

Perception of Exercise Lifestyle as a Valid Tool for Prevention and Treatment of Depression in Rural Communities

Karen Duong¹ and Jenny Seung-Hyun Lee^{2*}

¹Medical Student, ²Assistant Professor, Department of Family Medicine, Texas College of Osteopathic Medicine, University of North Texas Health Science Center, 3500 Camp Bowie Blvd., Fort Worth, Texas 76107-2699, USA

Background: This study examines perception of exercise lifestyle prescription as a valid treatment for depression among rural patients at a primary care clinic in Texas.

Methods: The researchers created a depression and exercise survey completed by 104 patients ages 18 and up living in central, economically disadvantaged rural Texas. Logistic regression was used to analyze data obtained.

Results: There was a significant difference ($p = 0.01$) in perception of exercise as a valid treatment for depression as a function of demographic variables, however not as a function of exercise duration ($p = 0.12$) in the rural primary care clinic's patients. Even though it was not a statistically significant finding, there was a positive correlation found between the amount of exercise engaged in per day and the likelihood to have a positive perception of exercise prescription as a tool in depression prevention and treatment.

Conclusion: Participants between ages 40 to 59 years old, female, and of Hispanic ethnicity independently are most likely to perceive exercise lifestyle as a valid treatment for depression. This is the first study to look specifically at patient perception of exercise as a valid treatment tool for depression not only in rural areas, but also in the nation. Findings from this pilot study may help healthcare service providers learn how to best incorporate exercise prescription into depression prevention and treatment in rural areas, leading to reducing depression epidemics.

Key Words: Depression, Rural healthcare service, Exercise lifestyle practice, Lifestyle medicine

INTRODUCTION

In the United States, mental illnesses are widespread, perilous, and costly. In the United States, mental disorders are the leading cause of disability [1]. According to the 2004 U.S. Census, approximately one in four, 26.2% of American adults ages 18 and older suffered from a diagnosable mental

disorder in a year which is 57.7 million people [2]. In 2013, there was a reported decline in the prevalence of mental disorders down to 18.5% of the U.S. adult population, consisting of 43.8 million people [3]. But it is unclear if it is attributed to improved treatment outcomes or reduced incidences of depression through preventive services [4]. Depression specifically is prevalent in the United States. Depression constitutes 7.6% of the mental disorder diagnoses for Americans ages 12 and up [5]. Depression is one of the major risk factors for suicide, causing 16 deaths per 100,000 worldwide [1]. Patients with depression report lower quality and satisfaction of daily life as a result of strain at work

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*Corresponding author: Jenny Seung-Hyun Lee

Department of Family Medicine, Texas College of Osteopathic Medicine, University of North Texas Health Science Center, 3500 Camp Bowie Blvd., Fort Worth, Texas 76107-2699, USA
Tel: 1-817-735-0521, Fax: 1-817-735-5089
E-mail: jenny.lee@unthsc.edu; jleewellife7@gmail.com

and family life and ultimately socially alienating themselves [6].

It was reported that factors identified in the United States that are associated with a positive screen for depression include demographic characteristics (e.g. age, gender, race, family medical history), health status, as well as lifestyle practices. The highest incidence of depression in the United States occurs in the groups of 40-59 year olds, females, and non-Hispanic blacks [5]. Other identified factors associated with patient susceptibility to depression include: 1) fair to poor health; 2) limitations in engaging in social activities; 3) change in health during the past year whether a decline or improvement; and 4) hypertension or obesity with a BMI of 29 or greater [7]. Lifestyle behaviors such as chronic stress and cigarette smoking also contribute to depression [8]. Additional factors associated with depression include a family income less than \$20,000, unmarried legal status, unemployment, and English fluency [7].

Direct medical costs for mental illness in America in 2011 were \$77.6 billion spent on drugs, therapy and hospitalizations [9,10]. This direct cost spent annually for mental illness surpasses what was spent even on diabetes mellitus in 2011, which had \$55.2 billion in direct costs [9]. According to a 2008 study published by The American Journal of Psychiatry, people with serious mental illness earn about \$16,000 less than their mentally well counterparts, equaling \$193 billion earnings lost annually [10]. Although federal healthcare plans have significantly increased coverage for mental illness, it is estimated only 1.15 million new users take advantage of mental health services. Barriers that prevent patients from seeking mental health care are the negative stigma surrounding mental health and half of patients that do seek care do not get the proper treatment for their specific condition [10].

Although statistics for the United States as a whole are examined, depression is much more prevalent in rural populations than urban areas. According to a 1999 National Health Interview Survey, results showed that 2.6 million adults in rural America have depression [7]. The prevalence of depression in rural populations was 6.1% versus 5.2% in urban areas. The 1999 NHIS study showed that rural populations have a larger White population at 85% versus 71.8% in urban areas. As for minority groups in rural

America, the largest groups consist of African Americans (7.7%), Hispanics (4.7%) and other races (2.7%). Rural populations also differ from urban in age demographics with more adults over the age of 50. The NHIS survey shows residence is not independently associated with depression when resource and health factors are held constant. Instead, it is likely attributable that the population that constructs rural areas is more likely to have an increased reporting of characteristics associated with depression such as poverty, chronic disease and poor health [7]. Other factors identified in rural populations reveal higher rates of residents who do not complete high school, are unemployed, and have fewer personal resources [7].

Another reason rural residents are likely to have depression is because they report more physical inactivity, leading to a greater proportion of BMIs of 30 or higher, heavy alcohol consumption and fewer regular dental visits [7]. Literature has shown a statistically significant association between depression and overweight and obese individuals [11]. The higher rates of obesity in rural areas may be linked to further distances from recreational facilities, stores, churches and schools according to studies looking at rural Missouri, Tennessee, and Arkansas populations [12]. With the vast amount of evidence that physical inactivity contributes to the obesity epidemic, the shift in type of employment in rural areas contributes to the decline in physical activity. Studies show farmers get more physical activity than non-farmers, but there has been a decline in rural occupations such as forestry and fishing and a shift to consumer services requiring less physical exertion [12]. According to studies of immigrants from the Middle East to Sweden, prevention emphasizing physical activity can reduce the risk of poor mental health states [13]. The Mediterranean Islands Elderly Study (MEDIS) also demonstrates that physical inactivity and unhealthy dietary habits correlate with depression [14].

Lifestyle medicine is defined as “the evidence-based practice of helping individuals and families adopt and sustain healthy behaviors that affect health and quality of life,” which offers a promising way to change the current prevention and management of depression in rural communities to reflect better outcomes [15]. The ACLM standards task force has also defined Lifestyle Medicine as “the therapeutic use of evidence-based lifestyle interventions to treat and

prevent lifestyle related diseases in a clinical setting. It empowers individuals with the knowledge and life skills to make effective behavior changes that address the underlying causes of disease.” Lifestyle medicine has helped to prevent, treat, and even reverse many chronic diseases that are a result of lifestyle practice such as coronary heart disease, type 2 diabetes, insulin resistance syndrome, and osteoporosis. Factors associated directly with depression, such as hypertension and obesity as well as alcohol consumption, physical inactivity, or perceived stress, have also been addressed by lifestyle medicine [16].

For example, addressing nutritional changes such as switching to a Mediterranean diet have shown to prevent and slow metabolic syndrome [17]. In obese pediatric patients in underserved areas, studies have proven statistically significant improved outcomes in obesity with weight loss most correlated to stress reduction [18]. The Lifestyle Heart Trial showed that intensive lifestyle changes (10% fat whole foods vegetarian diet, aerobic exercise, stress management training, smoking cessation, group psychosocial support) lead to regression of coronary atherosclerosis [19]. Addressing lifestyle behaviors has also been important in management of chronic pain syndromes such as back pain [20]. In this report, doctors implementing positive lifestyle behaviors have proposed positive lifestyle behaviors as a “first-line therapy” intervention strategy for chronic pain as well as a means to reduce the socioeconomic costs related to chronic pain.

Increased body of data has shown how exercise prescription specifically can help in medicine. In pre-diabetic patients, exercise was shown to be an effective tool for improving cardiometabolic risks [21]. Recent cancer studies have shown that exercise lifestyle is a key factor in pre and post diagnosis states. Currently studies conducted in Iran have identified sub-optimal levels of two lifestyle factors (self-care and exercise) in the majority of study participants for a year before acquiring breast cancer [22]. The Shanghai Breast Cancer Survival Study demonstrated post diagnosis exercise was associated with improved survival in women with triple-negative breast cancer [23]. Exercise prescription has shown a pharmacologic free approach in helping the prevalence of hypertension and lower blood pressure. [24]. In Nigeria, obesity has the highest non-com-

municable disease specific prevalence of 25%. Clinicians in Nigeria have recently developed a lifestyle medicine mnemonic, WASHED, which incorporates weight control, alcohol reduction, smoking cessation, health promotion, exercise and diet as components to prevent and manage obesity [25].

Studies have also shown that adopting exercise lifestyle can play a positive role in preventing and reducing the prevalence of depression. Exercise prescription addresses factors such as obesity and hypertension which are directly associated with depression, thereby reducing depression when these factors are managed. Specifically, lifestyle medicine practices such as physical activity or exercise, along with promotion of relaxation and proper sleep hygiene, social interactions, dietary modifications, meditation, and reduction of drugs, alcohol and nicotine have showed a positive role in the treatment of depression [26]. Many research studies have been conducted to assess possible benefits of exercise (physical activity) in mental illness treatment. There have been positive correlations with physical activity and mood disorders and reduction in stress and depressive symptoms in patients as well [27]. The depressive animal model study suggested that treadmill exercise exerted anti-depressive effects. It is claimed that exercise demonstrated similar efficacy to anti-depressive medications by increasing serotonin [28,29]. Exercise improved symptoms of depressive disorder in patients and exercising regularly suppresses neuroticism, anxiety, and depression [30,31]. Exercise also promotes positive brain plasticity by enhancing neurogenerative, neuroadaptive and neuroprotective processes [32,33,29].

With consistently failed rural healthcare management of depression, it is important to seek low-cost, sustainable, and effective interventions for this chronic disease. Traditional rural healthcare practices for depression are not successfully addressing rural population mental health needs. The mainstay of depression treatment is anti-depressant drugs and talk therapy [34]. Antidepressant drugs are number one on the U.S. National Sales chart for prescribed drugs [35]. Limitations of pharmacologic treatment that patients and healthcare providers must keep in mind is that anti-depressants have: 1) delayed onset of effect, requiring up to four to six weeks to achieve therapeutic treatment levels; 2) hazardous side effects; 3) lethality after overdose, and 4) 20-30% of depressed patients are not responsive to these

psychotropic drugs [36]. There is a long list of side effects of anti-depressants reported by the U.S. Food and Drug Administration (FDA) which includes nausea and vomiting, weight gain, diarrhea, sleepiness, and sexual problems. Other very serious, but less common side effects listed by the FDA for antidepressants include heart problems, seizures, imbalance of blood sodium levels, liver damage, suicidal thoughts, or serotonin syndrome [37].

Talk therapy also has its delivery disadvantages in that it takes numerous individual sessions that can easily span months to years of time for positive effects from therapy. This is the main reason why offering talk therapy is falling out of favor with mental healthcare providers since it takes much longer to deliver and see the positive effects of treatment from this modality [38]. Talk therapy has shown to be as equally effective as pharmacologic therapy in treating depression with less undesirable side effects, but is often less opted for since it takes many more follow-up visits with their talk therapy providers.

The literature also shows that rural populations disproportionately suffer from a shortage of healthcare providers and there is evidence of worse symptom levels and outcomes among those in rural areas in regards to mental health issues [39]. Primary care physicians largely provide medical care for rural communities. Two of every five doctors practicing in small towns are family physicians (41%). Overall, rural residents have less access to primary care, specialists, health related technologies and health and social services than urban populations. The proportion of whole county shortage areas for mental healthcare providers increases from 37% in large rural counties adjacent to metropolitan areas to 76% among isolated small rural counties. Even if patients have access to primary care, there may not be any mental health specialists that primary care providers can refer patients out to [7]. Furthermore, patients are less likely to comply with their medical treatment due to the greater distances they might have to travel to see a specialist [7]. Rural areas have higher hospitalization rates for depression despite higher physician patient interactions. Higher hospitalization rates may be due to general physicians not meeting current recommendations for treatment [40]. A county-level analysis has shown that patients receiving care from non-mental healthcare providers has been linked to

higher suicide rates due to prescribing from outdated depression medication regimens [41].

It's clear that mental rural healthcare systems are running out of successful treatment options for patients who suffer from mental illnesses including depression. Research must be invested in looking at comparative-effectiveness research and extending research to explore prevention and treatment modalities that are long-term, beneficial and cost-effective to better patient healthcare services. Based on the endorsed evidence-based lifestyle medicine approach to prevention and treatment of chronic diseases, including the chief complaint of depression, rural healthcare providers need to address lifestyle counseling with patients to achieve cost-effective, sustainable, and effective patient care service. It is essential for primary care in rural areas to adopt the Lifestyle Medicine approach to improve health outcomes of patients with depression, especially residents in rural areas. In this initial study, it is important to explore rural residents' readiness and perceptions of exercise lifestyle as a valid tool for prevention and treatment of depression.

Preliminary research has shown that the efficacy of exercise prescription for depression is most optimal when prescribed to individuals who are most prone to respond [42]. This idea of identifying individuals most prone to respond is based on a model developed in the 1950s; the Health Belief Model (HBM) which is the most commonly used theory in health education and promotion [Hayden]. The main concept of the HBM is that health behavior is determined by personal perceptions and/or beliefs about a disease and the strategies available to decrease its occurrence [43]. The health belief model has been an effective theory used in prevention strategies for women with osteoporosis [44]. In China, the HBM has also been used to successfully identify factors in the elderly population of patients who are most likely and unlikely to receive influenza vaccination [45]. Looking at perception is essential to assess patient's readiness and who is most likely to respond to prevention and treatment strategies.

Research Questions:

- 1) How do patients living in rural areas perceive exercise prescription as a valid tool for prevention and treatment of depression as a function of demographic variables?

2) Is there a correlation between the amount of exercise patients engage in per week and perception of exercise prescription as a valid tool for prevention and treatment of depression in rural communities?

MATERIALS AND METHODS

1. Participants

The study population includes participants that are 18 years of age or older and live in Seguin, Texas, and are of all racial and ethnic distributions (Table 1). Otherwise, no other inclusion/exclusion criterion was required. The study sample was obtained from a primary care clinic in Seguin, Texas.

Seguin, TX is an economically deprived town that is the county seat of Guadalupe County. It is located fifty miles south of the capital of Texas, Austin. Seguin is now a leader in industry in Texas with factories that create materials such as steel, mowing equipment, and construction supplies. According to a 2010 U.S. Census Bureau survey, the population is 26,272 with 9,714 housing units. The population density was 730.5 people per square miles with a total of 34.46 square miles land area. The racial makeup of the community consists 8% African Americans/Blacks, 55.4% Latino/Hispanics, 35.5% White, and two or more races 2.6%. The per capita money income per year was \$18,271 with a median household income of \$40,616. The persons below

poverty level are 18.6% [46].

2. Materials

The “Depression and Exercise Survey” was organized into two parts. Part one gathered information about background and demographics, extent of patient participation in exercise, and questions on perception of depression and exercise as a valid treatment or adjunct therapy for depression which was the main focus of this study. An example of a question in the survey is “How many minutes do you exercise per session on average?” Answer choices are listed as 0-30 minutes, 30-50 minutes or 60 minutes or more. Many of the questions in part 1 were either taken directly or adapted from the U.S. Census Bureau’s American Community Survey or the Stanford Patient Education Research Center [47]. Additional questions about type of exercise engaged in and perception of exercise prescription as a depression treatment tool were created due to a lack of perception surveys in research literature. Part 2 of the survey helped to identify if a patient currently had depression and if so the severity of the depression. Part 2 questions came directly from the Beck Depression Inventory, which places an emphasis on symptoms of depression and is described in more detail below under the “depression scale” section.

3. Depression scale: Beck Depression Inventory (BDI)

The Beck Depression Inventory (BDI) was created by Dr. Aaron T. Beck and is a 21-question multiple-choice self-report inventory and one of the most widely used instruments used by health care professions to measure the severity of depression [48]. The Beck Depression Inventory measures the severity of depression. It assesses symptoms of depression such as hopelessness, cognitions such as guilt or feelings of being punished, irritability, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex. Scoring is done by adding up the score for each of the twenty-one questions by counting the number to the left of each question marked. The highest possible total for the whole test would be sixty-three. This would mean the number three was circled on all twenty-one questions. The lowest possible score for each question is zero; the lowest possible score for the test would be zero. The total score can be interpreted by seeing where that value falls on this table. A

Table 1. Characteristics of study sample

Characteristics	N	%
Gender		
Male	19	18.3%
Female	85	81.7%
Age		
18-39 years old	36	34.6%
40-59 years old	35	33.7%
Above 60 years old	33	31.7%
Race/Ethnicity		
White	75	72.1%
Black	2	1.9%
Hispanics	27	26.0%
Engage in exercise (Minutes/day)		
0-30 minutes	65	62.5%
30-60 minutes	27	26.0%
More than 60 minutes	8	7.7%

persistent score of 17 or above indicates that the patient may need medical treatment. An attachment of resources was provided for patients to seek medical attention and help.

4. Procedure

This study protocol including all associated documents was reviewed and approved by the office of research compliance at the University of North Texas Health Science Center (UNTHSC). During a three month window from October to December 2014, when a patient, age 18 or older signed in for their appointment at the primary care clinic, the front desk staff asked participants if they would like to participate in an anonymous survey regarding depression and exercise. The participant was asked to read the consent letter first and then answer the survey to the best of their ability. The 104 patients who agreed to participate, when finished were asked to place the survey in a folder labeled "Completed depression and exercise surveys." The completed surveys were preceded to a locked room upon being turned in. Once the data collection period was completed, the data was transferred and processed at the UNTHSC for the data analysis.

5. Design

The design for this study was a cross-sectional survey that was completed by 104 patients in a primary care clinic in Seguin, Texas as they waited for their appointment.

6. Variables

Patients were asked to report if they had a documented history of depression which served as a dependent variable. Independent variables collected in the survey included: age, race/ethnic group, gender, income, education level, if the patient has ever seen a mental health professional, diagnosed with any documented psychiatric condition, history of being diagnosed with depression, received treatment for depression in the past, number of days a week person engages in physical activity, amount of time they spend exercising each session, what type of exercise they engage in, and if they believe exercise can be used as a prevention, treatment or adjunct therapy tool for depression?

7. Statistical analysis

Descriptive statistics were analyzed for all independent variables and by the outcome (depression) and by perception of valid treatment. Bivariate analysis (t-test, chi-square) of age and ethnic groups by perception of valid treatment were analyzed. We used logistic regression methods, in which exercise was a dependent variable and age, ethnicity and amount of exercise were independent variables.

RESULTS

This cross-sectional study was conducted to examine: 1) patients' perception of exercise prescription as a valid tool for prevention and treatment of depression and 2) a correlation between the amounts of exercise engaged in per week; and the perception of exercise prescription as a valid tool for prevention and treatment of depression. For the first research question, logistic regression was performed to determine which age and ethnic groups are more likely to perceive exercise as a valid treatment for depression. Based on age, Group 1 (18-39 years) was 0.570 times [0.117-2.767] less likely and Group 2 (40-59 years) was 1.6 times [0.257-10.662] more likely than group 3 (60+ years) to perceive exercise as valid treatment for depression. Based on ethnicity, Whites were 0.945 times [0.210-4.264] less likely and Blacks are 0.179 times [0.008-3.809] less likely than Hispanics to perceive exercise as valid treatment.

Hispanics were used as an ethnic reference group since they have a higher incidence of depression even though our sample size consisted of 70% White population. The 60+ age group was also used as a reference since after survey scoring it was found that majority of 60+ age group patients were classified as borderline clinical and moderate depression.

To address our second question, we performed logistic regression to identify a correlation between exercise performed (independent variable) and perception of exercise as a valid or adjunct treatment approach for depression (dependent variable) among the rural primary care patients. Results indicate that participants who exercised for 0-30 minutes on an average day are 1.683 times [0.3-9.425] more likely and participants who exercised for 30-60 minutes are

2.347 times [0.339-22.748] more likely to perceive exercise as valid treatment for depression than participants who exercised for more than 60 minutes.

DISCUSSION

In this study, we explored participant's perception towards exercise as a valid tool for prevention and treatment of depression as a function of demographic factors and examined the correlation between amount of exercise patients engaged in per week and their perception of exercise prescription. From the present study analysis, we found statistically significant findings from 3 demographic collectors. We learned that participants between ages 40 to 59 years, female, and of Hispanic ethnicity independently were most likely to perceive exercise as a valid treatment for depression. Interestingly, the findings by Pratt indicated that 40-59 years old, female and non-Hispanic Black showed the highest incidence of depression. Both studies indicated that females, 40-59 years old showed the highest incidence of depression, but also the most likely to perceive exercise lifestyle as a valid remedy for preventing and treating depression.

Most of the research has been done focusing on effect of exercise on patients with depression but none of the earlier studies has focused on the participant's perception exercise as a treatment. Considering the Health Belief Model from behavior and community health subject, many researchers believe that there are more chances of adherence to assigned treatment for a particular patient if he/she believes in that [43]. The present study is unique in that it is the first of its kind to look specifically at patient perception of exercise as a valid treatment tool in depression. The results can also help support established study theories that exercise helps to improve depression and its related symptoms.

There are several limitations to this study. One limitation is that there was a sampling bias since we only used one clinic population to obtain surveys from. Another limitation is that there was a small sample size, therefore making it hard to truly generalize findings from this study to this entire rural Texas community. Also, suppose we focused on obtaining answer of question related to exercise perception

on a Likert scale rather than binary outcome (yes/no), it would be more self-explanatory and beneficial for obtaining better results. The survey was open to all adults ages 18 and up in the primary care clinic, regardless of any mental illness or not. If surveys had been distributed only to patients with a chief complaint of mental disorders, then findings may have been different. Another conflicting reason which we can think of is non-uniform representative population i.e. Whites comprised of most of the sample size hence it was somewhat affecting the results.

In terms of strengths, this study was in line with the underlying theory of the Health Belief Model, which has substantial evidence of success when used as an underlying foundation in studies of intervening in other chronic diseases by incorporating participants' perceptions. It is also the first ever study that has been designed to look at patient perception of exercise prescription in the prevention and treatment of depression. Furthermore, this preliminary study data provides an alternative low-cost, sustainable, effective remedy to prevent and treat patients living in rural areas where mental healthcare services are scarce.

Mental illness is the leading cause of disability in America affecting 43.8 million (18.5%) people in the United States. Specifically, depression is now one of the most prevalent mental illnesses constituting 7.6% of mental illness in the U.S. Depression lowers quality and satisfaction of daily life and results in strains at work and family life for patients. Rural areas disproportionately suffer from a lack of healthcare providers and therefore fewer resources to address prevention and treatment strategies to help patients with depression, leading to higher hospitalization rates. There is a need to explore alternative long-term, cost-effective tools for prevention and treatment of depression. This study was designed based on the Health Belief Model theory along with an innovative approach of lifestyle medicine, the new medicine branch of the 21st century, to assess rural patient perceptions of using exercise lifestyle strategy, in the prevention and treatment of depression. This study found statistically significant evidence that participants between ages 40 to 59 years old, female, and of Hispanic ethnicity were most likely to perceive exercise as a valid treatment for depression. As a pilot study, this can serve as a starting point to assess other rural and urban patient populations and to

tailor prevention and treatment plans based on specific demographic factors.

From this survey study and previous studies done to examine the effectiveness of exercise prescription as a tool to prevent and treat depression, it is implied that exercise can help exert anti-depressant effects similar to pharmacologic agents. Especially this present study is the first of its kind to examine patient perception of exercise prescription in depression prevention and treatment, the results from this study can help not only rural populations but also urban areas and the general population as a whole. These findings can help healthcare providers tailor treatment of depression to specific age and ethnic groups. As our study demonstrated that people show the positive perception about practicing exercise lifestyle in preventing and treating depression, exercise can be regarded as an alternative remedy to fight off depression prevalence in rural areas. Exercise can also be recommended to prevent and treat other chronic disease the rural residents may face.

For future studies, researchers should examine a larger sample size from multiple clinics than used in this study. Finally, future research could include patients with mental illnesses in both rural and urban clinic settings in Texas to greater understand patient perception of exercise as a valid treatment for depression.

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