions asking, "During the past 30 days, how often did you feel so sad that nothing could cheer you up, nervous, restless or fidgety, hopeless, that everything was an effort, and worthless?" Responses were categorized as 0 (All of the time), 1 (Most off the time), 2 (Some of the time), 3 (A little of the time), 4 (None of the time). Individuals who answered "Refused" or "Don't know" were excluded in the analyses. The scores were reversed in the study and were summed up to produce the outcome variable of interest. The lower the score indicates a better mental health. Scores ranges from 0 (No psychological distress) to 24 (Severe distress). The scores are classified into three distress groups: (0 - 12) none or low distress, (13 - 18) moderate distress, and (19 - 24) serious distress (Andrews & Slade, 2001; Kessler et al., 2010; Prochaska, Sung, Max, Shi, & Ong, 2012). Due to the lack of statistical power, depressive symptoms were also categorized as a dichotomous variable (Yes/No). Participants with a score lower than 7 were considered as not having psychological distress and higher than 7 as having psychological distress.

Mind-Body Therapies

The independent variable, the used of Mind-Body therapies, was determined using questions such as "Have you EVER practice/use chiropractic or osteopathic manipulation, yoga, meditation (mantra meditation, mindfulness meditation, spiritual meditation), massage, guided

imagery, progressive relaxation, tai chi, qi gong, acupuncture, biofeedback, hypnosis, or Alexander Technique?" Individuals who responded "Mentioned" were assumed to have used at least one type of mind-body therapy, and "Not Mentioned" as never used mind-body therapy. Responses were gathered and were classified by the number of mind and body therapies used (0, 1, 2, …, 10). All responses of "Refused", "Not Ascertain", and "Don't Know" were excluded from the analysis due to small number of responses. Mind-Body modalities therapies such as Biofeedback, Hypnosis, Qi Gong, Alexander Technique, and Trager Psychophysical Integration were excluded from the binomial and multinomial logistic regression analyses due to small sample size. Three variables were created with these questions, a dichotomous variable (yes/no): whether an individual has practiced mind-body therapy; the number of mind-body therapies practiced per individual; and whether an individual practiced selected mind-body therapies. Selected mind-body therapies include yoga, meditation, chiropractic/osteopathic manipulation, and massage therapy. These therapies are the four most commonly used practices according to NHIS (NIH, 2017). Due to the lack of statistical power, only the four-selected mind-body therapies were included in the logistic regression analysis and generalized linear mixed model analyses. The number of mind-body therapies practiced was considered as both a continuous and categorical variable. The number of mind-body modalities was not part of the NHIS survey questions, however, in the analyses, the number of mind-body modalities was combined into four categories. These four categories consist of zero, one, two, and more than three types of mind-body therapies used.

Sociodemographic Variables

Sociodemographic variables were categorized as follows: gender (male, female), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Asian, Other/ Non-Hispanic Multiple race), and region was categorized as Northeast, Midwest, South, and West. The value of age was considered as a continuous variable in its measured form. The sample size was exclusive to adults 18 years of age and above. The response of "Not Released" for race was excluded from the analyses due to small number of individuals who refused to release their race/ ethnicity.

Chronic Conditions

Chronic diseases such as Coronary Heart Disease, Stroke, Emphysema, Chronic Obstructive Pulmonary Disease (COPD), Asthma, Cancer, Diabetes, Arthritis, and BMI were included in the study as possible factors contributing to depressive symptoms. Question such as "Have you ever been told by a doctor or other health professional that you have Coronary Heart Disease, Stroke, Emphysema, Chronic Obstructive Pulmonary Disease (COPD), Asthma, Cancer, Diabetes, or Arthritis" were asked to determine if an individual has certain chronic conditions. Responses such as "Yes" were considered in the analyses. All responses of "Refused", "Not Ascertain", and "Don't Know" were excluded from the analyses. NHIS calculated BMI based on the height and weight variables using the equation: BMI= [Weight (kg)/ [Height (m) squared]] rounded to 2 decimal places. The value of BMI was considered as both continuous and categorical variable. BMI is categorized as underweight for a BMI below 18.5, Normal for a BMI of 18.5 to 24.9, Overweight as 25.0 to 29.9, and Obese for 30.0 and above (Centers for Disease Control and Prevention, 2017). Due to the lack of statistical power,

emphysema was excluded from the logistic regression analysis and generalized linear mixed

model analysis due to small sample sizes with some of the covariates used in these analyses.

<u>Physical and Strength Activities</u>

The frequency and duration of light/moderate activity and vigorous physical activity

were assessed with questions "How often do you do LIGHT or MODERATE leisure-time physical

activities for AT LEAST 10 MINUTES that cause ONLY LIGHT sweating or a SLIGHT to MODERATE

increase in breathing or heart rate?" and "How often do you do VIGOROUS leisure-time

physical activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in

breathing or heart rate?" According to the 2008 Physical Activity Guidelines (PAG) for

Americans, adults should do at least 150 minutes a week of moderate- intensity (such as brisk

walking or tennis), 75 minutes a week of vigorous intensity aerobic physical activity (such as

jogging or swimming laps), or an equivalent combination of moderate-intensity and vigorous-

intensity aerobic physical activity (Office of Disease Prevention and Health Promotion, 2017).

Light/Moderate and vigorous physical activity were combined and categorized into two levels:

inactive and active. Adults who met the PAG guidelines of engaging in physical activity for at

least 10 minutes per week were classified as "active," and those who did not meet the criteria

were classified as "inactive." Strength activity was assessed with the question: "How often do

you do physical activities specifically designed to STRENGTHEN your muscles such as lifting

weights or doing calisthenics?" Weekly frequency was used to measure respondents' level of

physical and strength activities. Strength activity was also categorized into two levels: inactive

and active. Adults who did muscle strengthening activities (such as lighting weights or using

resistance bands) for all major muscle groups on 2 or more days a week were classified as "active." Adults who did not do any muscle strengthening activity were classified as "inactive."

Statistical Analyses

All analyses were conducted using the statistical software SAS 9.4. NHIS datasets responses were weighted accordingly based on the 2010 U.S. Census data to ensure that the sample was nationally representative.

Descriptive statistics were conducted to summarize the characteristics of the overall study sample. The weighted and unweighted frequencies for all demographics variables, covariates and depressive symptoms are summarized in Table 1 and Table 4. Table 1 includes the frequencies of individuals with depressive symptoms categorized by three levels: Low, Moderate, and High. Table 4 presents the frequencies of individuals with depressive symptoms as a dichotomous variable. PROC FREQ and PROC SURVEYFREQ were used to estimate the unweighted and weighted frequencies for depressive symptoms and each categorical variable. PROC MEANS and PROC SURVEYMEANS were used to produce the unweighted and weighted means for continuous variables (Age, BMI, and Number of mind-body therapies). Stratification, clustering, and sampling weight variables were utilized in PROC SURVEYFREQ and PROC SURVEYMEANS to indicate the structure of the data, and NOMCAR was specified to treat missing data as "not missing completely at random."

Ordinal Logistic Regression was first performed to predict the probability of depressive symptoms given the use of mind-body therapies. In the ordinal logistic regression analysis, the three levels of depressive symptoms (No to Low depressive symptoms, Moderate depressive symptoms, and High depressive symptoms) were used. PROC LOGISTIC and PROC

SURVEYLOGISTIC with the default logit link were used to test the proportional odds assumption. The score test and p-value were observed in order to determine whether the proportional odds assumption was violated in the cumulative logistic regression model. If the assumption does not hold, the more general multinomial logistic regression model will be used.

Multinomial Logistic Regression was used to predict the probability of the categorical outcome of interest given the independent variables. Multinomial Logistic Regression used the three categories depressive symptoms variable (No to Low depressive symptoms, Moderate depressive symptoms, and High depressive symptoms). PROC LOGISTIC and PROC SURVEYLOGISTIC were used to produce the unadjusted and adjusted odds ratio, 95% confidence interval, and the p-value. The summary can be found in Tables 2 and 3. The STRATA, CLUSTER, and WEIGHT statement options were specified in the same manner as PROC SURVEYFREQ and PROC SURVEYMEANS. To fit the model using a generalized logit function, the LINK=GLOGIT option was specified in the MODEL statement.

Due to estimation error in the generalized linear mixed model with the three levels of depressive symptoms, the outcome was categorized into a dichotomous variable. Depressive symptoms was categorized as No/Low depressive symptoms, and Moderate/High depressive symptoms. Binomial Logistic Regression was then used to predict the probability of the categorical outcome of interest given the independent variables. In order to run the binomial logistic regression analysis, PROC LOGISTIC and PROC SURVEYLOGISTIC were used to produce the unadjusted and adjusted odds ratio, 95% confidence interval, and the p-value. The summary can be found in Tables 5 and 6. The STRATA, CLUSTER, and WEIGHT statement options were specified in the same manner as PROC SURVEYFREQ and PROC SURVEYMEANS. To

fit the generalized logit models, the LINK=GLOGIT option was specified in the MODEL

statement.

Generalized linear mixed models were used to predict the probability of depressive

symptoms given the use of mind-body therapy while accounting for clustering of observations

by region. PROC GLIMMIX was used to produce the unweighted unadjusted and adjusted odds

ratio, 95% confidence interval, and the p-value. The WEIGHT statement was not used due to

the nature of the data. Due to estimation error, the dichotomous variable of depressive

symptoms was used in this model. A binomial distribution with a logit link function was

specified. Region was specified as a random effect. The summary of the generalized linear

mixed model analysis can be found in Table 7.

RESULTS

Descriptive Statistics

Characteristics of the study sample are presented in Table 1 and 4. Table 1 presents

individuals with depression symptoms, where depressive symptoms are categorized by three

levels. Table 4 presents individuals with depressive symptoms, where depressive symptoms are

categorized by two levels. All statistical interpretations observed use the weighted models, and

the depressive symptoms categorized by two levels. Approximately 6% of this study sample

reported having moderate and 2% reported having high depressive symptoms. Among these

individuals, 50.79% were women and 49.21% were men. The mean age for those reported

having experienced depressive symptoms was 38.38 years of age. Most of the study sample

who reported moderate/high depressive symptoms was non-Hispanic White (68.78%)

compared to Hispanic (14.20%), non-Hispanic Black (9.62%), non-Hispanic Asian (2.71%), and

other race (4.68%). Individuals the South region of the United States (33.05%) were more likely

to be depressed compared to West (28.51%), Midwest (23.18%), and Northeast (15.26%). A

map of the U.S. with NHIS grouping of regions can be seen in Figure 1. Among all chronic

conditions (arthritis, asthma, diabetes, cancer, CHD, COPD, stroke, emphysema, and BMI

classification) explored in this analysis, individuals with arthritis, asthma, and

overweight/obesity had the highest prevalence of depressive symptoms with 21.54%, 20.38%,

31.47%, and 32.37% respectively. When asked if individuals with moderate/high depressive

symptoms had practiced at least one of the mind-body therapies (yoga,

chiropractic/osteopathic manipulation, massage, meditation, Pilates, acupuncture, tai chi,

progressive relaxation, guided imagery, hypnosis, qi gong, biofeedback, alexander technique, or

Trager psychophysical integration), 62.18% responded "Yes" and 37.82% responded "No."

Among those who reported moderate/high depressive symptoms, 37.78% reported never used

any type of mind-body modalities, 24.11% reported using one type of mind-body modalities,

11.87% reported using two types of mind-body modalities, and 26.23% reported using more

than 3 types of mind-body modalities. Out of the most commonly practiced mind-body

therapies (yoga, meditation, massage, and chiropractic/osteopathic manipulation), 58.97% of

respondents reported moderate/high depressive symptoms compared to 48.69% who reported

no/low depressive symptoms. For physical and strength activities, 87.92% reported having

moderate/high depressive symptoms compared to 92.39% who reported no/low depressive

symptoms when exercising for at least 150 minutes a week of moderate-intensity activities or

75 minutes a week of vigorous-intensity aerobic physical activities. Among individuals who

reported moderate/high depressive symptoms, 36.96% reported engaging actively in weight

training at least once a week compared to 63.04% of individuals who did not report engaging in

weight training.

Ordinal Logistic Regression

Ordinal logistic regression analysis was performed to examine how the variable of

interest and the covariates were associated with depressive symptoms. The score test and

p-value were observed to assess the proportional odds assumption test. Results showed a

significant p-value for all variables. For example, age had a chi-square value of 8.38 and a p-

value of 0.0038, and the use of at least one mind-body therapy had a chi-square value of 13.09

with a p-value of 0.0003. These results showed a violation of the proportional odds assumption

test, therefore, a multinomial logistic regression model was best used.

Multinomial Logistic Regression

Multinomial logistic regression analyses were conducted to examine how the variable of interest and the covariates were associated with depressive symptoms. Tables 2 and 3 present odds ratio, 95% confidence interval (95% CI), and p-value for demographic characteristics, physical and strength activities, and mind-body modalities among those who have reported experiencing no/low depressive symptoms, moderate depressive symptoms, and high depressive symptoms.

In the weighted unadjusted multinomial logistic regression model, for each additional year of age, the odds of having moderate or high depressive symptoms as compared to a none/low level of depressive symptoms was close to 1 [OR= 0.99, 95% CI (0.98, 1.00)]. The results were similar for BMI [high vs low: OR= 1.01, 95% CI (1.00, 1.02)], [moderate vs low: OR= 1.01, 95% CI (1.00, 1.02)]. Females were more likely to have moderate vs low [OR= 1.04, 95% CI (0.85, 1.28)] or high vs low [OR=1.68, 95% CI (1.19, 2.39)] depressive symptoms than males. Hispanic participants were more likely to have moderate vs low [OR= 1.13, 95% CI (0.84, 1.52) or high vs low [OR= 1.69, 95% CI (1.08, 2.65)] depressive symptoms compared to Non-Hispanic Whites. Non-Hispanic Black participants were equally likely to have moderate depressive symptoms as compared to low depressive symptoms [OR= 0.97, 95% CI (0.71, 1.34)], but had increased odds for high vs low depressive symptoms [OR= 1.44, 95% CI (0.85, 2.42)]. Non-Hispanic Asians were less likely to have moderate vs low [OR=0.63, 95% CI (0.42, 0.93)] or high vs low [OR=0.33, 95% CI 0.10, 1.10)] depressive symptoms as compared to non-Hispanic Whites. Arthritis, asthma, diabetes, COPD, and BMI classification were statistically significantly associated with depressive symptoms in this multinomial logistic regression model. Participants

with arthritis had increased odds for both moderate vs low [OR=1.37, 95% CI (1.09, 1.73)] and high vs low [OR=2.38, 95% CI (1.59, 3.55)] depressive symptoms. Similarly, for participants with asthma, participants had increased odds for moderate vs low [OR=1.93, 95% (1.50, 2.49)] and high vs low [OR= 2.21, 95% CI (1.46, 3.34)] depressive symptoms. Participants with diabetes and stroke also showed increased odds for moderate vs low and high vs low depressive symptoms. Diabetic participants were more likely to have moderate vs low depressive symptoms [OR= 1.61, 95% CI (1.09, 2.40)] and high vs low depressive symptoms [OR= 1.99, 95% CI (1.19, 3.34)] as compared to non-Diabetic participants. Participants diagnosed with COPD were more likely to have moderate vs low [OR=1.60, 95% CI (0.90, 4.26)] or high vs low [OR= 7.94, 95% CI (3.61, 17.46)] depressive symptoms than those who had never been diagnosed with COPD. Those who reported using at least one mind-body therapy were more likely to experience moderate vs low depressive symptoms [OR= 1.60, 95% CI (1.30, 1.98)] and high vs low depressive symptoms [OR= 1.19, 95% CI (0.86, 1.64)]. Participants who reported using the most common mind-body therapies (yoga, meditation, acupuncture, and chiropractic/ osteopathic manipulation) also showed an increased odd for moderate vs low [OR= 1.57, 95% CI (1.27, 1.93)] and high vs low [OR= 1.33, 95% CI (0.97, 1.83)] depressive symptoms. Individuals who reported using multiple mind-body therapies were more likely to experience moderate vs low [OR= 1.13, 95% CI (1.08, 1.17) or high vs low [OR= 1.14, 95% CI (1.07, 1.22)] depressive symptoms. Individuals who reported physical activity and strength activity were less likely to have moderate vs low depressive symptoms [OR=0.62, 95% CI=0.42, 0.92] and were less likely to have high vs low [OR=0.52, 95% CI= 0.30, 0.90] depressive symptoms, and individuals who reported weight

lifting were similarly less likely to have both moderate vs low [OR= 0.78, 95% CI= 0.65, 0.95] and high vs low [OR= 0.56, 95% CI (0.38, 0.81)].

In the weighted adjusted multinomial logistic regression model, age [moderate vs low depressive symptoms: OR= 0.97, 95% CI (0.97, 0.98); high vs low depressive symptoms: OR= 0.97, 95% CI (0.97, 0.98)], race [moderate vs low depressive symptoms: Hispanic: OR= 1.13, 95% CI (0.82, 1.56), NH-Black: OR= 0.93, 95% CI (0.66, 1.31), NH-Asian: OR= 0.73, 95% CI (0.49, 1.09); high vs low depressive symptoms: Hispanic: OR= 1.68, 95% CI (1.05, 2.70), NH-Black: OR= 1.34, 95% CI (0.77, 2.36), NH-Asian: OR= 0.36, 95% CI (0.11, 1.19)], arthritis [moderate vs low depressive symptoms: OR= 1.49, 95% CI (1.14, 1.96); high vs low depressive symptoms: OR= 2.96, 95% CI (1.76, 4.92)], asthma [moderate vs low depressive symptoms: OR= 1.56, 95% CI (1.20, 2.02); high vs low depressive symptoms: OR= 1.49, 95% CI (0.96, 2.31)], diabetes [moderate vs low depressive symptoms: OR= 1.78, 95% CI (1.15, 2.76); high vs low depressive symptoms: OR= 1.87, 95% CI (1.04, 3.37)], COPD [moderate vs low depressive symptoms: OR= 1.72, 95% CI (0.74, 4.04); high vs low depressive symptoms: OR= 7.05, 95% CI (2.95, 16.97)], the use of at least one mind-body therapy [moderate vs low depressive symptoms: OR=1.41, 95% CI (0.85, 2.33); high vs low depressive symptoms: OR= 0.21, 95% CI (0.06, 0.77)], number of mind-body therapies used [moderate vs low depressive symptoms: OR= 1.11, 95% CI (1.05, 1.18); high vs low depressive symptoms: OR= 1.14, 95% CI (1.05, 1.24)], and strength activity [moderate vs low depressive symptoms: OR= 0.75, 95% CI (0.62, 0.91); high vs low depressive symptoms: OR= 0.56, 95% CI (0.37, 0.83)] remained statistically significant with the association of moderate or high vs low depressive symptoms when controlling for all other variables. BMI,

physical activity, and selected mind-body therapies became statistically insignificant when controlling for all other variables in this model.

Binomial Logistic Regression

Binomial logistic regression analyses were conducted to examine how the variable of interest and the covariates were associated with depressive symptoms as a dichotomous variable. Tables 5 and 6 present odds ratios, 95% confidence interval (95% CI), and p-values for demographic characteristics, physical and strength activities, and mind-body modalities among those who have reported experiencing no/low depressive symptoms and moderate/high depressive symptoms.

In the weighted unadjusted binomial logistic model, age and race were demographic characteristics that yielded a statistically significant association with depressive symptoms. For each additional year of age, the odds of being depressed had a 0.99 decrease in odds [OR= 0.99, 95% CI (0.98, 0.99)]. Hispanic [OR= 1.23, 95% CI (0.96, 1.58)] and non-Hispanic Blacks [OR= 1.06, 95% CI (0.79, 1.42)] had increased odds of experiencing depressive symptoms as compared to non-Hispanic Whites. Non-Hispanic Asians [OR= 0.58, 95% CI (0.39, 0.85)] had decreased odds of experiencing depressive symptoms. Sex [OR= 1.14, 95% CI (0.95, 1.37)] and region [South: OR=0.88, 95% CI (0.70, 1.10); Midwest: OR= 0.87, 95% CI (0.67, 1.13); Northeast: OR= 0.89, 95% CI (0.69, 1.16)] did not yield statistically significant associations with depressive symptoms. Most chronic conditions including arthritis [OR= 1.55, 95% CI (1.27, 1.89)], asthma [OR=1.98, 95% CI (1.59, 2.48)], diabetes [OR=1.69, 95% CI (1.22, 2.34)], and COPD [OR=3.09, 95% CI (1.76, 5.410)] yielded statistically significant associations with depressive symptoms. Other chronic conditions such as cancer [OR= 1.19, 95% CI (0.88, 1.62)], CHD [OR=1.36, 95% CI (0.79, 2.32)],

and stroke [OR=1.39, 95% CI (0.82, 2.35)] did not yield statistically significant associations with depressive symptoms. Underweight as compared to normal weight participants were more likely to be depressed [1.58, 95% CI (0.69, 3.62)] and overweight vs normal weight participants were slightly more likely to be depressed [OR=1.05, 95% CI (0.83, 1.33)]. Obese as compared to normal weight individuals were more likely to be depressed [OR= 1.52, 95% CI (1.19, 1.94)]. Both physical activities [OR= 0.60, 95% CI (0.43, 0.84)] and strength activities [OR= 0.73, 95% CI (0.62, 0.87)] were negatively associated with depression. The use of at least one mind-body therapy [OR= 1.51, 95% CI (1.26, 1.81)], the use of selected mind-body therapies [OR=1.51, 95% CI (1.27, 1.81)], and the number of mind-body therapies used [OR=1.13, 95% CI (1.09, 1.17)] all yielded statistically significant association with depressive symptoms. The odds of being depressed increased with the use of mind-body therapies. This could also be interpreted as depressed individuals were more likely to be using mind-body therapies. This interpretation aligned with findings in some studies in the literature.

When comparing the unweighted and weighted unadjusted binomial logistic regression results, sex was found to be statistically significant in the unweighted model [OR= 1.24, 95% CI (1.09, 1.43)] but became statistically insignificant when accounting for sampling weights [OR= 1.14, 95% CI (0.95, 1.37)]. When region was included as a fixed effect, region [South: OR= 0.82, 95% CI (0.70, 0.97), Midwest: OR= 0.76, 95% CI (0.62, 0.92), Northeast (OR= 0.87, 95% CI (0.70, 1.07)] was also statistically significant in the unweighted model but statistically insignificant in the weighted model.

In the weighted adjusted logistic model, sex [OR=0.99, 95% CI (0.81, 1.21)], region [South: OR=0.94, 95% CI (0.75, 1.17); Midwest: OR= 0.87, 95% CI (0.67, 1.12), and Northeast:

OR= 0.95, 95% CI (0.71, 1.27)], BMI [OR= 1.01, 95% CI (1.00, 1.01)], CHD [OR= 1.54, 95% CI (0.85, 2.79)], stroke [OR= 1.03, 95% CI (0.56, 1.92)], the use of at least one mind-body therapy [OR= 1.12, 95% CI (0.69, 1.83)], and most common used mind-body therapies [OR= 1.09, 95% CI (0.69, 1.75)] all failed to reach statistically significant level associations with depressive symptoms while controlling for all other variables in this model. Age [OR= 0.97, 95% CI (0.96, 0.98)], race [Hispanic: OR= 1.23, 95% CI (0.94, 1.61), non-Hispanic Black: OR= 1.01, 95% CI 0.74, 1.38), non-Hispanic Asian: OR= 0.66, 95% CI (0.44, 0.97, and non-Hispanic Other: OR= 1.88, 95% CI (1.12, 3.18)], arthritis [OR= 1.72, 95% CI (1.36, 2.17)], asthma [OR= 1.55, 95% CI (1.23, 1.95)], diabetes [OR= 1.81, 95% CI (1.26, 2.59)], the number of mind-body therapies used [OR= 1.12, 95% CI (0.69, 1.83)], physical activity [OR= 0.67, 95% CI (0.47, 0.95)], and strength activity [OR= 0.71, 95% CI (0.60, 0.84)] remained significantly associated with depressive symptoms when controlling for all other variables in this model. Cancer [OR= 1.23, 95% CI (1.02, 2.01)] and COPD [OR= 2.70, 95% CI (1.45, 5.03)] were found statistically significant when controlling for all other variables compared to the unadjusted logistic regression model.

Generalized Linear Mixed Model

Generalized Linear Mixed Model results account for clustering by region are presented in Table 7. In the unadjusted multilevel modeling model, for each additional year of age, the odds of having depressive symptoms decreased by 0.97 [OR= 0.97, 95% CI (0.97, 0.98)]. Hispanics [OR= 1.26, 95% CI (1.03, 1.55)] had higher odds of having depressive symptoms, while non-Hispanic Blacks [OR= 0.18, 95% CI (0.95, 1.47)] and non-Hispanic Asians [OR= 0.82, 95% CI (0.57, 1.18)] were less likely to have depressive symptoms. Similarly, to binomial and multinomial logistic regression models, arthritis [OR= 1.80, 95% CI (1.49, 2.18)], asthma [OR=

1.65, 95% CI (1.38, 1.97)], diabetes [OR= 1.82, 95% CI (1.39, 2.38), COPD [OR= 2.38, 95% CI

(1.48, 3.82)], and stroke [OR= 1.87, 95% CI (1.14, 3.07)] were statistically significantly associated

with depressive symptoms. Cancer [OR=1.47, 95% (1.13, 1.92)] was found to be statistically

significant in this model. Physical activity and strength activity had 0.76 and 0.73, respectively,

the odd of being more likely to have depressive symptoms. Weight categorization results were

similar, with slightly different odds ratio point estimates. As for mind-body modalities, only the

number of mind-body therapies used was found to be statistically significant with a negative

association with depressive symptoms.

In the adjusted multilevel model, sex [OR= 1.08, 95% CI (0.93, 1.25)], BMI [OR= 1.00,

95% CI (0.99, 1.01)], CHD [OR= 1.37, 95% CI (0.88, 2.13)], the used of at least one mind-body

therapy [OR= 1.04, 95% CI (0.70, 1.55)], and selected mind-body therapies [OR= 1.07, 95% CI

(0.72, 1.59)] all failed to yield statistically significant with depressive symptoms. All other

variables: age [OR=0.97, 95% CI (0.97, 0.980; race: Hispanic [OR= 1.26, 95% CI (1.03, 1.55)], NH-

Black [OR= 0.18, 95% CI (1.18, 95% CI (0.95, 1.47)], NH- Asian [OR=0.82, 95% CI (0.57, 1.18), NH-

Other [OR= 1.60, 95% CI (1.13, 2.27)]; arthritis [OR= 1.80, 95% CI (1.49, 2.18)]; asthma [OR=

1.65, 95 CI (1.38, 1.97)]; diabetes [OR= 1.82, 95% CI (1.39, 2.38)]; cancer [OR= 1.47, 95% CI

(1.13, 1.92)]; CHD [OR=1.37, 95% CI (0.88, 2.130); COPD [OR= 2.38, 95% CI (1.48, 3.82)], BMI

Classification: underweight [OR= 1.11, 95% CI (0.61, 2.01)], overweight [OR= 1.16, 95% CI (0.97,

1.39)], obese [OR= 1.45, 95% CI (1.16, 1.80)]; number of mind-body therapies used [OR= 1.12,

95% CI (1.07, 1.16)]; physical activity [OR= 0.75, 95% CI (0.60, 0.94)]; and strength activity [OR=

0.69, 95% CI (0.60, 0.80)], yielded statistical significance when controlling for all other variables.

Multilevel modeling with clustering observation by region added a layer of complexity

that was likely adding to the complexity of the modeling process, with marginal added benefit.

DISCUSSION

The aim of this study was to investigate the association between the use of mind-body therapies and depressive symptoms. The results from this analysis are consistent with previous finding. Results of this study showed a negative association between the use of mind-body therapy and mental health. Results in the analyses were quite contradictory, where in the unadjusted multinomial logistic regression, the use of at least one mind-body therapy, the number of mind-body therapies used, and the most common used mind-body therapies all yielded statistically significant association with depressive symptoms, but in the adjusted multinomial logistic regression, the most common used mind-body therapies were not associated with depressive symptoms. Moreover, the binomial logistic regression analyses show the same pattern, where in the unadjusted binomial logistic regression, the use of at least one mind-body therapy, the number of mind-body therapies used, and the most common used mind-body therapies all yielded statistically significant association with depressive symptoms. However, in the adjusted binomial logistic regression, only the number of mind-body therapies used remained statistically significant. This contradiction makes the interpretation of the results difficult. All unadjusted models indicate that there were a statistically significant association between the association of the use of mind-body therapy and depressive symptoms, but become statistically insignificant when controlling for all other variables. This means that there is an effect modifier, where different groups of individuals (e.g., region) may affect depressive symptoms differently. For example, people living in the West of the United States are often found to be less depressed than people living in the South of the United States (CDC, 2010).

When only observing the statistically significant association between the use of mind-body therapy and depressive symptoms, results suggest that individuals who use mind-body therapies are more likely to be depressed individuals. These results support the research literature, where depressed individuals are more likely to seek out additional treatment to reduce stress or to find a cure (Bishop, & Lewith, 2010). In the context of CAM usage, individuals who suffer from chronic conditions or have a life-threatening disease were more likely to use mind-body modalities (Bishop, & Lewith, 2010). Moreover, individuals who are not satisfied by conventional medicine and who are experiencing psychological distress were also more likely to turn to CAM modalities (Lee-Treweek, 2005). Mind-body therapies have shown to be beneficial for the improvement of mental health. Although this study does not allow for assessing the causal relationship of mind-body therapies and depressive symptoms due to the nature of the data, an experimental study may be beneficial to assess the causal relationship between mind-body therapies and depressive symptoms.

The logistic regression analyses results reflect and correspond to epidemiological data about chronic conditions and depressive symptoms. The findings support research literature that arthritis, asthma, diabetes, cancer, and COPD affect individuals' mental health and well-being. Many studies evaluate the use of CAM modalities due to chronic conditions. Studies have found that the use of CAM modalities increased with a higher numbers of chronic health conditions (Bishop, & Lewith, 2010). An UK-based study analyzed CAM use with arthritis, cancer, and diabetes (Bishop, & Lewith, 2010). In their bivariate tests, 53% of individuals with arthritis, 30% of individuals with cancer, and 24% of individuals with diabetes were found to be using CAM modalities due to having anxiety or depression (Bishop, & Lewith, 2010). In this

analysis, the association between chronic conditions and the use of mind-body therapies was not assessed but it was found that mind-body therapies users were more likely to be depressed individuals. Thus, the assumption that individuals with comorbid chronic conditions and depression were also more likely to use mind-body modalities. It was found that individuals with diabetes (7.65%), cancer (7.39%), CHD (3.09%), COPD (2.77%), stroke (1.46%), and emphysema (1.63%) were less likely to report depressive symptoms compared to arthritis (21.54%) and asthma (20.38%). In the analyses, COPD was found to have a large confidence interval, this may be due to small sample size of individuals reported having COPD while indicating the use of at least one mind-body therapy. In all the analyses conducted, BMI classification showed a U-shape relationship, where individuals who were underweight or obese were more likely to experience moderate to high depressive symptoms. This finding supports the literature reviews that many factors can contribute to or be related to depressive symptoms. Many studies have found this U-shape relationship between depression and BMI. The Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) defined depression with an association with both an increased and decreased intake of food, or an increased and decreased of physical activity (American Psychiatric Association, 2013). According to DSM-IV's definition of association between BMI and depression, it seems logical to state that increased levels of depression is associated with either obesity or underweight. In this analysis, comorbidity of chronic conditions, physical and strength activities were considered, however, other factors such as socioeconomic level and education level were not included in this study. Unfortunately, it was not possible to include all possible confounding variables to assess the relationship with depressive symptoms.

Findings regarding physical activity and strength activity support research literature that physical activity and strength activity can improve mental health. One study conducted with the adult population in Brazil indicated that people who do not engage in physical activity were two times more likely to exhibit symptoms of depression and anxiety compared to those who exercise regularly (De Mello, Lemos, Antunes, Bittencourt, Santos-Silva, & Tufik, 2013). Additional studies exploring whether adults with major depression and who are physically active differ in their depression symptoms profile also found that physically active individuals were less likely to endorse suicidality compare to those who are physically inactive (McKercher, Patton, Schmidt, Venn, Dwyer, & Sanderson, 2013). Individuals who are actively exercising, even light intensity physical activity, whether it is aerobic physical activity or strength training, was found to have positive mental health effects (Loprinzi, 2013). In this analysis, similar results were found, where individuals who are physically active were less likely to experience depressive symptoms. However, there were no descriptions of the types of exercise practiced, and physical and strength activities were only classified as active or inactive according to CDC's recommendation of exercise.

Limitations

Several limitations of this study were due to the design of NHIS survey data. First, the NHIS is cross-sectional data, where only the association between the use of mind-body therapies and depressive symptoms could be examined. The causal relationship of these measures cannot be determined so we were unable to assess whether the use of mind-body therapies increases depressive symptoms, or whether individuals with depressive symptoms are more likely to use mind-body therapies. The NHIS survey is based on self-reported

responses, which are subjected to recall bias. The sample size of this study could not include all the participants in NHIS due to missing data. Only those who responded to both questions regarding depressive symptoms and the use of mind-body therapies were included in the analyses. This is important for the analyses because the calculation of sample size makes use of the expected proportion with the specified outcome of interest. Individuals who did not respond to both questions would not be relevant in the study, and would not give a precise and accurate conclusion. Moreover, the question "Have you EVER practice/use chiropractic or osteopathic manipulation, yoga, meditation (mantra meditation, mindfulness meditation, spiritual meditation), massage, guided imagery, progressive relaxation, tai chi, qi gong, acupuncture, biofeedback, hypnosis, or Alexander Technique?" may not accurately portray whether individuals have recently practiced mind-body therapies, or practiced mind-body therapies a few years back. Also, there was no indication of the frequency or the duration of mind-body therapies practiced. This type of information is important for future studies when examining whether mind-body therapies do improve mental health.

An additional limitation is that the ordinal nature of the outcome was lost when the multinomial logistic regression analysis was conducted in place of ordinal logistic regression with depressive symptoms as the response variable. Because the ordinal nature was not used in the analysis, this added layer of information about the outcome was not accounted for in the analyses. Missing values were also a limitation, especially for mind-body therapies. All participants were given the questions about the alternative supplement, however, those who did not complete the supplement were given the value of "Not Ascertain," or some answers were missing.

Future Studies

As the complementary and alternative supplement survey questions are assessed every five years, new data on mind-body therapies should be available soon and may have additional questions to clarify the use of mind-body therapy. For example, giving an actual time frame to the use of mind-body therapies may improve the accuracy of the measurement of the use of mind-body therapies. Although, the question "Have you practiced (a type of mind-body therapy) in the past 12 months" was available from the survey data, the respondents were limited to those who had responded "yes" to the question "Have you EVER practiced (a type of mind-body therapy), which created an extensive number of missing values. Although this study used a cross-sectional data, where all responses were self-reported, there were no details of the intention of practicing mind-body therapies. It is not clear why participants practiced mind-body treatments. Thus, it was not possible in the present study to determine whether respondents were using these therapies specifically as a treatment for their mental health issues, for other health problems or for reasons unrelated to health problems. A pilot qualitative study may be beneficial to understand better the health behavior relevant to participating in a type of mind-body therapy.

Conclusion

A negative association was found between the use of mind-body therapy and depressive symptoms among U.S. adults in all unadjusted models. When controlling for all covariates, certain variables regarding the use of mind-body therapy became statistically insignificant with the association of depressive symptoms. The negative association results support findings reported in previous studies that mind-body therapies users are more likely to be depressed

individuals. Findings suggest that people with at least one chronic condition were more likely to

seek out additional treatment, other than the conventional medicine, and that promoting

physical activity and strength activity may help improve mental health. Although the

methodology in the present study does not allow assigning a relation of cause and effect, the

association between mind-body modalities and depressive symptoms was observed.

FIGURES AND TABLES

Figure 1: Map of the U.S. with NHIS- Defined Regions

Table 1: Frequency of Individuals with Depressive Symptoms (Three Levels of Depression Symptoms) by Sample Characteristics, 2012 National Health Interview Survey (NHIS) (N=11,143)

| | Depressive Symptoms | | | | | | | | | | | |
| | Low (N= 10232) | | | Moderate (N= 705) | | | High (N= 206) | | | | | |
Variables	Unweighted Count	Unweighted (%)	Weighted (%)	Unweighted Count	Unweighted (%)	Weighted (%)	Unweighted Count	Unweighted (%)	Weighted (%)	Total	Total Unweighted (%)	Total Weighted (%)
Age in years Mean (SD)	10232	42.78 (16.07)	41.96	705	39.77 (14.76)	38.33	206	39.56 (13.62)	38.59	11143	42.53 (15.97)	41.70
BMI (Mean SD)	10232	28.43 (11.57)	28.34	705	29.82 (12.18)	30.21	206	29.75 (12.49)	29.37	11143	28.54 (11.64)	28.46
Sex												
Female	5162	50.45	47.47	384	54.47	48.44	125	60.68	60.35	5671	50.89	47.71
Male	5070	49.55	52.53	321	45.53	51.56	81	39.32	39.65	5472	49.11	52.29
Race												
NH- White	6775	66.21	71.71	449	63.69	70.52	115	55.83	62.75	7339	65.86	71.50
Hispanic	1389	13.58	12.05	101	14.33	13.39	45	21.84	17.80	1535	13.78	12.21
NH- Black	1235	12.07	9.47	95	13.48	9.07	29	14.08	11.91	1359	12.20	9.48
NH- Asian	577	5.64	4.67	32	4.54	2.88	3	1.46	1.35	612	5.49	4.52
NH- Other	256	2.50	2.09	28	3.97	4.15	14	6.80	6.18	298	2.67	2.28
Region												
South	3500	34.21	34.23	234	33.19	33.75	62	30.10	30.38	3796	34.07	34.14
West	2943	28.76	25.72	222	31.49	26.65	81	39.32	35.15	3246	29.13	25.93
Midwest	2239	21.88	24.43	139	19.72	24.10	35	16.99	19.86	2413	21.65	24.34
Northeast	1550	15.15	15.63	110	15.60	15.50	28	13.59	14.61	1688	15.15	15.60
Chronic Conditions												
Arthritis	1629	15.92	15.11	159	22.55	19.64	60	29.13	29.72	1848	16.58	15.58
Asthma	1200	11.77	11.39	155	21.90	19.88	44	21.36	22.07	1399	12.55	12.05
Cancer	654	6.39	6.29	61	8.65	7.40	17	8.25	7.46	732	6.57	6.37
Diabetes	529	5.17	4.71	60	8.51	7.34	23	11.17	8.91	612	5.49	4.92
CHD	235	2.30	2.28	21	2.98	2.95	7	3.40	3.54	263	2.36	2.34
COPD	107	1.05	0.92	16	2.27	1.78	12	5.83	6.84	135	1.21	1.06
Stroke	112	1.09	1.061	14	1.99	1.15	8	3.88	2.71	134	1.20	1.09
Emphysema	65	0.64	0.62	8	1.13	1.18	8	3.88	3.49	81	0.73	0.70
BMI Classification												
Underweight	123	1.20	1.50	10	1.42	2.15	3	1.46	1.67	136	1.22	1.54
Overweight	3547	34.67	34.57	238	33.76	32.76	55	26.70	26.07	3840	34.46	34.34
Obese	2537	24.79	24.63	229	32.48	32.63	70	33.98	31.78	2836	25.45	25.20

Normal	4025	39.34	39.29	228	32.34	32.46	78	37.86	40.47	4331	38.87	38.91
The Use of at least one Mind-Body Therapy												
Yes	5390	52.68	52.13	441	62.55	63.62	116	56.31	56.47	5947	53.37	52.87
No	4842	47.32	47.87	116	56.31	36.38	90	43.69	43.53	5196	46.63	47.13
Mind- Body Therapies												
Chiropractic/ Osteopathic	3068	29.98	29.79	261	37.02	36.24	77	37.38	38.64	3406	30.57	30.29
Yoga	2344	22.91	22.89	181	25.67	26.34	49	23.79	22.28	2574	23.10	23.09
Massage	2234	21.83	21.23	211	29.93	27.72	58	28.16	31.14	2503	22.46	21.76
Spiritual Meditation *	534	50.71	51.67	75	51.72	49.38	21	48.84	52,42	630	50.77	51.43
Mindfulness Meditation *	427	40.55	40.27	56	38.62	35.35	18	41.86	32.37	501	40.37	39.46
Mantra Meditation *	401	38.08	38.08	61	42.07	35.42	25	58.14	57.54	487	39.24	38.25
Pilates	1201	11.74	11.39	93	13.19	14.90	26	12.62	14.08	1320	11.85	11.64
Acupuncture	808	7.90	7.54	63	8.94	7.88	20	9.71	11.72	891	8.00	7.62
Tai Chi	517	5.05	4.67	47	6.67	5.80	13	6.31	5.56	577	5.18	4.75
Progressive Relaxation *	463	43.97	43.96	71	48.97	49.47	24	55.81	51.20	558	44.96	44.82
Guided Imagery *	418	39.70	40.61	60	41.38	41.18	21	48.84	46.20	499	40.21	40.83
Hypnosis	176	1.72	1.58	27	3.83	3.46	13	6.31	6.48	216	1.94	1.76
Qi Gong	140	1.37	1.10	10	1.42	1.35	3	1.46	1.32	153	1.37	1.11
Biofeedback	127	1.24	1.23	22	3.12	2.71	10	4.85	4.33	159	1.43	1.36
Alexander Technique	56	0.55	0.52	6	0.85	0.88	1	0.49	0.04	63	0.57	0.54
Trager Psychophysical Integration	22	0.22	0.17	3	0.43	0.32	1	0.49	0.37	26	0.23	0.18
Number of Mind Body Therapies Used												
0	4853	47.35	47.85	264	37.45	36.38	90	43.69	43.53	5209	46.65	47.11
1	2376	23.18	23.49	168	23.83	26.11	36	17.48	15.93	2580	23.11	23.54
2	1330	12.98	12.60	90	12.77	11.57	24	11.65	13.10	1445	12.94	12.55
3+	1691	16.50	16.06	183	25.96	25.94	56	27.18	27.44	1931	17.30	16.81
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/Osteopathic)	5020	48.98	48.69	414	58.72		113	54.85		5549	49.70	49.45

Physical Activity												
Active	9482	92.51	92.39	629	89.22	88.30	181	87.86	86.39	10295	92.21	92.06
Inactive	768	7.49	7.611	76	10.78	11.70	25	12.14	13.61	870	7.79	7.94
Strength Activity												
Active	4454	43.45	44.40	257	36.45	38.46	62	30.10	30.81	4776	42.78	43.86
Inactive	5796	56.55	55.60	448	63.55	61.54	144	69.90	69.19	6389	57.22	56.14

* Survey Questions for meditations and guided imagery had missing value

Table 2: Unadjusted Multinomial Logistic Regression of Depressive Symptoms and the Use of Mind-Body Therapies, 2012 National Health Interview Survey (NHIS)

Variables	Unweighted Unadjusted Odds Ratio (OR)						Weighted Unadjusted Odds Ratio (OR)					
	Moderate vs. Low Depressive Symptoms		High vs. Low Depressive Symptoms				Moderate vs. Low Depressive Symptoms		High vs. Low Depressive Symptoms			
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	P-Value	AIC	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	P-Value	AIC
Age in years	0.99	0.98, 0.99	0.99	0.98, 1.00	< 0.0001	7258.169	0.99	0.98, 0.99	0.99	0.98, 1.00	< 0.0001	4804653
BMI	1.01	1.00, 1.01	1.01	1.00, 1.02	0.0045	7280.045	1.01	1.00, 1.02	1.01	1.00, 1.02	0.0084	48233686
Sex					0.0023	7277.307					0.0134	48259742
Female	1.18	1.01, 1.37	1.52	1.14, 2.01			1.04	0.85, 1.28	1.68	1.19, 2.39		
Male	Reference		Reference				Reference		Reference			
Race					< 0.0001	7262.997					0.0002	48087744
Hispanic	1.10	0.88, 1.37	1.91	1.35, 2.71			1.13	0.84, 1.52	1.69	1.08, 2.65		
NH- Black	1.16	0.92, 1.46	1.38	0.92, 2.09			0.97	0.71, 1.34	1.44	0.85, 2.42		
NH- Asian	0.84	0.58, 1.21	0.31	0.10, 0.97			0.63	0.42, 0.93	0.33	0.10, 1.10		
NH- Other	1.65	1.10, 2.47	3.22	1.83, 5.69			2.01	1.11, 3.66	3.37	1.60, 7.10		
NH- White	Reference		Reference				Reference		Reference			
Region					0.0285	7283.900					0.4194	48284313
South	0.89	0.73, 1.07	0.64	0.46, 0.90			0.95	0.74, 1.22	0.65	0.43, 0.99		
Midwest	0.82	0.66, 1.02	0.57	0.38, 0.85			0.95	0.71, 1.28	0.60	0.36, 0.97		
Northeast	0.94	0.74, 1.19	0.66	0.43, 1.01			0.96	0.71, 1.29	0.69	0.40, 1.19		
West	Reference		Reference				Reference		Reference			
Chronic Conditions												
Arthritis	1.54	1.28, 1.85	2.17	1.60, 2.95	< 0.0001	7249.707	1.37	1.09, 1.73	2.38	1.59, 3.55	< 0.0001	48121108
Asthma	2.12	1.76, 2.56	2.04	1.46, 2.87	< 0.0001	7222.657	1.93	1.50, 2.49	2.21	1.46, 3.34	< 0.0001	47977063
Cancer	1.39	1.06, 1.83	1.32	0.80, 2.18	0.0400	7283.714	1.19	0.84, 1.68	1.20	0.66, 2.19	0.5278	48326350
Diabetes	1.71	1.29, 2.26	2.31	1.48, 3.59	< 0.0001	7266.940	1.61	1.09, 2.40	1.99	1.19, 3.34	0.0019	48243809
CHD	1.31	0.83, 2.06	1.50	0.70, 3.22	0.3180	7287.577	1.30	0.69, 2.44	1.57	0.67, 3.68	0.4424	48322850
COPD	2.20	1.29, 3.74	5.86	3.17, 10.81	< 0.0001	7262.847	1.60	0.90, 4.26	7.94	3.61, 17.46	< 0.0001	48135419
Stroke	1.83	1.05, 3.21	3.65	1.76, 7.59	0.0005	7277.747	1.09	0.57, 2.10	2.61	1.12, 6.09	0.0837	48316373
BMI Classification					< 0.0001	7264.738					0.0090	48115180
Underweight	1.44	0.74, 2.77	1.26	0.39, 4.04			1.73	0.68, 4.44	1.08	0.30, 3.90		
Overweight	1.19	0.98, 1.43	0.80	0.57, 1.13			1.15	0.87, 1.52	0.73	0.47, 1.15		
Obese	1.59	1.32, 1.93	1.42	1.03, 1.97			1.60	1.21, 2.12	1.25	0.84, 1.88		

	OR	95% CI	OR	95% CI	p-value	AIC	OR	95% CI	OR	95% CI	p-value	AIC
Normal	Reference		Reference				Reference		Reference			
The Use of at least one Mind-Body Therapy					< 0.0001	7262.771					< 0.0001	48091137
Yes	1.50	1.28, 1.76	1.16	0.88, 1.53			1.60	1.30, 1.98	1.19	0.86, 1.64		
No	Reference		Reference				Reference		Reference			
Number of Mind Body Therapies Used	1.12	1.08, 1.16	1.13	1.07, 1.20	< 0.0001	7235.982	1.13	1.08, 1.17	1.14	1.07, 1.22	< 0.0001	47968765
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	1.48	1.27, 1.73	1.26	0.96, 1.67	< 0.0001	7262.441	1.57	1.27, 1.93	1.33	0.97, 1.83	< 0.0001	48097721
Physical Activity					0.0005	7275.927					0.0080	48201916
Active	0.67	0.52, 0.86	0.59	0.38, 0.90			0.62	0.42, 0.92	0.52	0.30, 0.90		
Inactive	Reference		Reference				Reference		Reference			
Strength Activity											0.0006	48187858
Active	0.75	0.64, 0.87	0.56	0.42, 0.76	< 0.0001	7261.933	0.78	0.65, 0.95	0.56	0.38, 0.81		
Inactive	Reference		Reference				Reference		Reference			

Table 3: Multinomial Logistic Regression of Depressive Symptoms and the Use of Mind-Body Therapies Adjusted by covariates, 2012 National Health Interview Survey (NHIS)

Variables	Unweighted Adjusted Odds Ratio (OR)						Weighted Adjusted Odds Ratio (OR)					
	Moderate vs. Low Depressive Symptoms		High vs. Low Depressive Symptoms				Moderate vs. Low Depressive Symptoms		High vs. Low Depressive Symptoms			
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	P-Value	AIC	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	P-Value	AIC
Age in years	0.97	0.97, 0.98	0.97	0.96, 0.98	< 0.0001	6987.670	0.97	0.96, 0.98	0.97	0.95, 0.98	< 0.001	42694059
BMI	1.00	0.99, 1.01	1.00	0.99, 1.01	0.9948		1.01	1.00, 1.02	1.00	0.99, 1.02	0.4441	
Sex					0.2911						0.1429	
Female	1.03	0.87, 1.21	1.27	0.94, 1.71			0.90	0.72, 1.13	1.50	0.96, 2.22		
Male	Reference		Reference				Reference		Reference			
Race					0.0018						0.0130	
Hispanic	1.11	0.87, 1.40	1.86	1.28, 2.71			1.13	0.82, 1.56	1.68	1.05, 2.70		
NH- Black	1.14	0.89, 1.46	1.34	0.86, 2.08			0.93	0.66, 1.31	1.34	0.77, 2.36		
NH- Asian	0.96	0.66, 1.41	0.32	0.10, 1.03			0.73	0.49, 1.09	0.36	0.11, 1.19		
NH- Other	1.36	0.90, 2.06	2.50	1.39, 4.51			1.68	0.91, 3.12	2.75	1.27, 5.99		
NH- White	Reference		Reference				Reference		Reference			
Region					0.0619						0.3774	
South	0.92	0.75, 1.13	0.64	0.45, 0.91			1.03	0.80, 1.32	0.64	0.42, 0.99		
Midwest	0.81	0.64, 1.02	0.68	0.44, 1.07			0.95	0.71, 1.27	0.59	0.36, 0.97		
Northeast	0.96	0.75, 1.22	0.68	0.44, 1.07			1.03	0.75, 1.42	0.70	0.40, 1.24		
West	Reference		Reference				Reference		Reference			
Chronic Conditions												
Arthritis	1.63	1.31, 2.01	2.56	1.78, 3.69	< 0.0001		1.49	1.14, 1.96	2.96	1.76, 4.92	< 0.0001	
Asthma	1.71	1.41, 2.08	1.42	0.99, 2.04	< 0.0001		1.56	1.20, 2.02	1.49	0.96, 2.31	0.0011	
Cancer	1.53	1.14, 2.05	1.28	0.75, 2.21	0.0155		1.48	1.02, 2.16	1.26	0.64, 2.51	0.1127	
Diabetes	1.73	1.27, 2.34	2.13	1.29, 3.52	< 0.0001		1.78	1.15, 2.76	1.87	1.04, 3.37	0.0036	
CHD	1.41	0.86, 2.31	1.29	0.55, 3.02	0.3517		1.63	0.84, 3.13	1.36	0.41, 4.57	0.3226	
COPD	1.76	0.99, 3.13	4.67	2.30, 9.48	< 0.001		1.72	0.74, 4.04	7.05	2.95, 16.97	< 0.0001	
Stroke	1.54	0.86, 2.78	3.14	1.43, 6.92	0.0097		0.85	0.41, 1.77	1.76	0.64, 5.07	0.4683	
BMI Classification					0.0164						0.4059	
Underweight	1.17	0.60, 2.28	0.95	0.29, 3.12			1.39	0.52, 3.71	0.85	0.23, 3.20		
Overweight	1.28	1.05, 1.57	0.81	0.56, 2.28			1.20	0.89, 1.63	0.77	0.46, 1.28		
Obese	1.55	1.21, 1.99	1.15	0.75, 1.76			1.02	0.59, 1.63	1.43	1.02, 2.00		

Normal	Reference		Reference				Reference		Reference			
The Use of at least one Mind-Body Therapy					0.1569						0.0269	
Yes	1.26	0.83, 1.92	0.40	0.12, 1.27			1.41	0.85, 2.33	0.21	0.06, 0.77		
No	Reference		Reference				Reference		Reference			
Number of Mind Body Therapies Used	1.11	1.06, 1.16	1.16	1.07, 1.25	< 0.0001		1.11	1.05, 1.18	1.14	1.05, 1.24	< 0.0001	
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	0.97	0.64, 1.46	2.06	0.64, 6.63	0.4704		0.96	0.58, 1.58	4.00	1.07, 14.94	0.1197	
Physical Activity					0.0436						0.0627	
Active	0.76	0.59, 0.98	0.71	0.46, 1.10			0.68	0.46, 1.01	0.61	0.34, 1.08		
Inactive	Reference		Reference				Reference		Reference			
Strength Activity					< 0.0001						0.0003	
Active	0.73	0.62, 0.86	0.56	0.41, 0.77			0.75	0.62, 0.91	0.56	0.37, 0.83		
Inactive	Reference		Reference				Reference		Reference			

Table 4: Frequency of Individuals with Depressive Symptoms (Two Levels of Depression Symptoms) by Sample Characteristics, 2012 National Health Interview Survey (NHIS) (N=11,143)

Variables	Depressive Symptoms								
	None/ Low (N= 10232)			Moderate/ High (N= 911)			Total (N= 11143)		
	Unweighted Count	Unweighted (%)	Weighted (%)	Unweighted Count	Unweighted (%)	Weighted (%)	Total	Total Unweighted (%)	Total Weighted (%)
Age in years Mean (SD)	10232	42.78 (16.07)	41.97	911	39.72 (14.50)	38.38	11143	42.53 (15.97)	41.70
BMI (Mean SD)	10232	28.43 (11.57)	28.34	911	29.76 (12.41)	30.03	11143	28.54 (11.64)	28.46
Sex									
Female	5162	50.45	47.47	509	55.87	50.79	5671	50.89	47.71
Male	5070	49.55	52.53	402	44.13	49.21	5472	49.11	52.29
Race									
NH- White	6775	66.21	71.71	564	61.91	68.78	7339	65.86	71.50
Hispanic	1389	13.58	12.05	146	16.03	14.20	1535	13.78	12.21
NH- Black	1235	12.07	9.47	124	13.61	9.62	1359	12.20	9.48
NH- Asian	577	5.64	4.67	35	3.84	2.71	612	5.49	4.52
NH- Other	256	2.50	2.09	42	4.61	4.68	298	2.67	2.28
Region									
South	3500	34.21	34.23	296	32.49	33.05	3796	34.07	34.14
West	2943	28.76	25.72	303	33.26	28.51	3246	29.13	25.93
Midwest	2239	21.88	24.43	174	19.10	23.18	2413	21.65	24.34
Northeast	1550	15.15	15.63	138	15.15	15.26	1688	15.15	15.60
Chronic Conditions									
Arthritis	1629	15.92	15.11	219	24.04	21.54	1848	16.58	15.58
Asthma	1200	11.77	11.39	199	21.84	20.38	1399	12.55	12.05
Cancer	654	6.39	6.29	78	8.56	7.39	732	6.57	6.37
Diabetes	529	5.17	4.71	83	9.11	7.65	612	5.49	4.92
CHD	235	2.30	2.28	28	3.07	3.09	263	2.36	2.34
COPD	107	1.05	0.92	28	3.07	2.77	135	1.21	1.06
Stroke	112	1.09	1.061	22	2.41	1.46	134	1.20	1.09
Emphysema	65	0.64	0.62	16	1.76	1.63	81	0.73	0.70
BMI Classification									
Underweight	123	1.20	1.50	13	1.43	2.05	136	1.22	1.54
Overweight	3547	34.67	34.57	293	32.16	31.47	3840	34.46	34.34
Obese	2537	24.79	24.63	299	32.82	32.37	2836	25.45	25.20
Normal	4025	39.34	39.29	306	33.59	34.11	4331	38.87	38.91
The Use of at least one Mind-Body Therapy									

Yes	5390	52.68	52.13	557	61.14	62.18	5947	53.37	52.87
No	4842	47.32	47.87	354	38.86	37.82	5196	46.63	47.13
Mind- Body Therapies									
Chiropractic/ Osteopathic	3068	29.98	29.79	338	37.10	36.71	3406	30.57	30.29
Yoga	2344	22.91	22.89	230	25.25	25.50	2574	23.10	23.09
Massage	2234	21.83	21.23	269	29.53	28.39	2503	22.46	21.76
Spiritual Meditation *	534	50.71	51.67	96	51.06	50.03	630	50.77	51.43
Mindfulness Meditation *	427	40.55	40.27	74	39.36	34.75	501	40.37	39.46
Mantra Meditation *	401	38.08	38.08	86	45.74	39.25	487	39.24	38.25
Pilates	1201	11.74	11.39	119	13.06	14.74	1320	11.85	11.64
Acupuncture	808	7.90	7.54	83	9.11	8.64	891	8.00	7.62
Tai Chi	517	5.05	4.67	60	6.59	5.76	577	5.18	4.75
Progressive Relaxation *	463	43.97	43.96	95	50.53	49.77	558	44.96	44.82
Guided Imagery *	418	39.70	40.61	81	43.09	42.05	499	40.21	40.83
Hypnosis	176	1.72	1.58	40	4.39	4.06	216	1.94	1.76
Qi Gong	140	1.37	1.10	13	1.43	1.34	153	1.37	1.11
Biofeedback	127	1.24	1.23	32	3.51	3.03	159	1.43	1.36
Alexander Technique	56	0.55	0.52	7	0.77	0.72	63	0.57	0.54
Trager Psychophysical Integration	22	0.22	0.17	4	0.44	0.33	26	0.23	0.18
Number of Mind Body Therapies Used									
0	4853	47.35	47.85	356	38.91	37.78	5209	46.65	47.11
1	2376	23.18	23.49	204	22.30	24.11	2580	23.11	23.54
2	1330	12.98	12.60	115	12.57	11.87	1445	12.94	12.55
3+	1691	16.50	16.06	240	26.23	26.23	1931	17.30	16.81
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	5020	48.98	48.69	529	57.81	58.97	5549	49.70	49.45
Physical Activity									
Active	9482	92.51	92.39	813	88.85	87.92	10295	92.21	92.06
Inactive	768	7.49	7.611	102	11.15	12.07	870	7.79	7.94
Strength Activity									
Active	4454	43.45	44.40	322	35.19	36.96	4776	42.78	43.86
Inactive	5796	56.55	55.60	593	64.81	63.04	6389	57.22	56.14

* Survey Questions for meditations and guided imagery had missing value

Table 5: Unadjusted Binomial Logistic Regression of Depressive Symptoms and the Use of Mind-Body Therapies, 2012 National Health Interview Survey (NHIS)

Variables	Unweighted Unadjusted Odds Ratio (OR)				Weighted Unadjusted Odds Ratio (OR)			
	Odds Ratio	95% Confidence Interval	P-Value	AIC	Odds Ratio	95% Confidence Interval	P-Value	AIC
Age in years	0.99	0.98, 0.99	< 0.0001	6280.244	0.99	0.98, 0.99	< 0.0001	42158307
BMI	1.01	1.00, 1.01	0.0010	6302.096	1.01	1.00, 1,02	0.0021	42348262
Sex			0.0017	6301.866			0.1468	42424872
Female	1.24	1.09, 1.43			1.14	0.95, 1.37		
Male	Reference							
Race			< 0.001	6293.195			0.0003	42245015
Hispanic	1.26	1.04, 1.53			1.23	0.96, 1.58		
NH- Black	1.21	0.98, 1.48			1.06	0.79, 1.42		
NH- Asian	0.73	0.51, 1.04			0.58	0.39, 0.85		
NH- Other	1.97	1.41, 2.76			2.26	1.37, 3.72		
NH- White	Reference				Reference			
Region			0.0234	6306.323			0.6241	42429808
South	0.82	0.70, 0.97			0.88	0.70, 1.10		
Midwest	0.76	0.62, 0.92			0.87	0.67, 1.13		
Northeast	0.87	0.70, 1.07			0.89	0.69, 1.16		
West	Reference				Reference			
Chronic Conditions								
Arthritis	1.67	1.42, 1.96	< 0.0001	6275.413	1.55	1.27, 1.89	< 0.0001	42285779
Asthma	2.10	1.78, 2.49	< 0.0001	6244.740	1.98	1.59, 2.48	< 0.0001	42091304
Cancer	1.37	1.07, 1.75	0.0114	6305.794	1.19	0.88, 1.62	0.2603	42437863
Diabetes	1.84	1.44, 2.34	< 0.0001	6290.285	1.69	1.22, 2.34	0.0018	42358503
CHD	1.35	0.91, 2.01	0.1395	6309.716	1.36	0.79, 2.32	0.2665	42435419
COPD	3.00	1.97, 4.58	< 0.0001	6290.743	3.09	1.76, 5.41	< 0.0001	42318216
Stroke	2.24	1.41, 3.55	0.0006	6301.976	1.39	0.82, 2.35	0.2183	42441418
BMI Classification			< 0.0001	6286.882			0.0019	42258888
Underweight	1.39	0.78, 2.49			1.58	0.69, 3.62		
Overweight	1.09	0.92, 1.28			1.05	0.83, 1.33		
Obese	1.55	1.31, 1.83			1.52	1.19, 1.94		
Normal	Reference				Reference			

The Use of at least one Mind-Body Therapy			< 0.0001	6287.408			< 0.0001	42222799
Yes	1.41	1.23, 1.62			1.51	1.26, 1.81		
No	Reference				Reference			
Number of Mind Body Therapies Used	1.12	1.09, 1.16	< 0.0001	6258.184	1.13	1.09, 1.17	< 0.0001	42081132
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	1.43	1.25, 1.64	< 0.0001	6285.462	1.51	1.27, 1.81	< 0.0001	42215494
Physical Activity			0.0001	6298.266			0.0033	42316574
Active	0.65	0.52, 0.81			0.60	0.43, 0.84		
Inactive	Reference				Reference			
Strength Activity			< 0.0001	6286.860			0.0004	42323445
Active	0.70	0.61, 0.81			0.73	0.62, 0.87		
Inactive	Reference				Reference			

Table 6: Binomial Logistic Regression of Depressive Symptoms and the Use of Mind-Body Therapies Adjusted by covariates, 2012 National Health Interview Survey (NHIS)

Variables	Unweighted Adjusted Odds Ratio (OR)				Weighted Adjusted Odds Ratio (OR)			
	Odds Ratio	95% Confidence Interval	P-Value	AIC	Odds Ratio	95% Confidence Interval	P-Value	AIC
Age in years	0.97	0.97, 0.98	< 0.0001	6010.051	0.97	0.96, 0.98	< 0.0001	40212488
BMI	1.00	0.99, 1.01	0.9850		1.01	1.00, 1.01	0.2342	
Sex			0.3338				0.9348	
Female	1.08	0.93, 1.25			0.99	0.81, 1.21		
Male	Reference				Reference			
Race			0.0084				0.0137	
Hispanic	1.26	1.03, 1.55			1.23	0.94, 1.61		
NH- Black	1.18	0.95, 1.47			1.01	0.74, 1.38		
NH- Asian	0.82	0.57, 1.18			0.66	0.44, 0.97		
NH- Other	1.60	1.13, 2.27			1.88	1.12, 3.18		
NH- White	Reference				Reference			
Region			0.0488				0.7559	
South	0.85	0.71, 1.01			0.94	0.75, 1.17		
Midwest	0.76	0.62, 0.93			0.87	0.67, 1.12		
Northeast	0.89	0.71, 1.10			0.95	0.71, 1.27		
West	Reference				Reference			
Chronic Conditions								
Arthritis	1.80	1.49, 2.18	< 0.0001		1.72	1.36, 2.17	< 0.0001	
Asthma	1.65	1.38, 1.97	< 0.0001		1.55	1.23, 1.95	0.0002	
Cancer	1.47	1.13, 1.92	0.0048		1.23	1.02, 2.01	0.0394	
Diabetes	1.82	1.39, 2.38	< 0.0001		1.81	1.26, 2.59	0.0015	
CHD	1.37	0.88, 2.13	0.1658		1.54	0.85, 2.79	0.1545	
COPD	2.38	1.48, 3.82	0.0003		2.70	1.45, 5.03	0.0018	
Stroke	1.87	1.14, 3.07	0.0135		1.03	0.56, 1.92	0.9189	
BMI Classification			0.0121				0.2542	
Underweight	1.11	0.61, 2.01			1.25	0.52, 3.01		
Overweight	1.16	0.97, 1.39			1.10	0.85, 1.43		
Obese	1.45	1.16, 1.80			1.33	1.00, 1.78		
Normal	Reference				Reference			

The Use of at least one Mind-Body Therapy			0.8472				0.6361	
Yes	1.04	0.70, 1.55			1.12	0.69, 1.83		
No	Reference				Reference			
Number of Mind Body Therapies Used	1.12	1.07, 1.16	< 0.0001		1.12	1.06, 1.18	< 0.0001	
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	1.07	0.72, 1.59	0.7353		1.09	0.69, 1.75	0.7074	
Physical Activity			0.0132				0.0242	
Active	0.75	0.60, 0.94			0.67	0.47, 0.95		
Inactive	Reference				Reference			
Strength Activity			< 0.0001				< 0.0001	
Active	0.69	0.60, 0.80			0.71	0.60, 0.84		
Inactive	Reference				Reference			

Table 7: Generalized Linear Mixed Models with Depressive Symptoms and the Use of Mind-Body Therapies with Clustering by Region, 2012 National Health Interview Survey (NHIS)

Variables	Unweighted Unadjusted Generalized Linear Mixed Model			Unweighted Adjusted Generalized Linear Mixed Model		
	Odds Ratio	95% Confidence Interval	P-Value	Odds Ratio	95% Confidence Interval	P-Value
Age in years	0.99	0.98, 0.99	< 0.0001	0.97	0.97, 0.98	< 0.0001
BMI	1.01	1.00, 1.01	0.0168	1.00	0.99, 1.01	0.9991
Sex			0.1196			0.3509
Female	1.23	1.05, 1.45		1.08	0.93, 1.25	
Male	Reference			Reference		
Race			0.0056			0.0055
Hispanic	1.22	0.98, 1.53		1.26	1.03, 1.55	
NH- Black	1.20	0.95, 1.53		1.18	0.95, 1.47	
NH- Asian	0.75	0.51, 1.12		0.82	0.57, 1.18	
NH- Other	1.84	1.21, 2.78		1.60	1.13, 2.27	
NH- White	Reference			Reference		
Chronic Conditions						
Arthritis	1.60	1.32, 1.94	< 0.0001	1.80	1.49, 2.18	< 0.0001
Asthma	2.02	1.65, 2.47	< 0.0001	1.65	1.38, 1.97	< 0.0001
Cancer	1.30	0.97, 1.74	0.0788	1.47	1.13, 1.92	0.0044
Diabetes	1.67	1.25, 2.26	0.0006	1.82	1.39, 2.38	< 0.0001
CHD	1.33	0.83, 2.13	0.2402	1.37	0.88, 2.13	0.1713
COPD	2.88	1.69, 4.90	0.0001	2.38	1.48, 3.82	0.0004
Stroke	2.06	1.16, 3.66	0.0134	1.87	1.14, 3.07	0.0139
BMI Classification			0.0006			0.0135
Underweight	1.48	1.21, 1.79		1.11	0.61, 2.01	
Overweight	1.06	0.88, 1.29		1.16	0.97, 1.39	
Obese	1.48	1.21, 1.74		1.45	1.16, 1.80	
Normal	Reference			Reference		
The Use of at least one Mind-Body Therapy			0.0003			0.8579
Yes	1.35	1.15, 1.58		1.04	0.70, 1.55	
No	Reference			Reference		

Number of Mind Body Therapies Used	1.31	1.07, 1.15	< 0.0001	1.12	1.07, 1.16	< 0.0001
Most common used Mind Body Therapies (Yoga, Meditation, Massage, and Chiropractic/ Osteopathic)	1.37	1.17, 1.60	0.0001	1.07	0.72, 1.59	0.7280
Physical Activity			0.0037			0.0135
Active	0.68	0.52, 0.88		0.75	0.60, 0.94	
Inactive	Reference			Reference		
Strength Activity			0.0001			< 0.0001
Active	0.73	0.62, 0.86		0.69	0.60, 0.80	
Inactive	Reference			Reference		

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