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Physical Activity and Ethnicity as Determinants for Depressive Symptoms

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Aims: Epidemiological research has shown that regular physical activity can help in the prevention of depression. Recent research has been unclear about the racial components of depression and knowing which population is at the greatest risk will help clinics, nurses, and teachers seek and promote interventions with the population. The purpose of this study is to explore the relationship of physical activity, gender, and ethnicity on depressive symptoms.
Study Design: Survey sample.
Place and Duration of Study: Department of Health and Physical Education, Eastern New Mexico University, between March 2016 and April 2016.
Methodology: Eighty-seven individuals completed a non-experimental research study and data was collected on demographics, the Center for Epidemiological Studies on Depression (CES-D), and the Johnson Space Center/NASA Physical Activity Rating Scale (PAR).
Results: Regression analysis showed that physical activity and non-minority status significantly influenced depressive symptoms [CES-D = 17.702 - 2.242(PAR) – 5.487(Caucasian)].
Conclusion: Results of the analysis revealed that being a Caucasian decrease the chance of developing depressions, and a lack of habitual physical activity can increase an individual's likely-hood of developing depressive symptoms. Access to mental health care must be improved for minorities to help improve these rates.

Keywords: Physical activity; depressive symptoms; ethnicity.

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1. INTRODUCTION

Major depression is a common mental health disorder that can have serious effects. Depression is characterized by significant distress or impairment in social or occupational functioning or both. The traditional treatments for depression are time consuming, costly, and often ineffective. Pharmacological treatments can cause side effects such as fatigue, cardiovascular complications, and possible addictions [1]. Thus, exercise may be a desirable alternative or adjunct treatment.

Approximately 4% to 5% of the U.S. population between 18 and 54 years of age will suffer from a "clinically significant" episode of a major depressive disorder (MDD) in any one year [2]. Other estimates derived from self-report of depression [3,4] suggest annual incidence rates ranging from 5% to 10%. The lifetime risk for at least one major depressive episode among the total U.S. population is approximately 17% [4]. The lifetime probability that a person will suffer at least one episode of major depression lasting a year or more is 5.2% [5].

If untreated, approximately 40% of people with a MDD will still have symptoms of depression one year later, and approximately 20% will still be symptomatic two years later [6]. Data from a 15-year naturalistic observational longitudinal study of the long-term course of a major depressive disorder [7], found that a cumulative 85% of the participants experienced a recurrence of depression over the 15-year period (with participants reporting varying amounts of treatment during and between episodes).

Although the first episode of MDD can occur at any age, the most likely age of onset is the mid to late 20's [6]. The age of onset peaks in women at an earlier age (15 to 19 years) than men (25 to 29 years) [3]. The age of onset is younger among birth cohorts born more recently [7], although at least some of this trend may be due to differences in reporting rates over this time period [8].

1.1 Gender and Cultural Effects of Depression

The National Comorbidity Survey (NCS), was the first nationally representative mental health survey in the U.S. to use a fully structured research diagnostic interview to assess the prevalence and correlates of DSM-III-R disorders. Using this database, Weissman et al. [5] reported that women are twice as likely as men to have mood disorders. The noteworthy point is that this difference is accounted solely by depressive disorder and dysthymia (persistently depressed mood). Reasons for the difference in men and women are unknown, but they are likely related to genetics, endocrine effects, and social learning [1].

There does not seem to be an ethnic effect for the rates of depression. Weissman and colleagues [5] using the NCS survey were the first to look at cultural effects. The study found that the prevalence of mood disorders in Caucasians, African Americans, and Hispanic American ethnic groups were similar. With regards to depressive disorder and dysthymia the rates were not significant, but were lower among the African-American and Hispanic-American populations by about 1% and 2% respectively. Some researchers have criticized conclusions of this study for the way the sample was meant to represent the whole country. Kinzie, Leung, Boehnlein, and Matsunaga found that in specific locations, results differ dramatically. Texas and California have higher Hispanic-American risks for depression than New York [9]. These results have been replicated in a study that found Hispanic males and females were more likely to have a diagnosis of major depression than African and European Americans. Hispanic-Americans also had significantly higher levels of self-reported psychotic symptoms [10]. These finding were supported by a number of new studies that are reporting Hispanics at the greatest risk for depression [11,12,13]. These new papers contradict previous studies that found the African American population suffers from depression more than any other ethnicity [14,15,16]. There is clearly a need for further research in this area because of shifts in the US population. By the year 2010, approximately 33% of the US population was Asian/Pacific Islander, African American, Native American, or of Hispanic origin. It becomes increasingly important to study this rising ethnic population.

1.2 Relationship of Exercise on Depression

It is evident that physical activity plays a role in depression. One of the first to point this out was The National Health and Nutrition Examination Survey I (NHANES I), a 1975 survey of nearly 7000 Americans aged 25-74, found that those

individuals who got little or no exercise reported more depressive symptoms [17]. In another study, The Canada Fitness Survey of 22,000 Canadians found that higher rates of depressive symptoms occurred in inactive people. The problem with both of these studies was the "chicken or egg dilemma." The researchers could not determine whether the inactivity or depression occurred first. But, a follow up study done by Farmer et al. [18] found that, the rate of depression among sedentary Caucasian women who were not depressed in 1975 and who remained inactive was twice that of those women who reported moderate amounts of physical activity. Likewise Farmer [18] found that Caucasian men who were depressed and inactive in 1975 and remained inactive were 12 times more likely to be depressed after eight years than those who were depressed but who had become physically active [1]. The problem with these studies is that only one ethnic group was studied and the exercise effect may not be present in other groups.

In the renowned study of Harvard male alumni, it was found that physical activity was shown to reduce the effect of developing depression [18]. The study went on to find that those men who expended 1000-2500 kcal per week had a 17% less likely chance of developing depression over their less active classmates. The percentage grew to 28% for those who exercised more than 2500 kcal a week. A problem once again with this study is that the sample was homogenous in nature. The sample was all male and mostly Caucasian.

1.3 Meta-Analyses on Exercise and Depression

There is a growing body of research on the effects that exercise and physical activity has on depression. One of the first meta-analysis' to study the effects of exercise and depression was done by North, McCullagh, and Tran. [19] Their analysis utilized 80 cross-sectional or longitudinal studies. The exercise group was found to have decreased depression scores more than the comparison groups (ES= -.53+-.85). They also found significant effects for all forms of depression from aerobic and anaerobic exercise and exercise programs of varying length. The study also found that both acute and chronic exercise significantly decreased depression. The results also concluded that exercise had better antidepressant effects than relaxation and enjoyable activities. The most significant finding was that exercise was as effective as psychotherapy, but exercise and psychotherapy together were better than exercise alone.

Craft and Landers' [20] found that exercise groups were less depressed than the comparison groups (ES= -.72+-.10). However, there were no differences for age, sex, intensity, duration, frequency, or change in fitness. Exercise was just as effective from other types of treatments. Craft and Landers' findings were supported in Lawlor and Hopker's 2001 study, which found that exercisers had a reduction in depression symptoms when compared to people who received no treatment. Their study went on the state that the effects of exercise were similar to the effects of cognitive therapy. Their analysis revealed a need for the continued research into the effects of exercise on depression. If exercise is a stronger treatment for depression, then the reoccurrence rates of depression will drop.

1.4 Hypothesized Causes for the Effects of Exercise on Depression

There is ample evidence that exercise is related to decreases in depression, but researchers are still trying to discover the underlying reasons for the effects. Explanations for this association are based on social, cognitive, and biological mechanisms [1]. The social cognition explanations for the decrease in depression are: diversions from stressful stimuli, attention, improved self-image, feelings of control, social interaction, and social support [21].

Biological mechanisms offer more potential for establishing a direct causal relationship. However, even biological explanations might not directly support an independent effect of exercise reducing depression [1]. Either way exercise is not yet medically recognized as a treatment for depression, even with the addition of the recent research that moderately intense exercise is an effective approach to reducing symptoms of mild to moderate depression [6]. Understanding how exercise directly and independently reduces depression is one of the next frontiers of exercise psychology [1]. Understanding the role of exercise on mental health may help contribute to interventions and better identification of those populations at greatest risk. The purpose of this study is to explore the relationship of physical activity, gender, and ethnicity on depressive symptoms.

2. METHODOLOGY

2.1 Participants

A total of eighty-seven subjects completed the survey. The age range of the subjects was from 19 to 56 (M=26.87) years (45 male & 42 female). Subjects were recruited from the university and off-campus sites. They were a convenience sample and asked at random to participate and data was collected from sites such as local churches, malls, community centers, gas stations, and gyms. Survey data was collected on age, gender, ethnic background, physical activity level, and depressive symptoms. Participants completed the forms in a quiet room at the location they were recruited. All subjects signed the informed consent before data collection and were not offered any compensation for participating in the survey. Sample size analysis was calculated and a sample of seventy-nine individuals was needed to achieve the required level of accuracy. The human subjects committee at the university approved the study.

2.2 Self-reported Physical Activity

Habitual physical activity was obtained from the multiple ratings of the 8 point (0-7) NASA Activity Scale [22]. The directions ask the individual to select one value that best represents the level of physical activity for the previous month. Moderate activity is defined on the scale from 3.5 to 5.0. Active is defined as 5.0 to 6.5; very active is above 6.5. The scale has been widely used both for academic research and research done at NASA with good reliability between .81-.86. The scale has a strong independent relationship with maximal oxygen uptake in individuals aged 20-79 with .81-.85 correlation. The R^2 for prediction is .66 [23].

2.3 Self-reported Depressive Symptoms

Depressive symptoms were assessed using the Center for Epidemiological Studies on Depression (CES-D) [23]. The scale is, and remains one of the most widely used instruments in psychiatric epidemiology [16,24,6]. The scale includes 20 items that survey mood, somatic complaints, interactions with others, and motor functioning. The response values are 4 – point Likert scales, with range 0-3, with anchor points in terms of days per week ‘rarely or none of the time (less than one day)’ to ‘most or all of the time (5-7 days)’. The final score spans from 0 to 60, with a higher score indicating greater impairment. People with a final score of 16 or higher are typically identified as a depressive ‘case’. This generally represents someone that has reported as least six items to be frequently present over the course of the previous week, or most of the 20 items to be present for a shorter duration. The CES-D has internal consistency for the general population at .85. Validity for the instrument is strong with high correlations between the Hamilton Clinician Rating Scale of .69-.75 [24].

2.4 Data Analysis

Data Analysis was done using SPSS version 23. Mean, standard deviation, and frequency were analyzed on all variables. Multiple Linear regression was used to generate a CES-D regression model. Self-reported physical activity, gender, ethnic make-up, and the interaction effects were evaluated as predictor variables.

3. RESULTS

Descriptive data of the subjects are presented in Table 1. The variance inflation factor (VIF) was analyzed and all variables were 1, thus multicollinearity does not exist.

The following multiple linear regression equation was developed for predicting CES-D (see Table 2): CES-D = 25.204 - 2.242(PAR) – 5.487(Caucasian).

Habitual physical activity and ethnic status (Caucasian) were statistically significant. The standardized beta weights for physical activity and ethnicity (Caucasian) were: -.452 and -.287 respectively (see Table 2). Physical activity increased, thus depression decreased. Based on the regression equation Caucasians experienced a decrease rate of depressive symptoms. The model accounts for 29.9% of the variance for depressive symptoms.

4. DISCUSSION

The purpose of the present study was to examine the effects of physical activity and ethnicity on depressive symptoms. The results revealed that physical activity (p=.000) and ethnicity (p=.002) were predictors of depressive symptoms. The standardized regression coefficients show that as habitual physical activity increases depressive symptoms decrease (-.452). It also shows that being Caucasian decreases depressive symptoms (-2.87).

Table 1. Descriptive data of subjects

Variable	N=87			Frequency
	M	SD	Range	
Age (years)	26.87	8.28	19-56	
Physical activity rating (PAR)	4.45	1.80	1-8	
CES-D	11.71	9.59	4-50	
Gender (males/females)				45/42
Ethnic				
Caucasian				42
Hispanic				25
African-American				19

Table 2. Results of the regression equation (N=87)

Variable	Coefficients	Std-Err	β	Sig
Constant	25.204	2.468		
PAR	-2.242	0.493	-.452	<.001
Caucasian	-5.487	1.758	-.287	.002
African-American			-.024	.827
Gender			-.073	.436
R=.546				

β = standardized multiple regression coefficients

The current study supports other research where exercise has been reported to be a factor associated to depressive symptoms [25,26, 27,28,29]. The results of this study contradict the prior research stating that either Hispanic Americans or African-Americans are at a greater risk of developing depression [10,11,12]. This study showed that being a Hispanic American or African-American neither increased nor decreased the risk of exhibiting depressive symptoms. In fact the data indicates that being Caucasian decreases the chance of developing depression, which contradicts the research done by Weissman and colleagues [5] evaluating the NCS that states, Caucasians are at the greatest risk. A discussion of the results related to the hypothesis is presented in the following sections.

4.1 Depressive Symptoms and Physical Activity

Physical activity accounted for 29.9% of the variance in the regression model developed in the current study, and physical activity (p= .000) was the strongest predictor of depressive symptoms. One of the factors predicted to have an impact on depressive symptoms was physical activity. The findings of this study support the hypothesis that physical activity is a significant determinant of depressive symptoms. This study also supports the findings of [5,17,18,19] that physical activity is a significant factor for depression symptoms. Among 25 population-based studies that have been reported around the world, the first in 1988, 22 reported an inverse relationship between physical activity and depression [30]. This study does the same.

4.2 Depressive Symptoms and Ethnicity

One of the factors predicated to effect depressive symptoms was ethnicity. Results of the regression analysis indicated that being Caucasian is a significant (p =.002) predictor of lower depressive symptoms. Minority status neither puts one at greater risk nor decreases the risk for exhibiting depressive symptoms. Based on prior research [5,10,14], it was hypothesized that ethnicity would be a significant factor for depression. The data observed in this study does support this hypothesis. However, it was not expected that being Caucasian would decrease one's chance of developing depressive symptoms. A possible explanation is that Caucasians have better access to mental health care and may employ better coping strategies than do minorities. Minority individuals typically do not have health insurance and are largely associated with greater health burdens [31].

4.3 Depressive Symptoms and Gender

The results of the study indicate that gender was not a significant determinant for depressive symptoms. These findings contradict the

research that women are at greatest risk for developing depression [5]. This is most likely due to the population demographics and sample size in the current study. If the sample was widened to capture more of the general population one might expect different results. However, this may not be the case. The majority of the sample was taken at a non-typical college setting. In a similar study with a larger sample size from the same population as the current study, gender was again found not to be a significant determinant of depressive symptoms [31]. In another research study, no gender differences were found for rates of depression [32,33,34]. These findings regarding gender should be explored in further studies.

5. STUDY LIMITATIONS

This study has some limitations. First, depressive symptoms and physical activity were measured using self-report. Surveys rely on subjective rating of descriptors, yet all studies reviewed used self-report and that biases are not likely to be dependent upon ethnicity. The effect of ethnicity was unlikely to have been affected. Second, the PAR should be recoded to calculate weekly caloric expenditure, which would allow greater understanding of the role of exercise. Future studies should include a complete physiological assessment of the subjects. Finally, there is some concern with the interpretation of the scales. The way people think about depression and exercise may be influenced by a cultural view of the individual and the role of the individual in society. Also, nearly 70% of the variance remains unexplained for depressive symptoms. These symptoms are most likely influenced by a number of factors; a death in the family, tax season, a job promotion, social support network, marriage, kids, and so forth. Despite these limitations, exercise and ethnicity accounts for a significant portion of depressive symptoms [29.9%).

This study's intent was to determine the role that physical activity and ethnicity, which to a certain extent includes cultural effects, has on depressive symptoms. Both physical activity and ethnicity were predictors' for symptoms of depression. This has some important clinical implementations for medical and other professional services. This study highlighted that Caucasians have lover incidents of depressive symptoms. It is important to have access to mental health care and this care must be improved for minorities in contact and instruction.

6. CONCLUSION

In summary, the results provide evidence consistent with the current literature regarding physical activity and its influence on depressive symptoms. The results show that being an Hispanic-American or African-Americans neither increases nor decreases the risk for depressive symptoms; however there is a clear distinction that being Caucasian decreases the chances. The purpose of the present study was to examine the effects of physical activity and ethnicity on depressive symptoms.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

The human subjects committee at the university approved the study.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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