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Moving to the Beat of Djembe Drums: African Dance and Reported Feelings of Depression

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CLAREMONT McKENNA COLLEGE
MOVING TO THE BEAT OF DJEMBE DRUMS: AFRICAN DANCE AND
REPORTED
FEELINGS OF DEPRESSION

SUBMITTED TO
PROFESSOR CHARLOP
AND
DEAN GREGORY HESS
BY
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Abstract

Depression is a disabling mental disorder that has huge impacts on one's life and is therefore considered a global health concern. Efforts to find the most effective treatments have led to the development of antidepressants and cognitive therapy treatments. However, exercise as a form of treatment for depression has been growing in popularity. Recently, Dance Movement Therapy has gained exposure as a possible form of exercise treatment. Therefore, in the current study, West African dance was studied in order to determine its effects on depression. It was hypothesized that West African dance would target and alleviate symptoms of depression as outlined on the Beck Depression Inventory. Participants were already enrolled in the dance class and the Beck Depression Inventory was administered to the participants. Results indicated that West African dance had a significant positive impact on depression by lowering overall depression scores and psychological depression scores. This study contributes to current literature by offering a unique form of dance with rhythmic drum beats that has not been studied before. Future research should be aimed at further establishing the efficacy of West African dance and the long-term effects it has on depression.

Key words: depression, treatment, exercise, dance

Moving to the Beat of Djembe Drums: African Dance and Reported Feelings of Depression

Depression has swept across the globe affecting people of all ages, gender, and ethnicity. The American Psychology Association (2010) defined depression as experiencing lack of interest, loss of energy, sleep disturbance, significant changes in weight, trouble concentrating, feelings of worthlessness, or thoughts of suicide.

Depression can manifest itself in different forms, which include: unipolar, bipolar, postpartum, catatonic and seasonal affective disorder. A staggering 20 million people are affected by some form of depression in the United States and 120 million people have depression worldwide (National Institute of Mental Health, 2010; World Health Org, 2010).

Several factors may contribute to the development of depression including biopsychosocial factors, which suggests that biological, psychological, and social issues are all leading contributors to the development of depression. Chemical, environmental and genetic factors also play their roles in contributing to the development of depression. According to the WHO (2010), depression occurs at a higher rate in females than males, which may be due to the multiple roles that women take on in their personal and professional lives. Additionally, direct relatives of those suffering with depression have a 10-15% greater risk for depression in comparison to the 1-2% in the general population.

The sudden onset of depression can be an indicator that aspects of a person's emotional, mental or physical health are in jeopardy due to an imbalance in any of these categories. Tragic events like the sudden death of a loved one or major life transitions like the addition of new members to a family can act as stressors in a person's life. These stressors are considered important contributors to the development of depression (APA,

2010). Major Depressive Disorder is alarmingly dangerous and contributes to premature death or disability (Murray & Lopez, 1997). Even though depression is a serious disease, which requires effective treatment, less than 25% of people worldwide have access to effective treatment (WHO, 2010).

As established by the statistics, depression is an immense public health concern. It is regarded as a serious threat to one's health and productivity. Due to the large pool of potential victims and those already afflicted with the disease, it is imperative that we find the most effective treatment to help prevent and cure depression. Currently, psychotherapy and antidepressant medications are the two dominant forms of treatment for depression.

Psychotherapy is derived from the field of clinical psychology, a field that applies scientific theory in the practice of treating individuals or groups who have problems with adjustment, personal development, and negative thoughts. A clinical psychologist is trained to work with these individuals or groups and help encourage their progress through identifying the source of the problem with intervention methods such as behavioral assessments. Psychotherapy applies the guidelines set forth by clinical psychology and involves a close relationship between the therapist and patient. Psychotherapy utilizes communication techniques like conversation and personal expression through different art forms in order to get to the root of the patient's problems. These techniques are aimed at developing insight to one's cognition and establishing the ability to come to a more sensible interpretation of reality. Psychotherapists often use tasks such as goal setting as a tool to decrease distorted thought patterns (APA, 2010).

Cognitive Behavioral Therapy (CBT), a form of psychotherapy, encourages patients to identify their cognitive distortions, challenge them, and come to a more clear sense of reality. Aaron Beck, an esteemed psychologist and specialist in the field of depression, claims that people with depression perpetuate negative views of themselves by misinterpreting events. This error leads to a distorted sense of reality. Given this issue, CBT was created to alter these misinterpretations and decrease negative thoughts of self. CBT relies on a two-way relationship between the patient and the therapist in order to maximize progress with treatment. The therapist helps the patient elicit and test automatic thoughts while encouraging them to comprehend their problematic construction of reality. Once the automatic thoughts are identified, the therapist helps the patient dispute their negative thoughts by encouraging them to examine the evidence available. This process helps patients come to a more realistic view of themselves and their situation (Beck, 1974, p.215).

CBT is well established in the field of clinical psychology. It is used to treat several mental disorders and is often recommended for patients with depression. For example, a case study conducted by Rush, Khatami, and Beck (1975) used CBT to treat three patients with chronic relapsing depression. Following the CBT guidelines, patients were encouraged to identify their cognitive distortions and come to a more realistic assessment of themselves. Utilizing CBT techniques proved to be an effective therapy for depression. Through cognitive clarification, improvements in self-esteem and mood were documented as well as a decrease in self doubt (Rush et al., 1975). Even though CBT is an effective treatment, the time commitment and a heavy workload are two criticisms of the CBT curriculum. Rush et al. (1975) demonstrated that patients who use CBT are

subjected to a lengthy waiting period to response and plenty of assignments to complete. For instance, patients in case study 1 and 2 are both instructed to keep daily journals of their activities and bring them to their sessions. In session, these patients were directed to analyze their journal entries and in some cases, re-read them every day until they could identify their cognitive distortions. The response times varied among the three patients but the longest response time was documented as two months.

Therefore, in the case of time urgency, CBT is not recommended as the most suitable treatment especially for the severely depressed. In addition to the time commitment, CBT requires an incredible amount of mental effort to complete the multitude of behavioral assignments. In light of these issues, antidepressants are offered as a quicker and easier solution.

The history of antidepressants can be traced back to 1952 when iproniazid was discovered to help lift the mood of terminally ill patients. (Crane, 1956). Following this discovery, Zeller (1955) demonstrated the active role of iproniazid in reducing the speed of the breakdown of the monoamines: norepinephrine, serotonin, and dopamine. Iproniazid accomplished this by inhibiting monoamine oxidase, which eventually became known as Monoamine Oxidase Inhibitors (MAOIs) (Zeller, 1955). Simultaneously, the first tricyclic (TCA) antidepressant was created through the fusion of imipramine. The active role of this drug was to stop the reuptake of norepinephrine and serotonin. Although MAOIs and TCAs were found to be effective in reducing depressive symptoms, both presented safety issues that were rooted in toxicity and undesirable side effects (Lieberman, 2003). These two medications were not used clinically until the 1960's. In the next decade, scientists were highly motivated to discover a new

antidepressant without the same toxicity issues and side effects as the MAOIs and TCAs. In the 1970's this motivation led to new discoveries and the creation of the first Selective Serotonin Reuptake Inhibitor (SSRI) named Fluoxetine (Prozac) (Fuller, Perry, & Molloy, 1974). This discovery marked an important time in history. From this point forward, SSRIs became widely sought after and currently dominate the market as the most popular drug of choice for Major Depressive Disorder in the United States (Olfson & Klerman, 1993).

Antidepressants are an attractive option because they offer quicker relief than psychotherapy and they don't take a considerable amount of mental effort in order to work. Response and remission rates were compared between antidepressant and cognitive therapy treatments in DeRubeis et al. (2005). The results showed that both response and remission rates were lower for cognitive therapy when compared to medication at the time intervals of eight weeks and 16 weeks. At eight weeks, response for therapy was 43% while medication was 50% and at 16 weeks, the remission rates were 40% for cognitive therapy and 46% for medication. Only after 16 weeks of treatment was the significant gap closed between cognitive therapy and medication, suggesting that it takes 16 weeks for cognitive therapy to become as effective as medication (DeRubeis et al., 2005). Additionally, antidepressant regimens do not include daily cognitive tasks like those required in cognitive therapy. Although antidepressants are an effective treatment for depression, they are intrusive and cause significant undesirable side effects including: nausea, insomnia, sexual dysfunction, weight gain, and fatigue.

Researchers have proposed the combination of antidepressant and cognitive therapy treatments in an attempt to maximize results. Taking this proposal into account, Manber et al. (2008) compared three groups in a 12 week treatment program, which included: antidepressants, psychotherapy, and the combination of the two. This study was designed to conclude which therapy offered a faster remission time. Results showed that remission rates were similar for the antidepressant group (14.2%) and psychotherapy group (13.9 %), but the combination group showed a much larger remission rate of 28.9 %. These findings suggest that in comparison to using psychotherapy or medication by itself, the combination of the two generates faster remission from chronic depression (Manber et al., 2008).

In review of the current literature regarding antidepressants and psychotherapy, both have proven to be effective treatments for depression. The suggested combination of these two therapies may sound appealing because the patient would get the benefits from each treatment, but we must acknowledge that the combination of treatments would also yield both side effects. For instance, a patient would still have to complete mentally exhausting assignments and also experience the physical side effects from medicine. In regards to these issues, exercise is offered as a monotherapy for depression.

Exercise as a treatment for depression has grabbed the attention of the global community. Countries all over the globe have begun to encourage its citizens to implement physical activity into their lives to help alleviate symptoms of depression. For example, community programs that focus on encouraging active lifestyles have been created in Australia. Under their Medicare program, they offer services of an exercise physiologist (Minister for Health and Ageing, 2005). Similarly, nations have also

released public health announcements encouraging the implementation of exercise to help lower depression (Daley, 2008). Specifically, in 2004, the Chief Medical Officer of the United Kingdom issued a statement concerning the benefits of physical activity on depression. Thus, exercise as a treatment for depression is gaining support worldwide.

The support of exercise treatment is enough to warrant further exploration of the possibilities offered through exercise. When a new therapy is proposed in the face of existing therapies, it is important to establish a need for the new therapy and ensure that it has the efficacy to stand alone as a monotherapy. The need can be assessed by looking at the deficiencies of the current therapies offered and the efficacy can be established by comparing exercise to the efficacy of psychotherapy and antidepressants.

A well documented deficiency of antidepressants is that they do not eliminate all symptoms of depression. Remaining symptoms of fatigue and reduced cognitive function have been reported after receiving antidepressant medication treatment, which suggests medication does not take care of all symptoms. This evidence strengthens the case for exercise because exercise can eliminate these leftover symptoms that medication fails to address (Eriksen & Bruusgaard, 2004; Etnier et al., 1997). A review of articles concerning exercise in comparison to conventional treatments was conducted by Daley (2008) who concludes that exercise is an attractive alternative therapy. This proposition is supported by simple facts that show exercise is not only a cheap and side effect free option, but it also provides immediate results. Rethorst, Wipfli and Landers (2009) provide similar evidence that Daley (2008) cites as motivation for considering exercise as an alternative to conventional therapy. Rethorst et al. (2009) supports this claim by explaining that the benefits of medication and psychotherapy do not extend beyond

relieving depressive symptoms, while exercise can reduce risk of heart disease, certain cancers, and improve cognitive functioning (Kelly & Kelly, 2000; Taylor et al., 2004; US Department of Health and Human Services, 1996; Warburton, Nicol, & Bredin, 2006). Furthermore, the evaluation of the costs associated with exercise versus other treatments, reveals a convincing argument to promote exercise instead of medication or psychotherapy. The costs of exercise are minimal and include: the cost of your own time, a gym membership, and physical exertion. (Rethorst et al., 2009) On the other hand, the costs of medication have significantly higher costs than exercise which include: undesirable weight changes, bleeding, sexual dysfunction, and fatigue (Food and Drug Administration, 2006). The costs associated with psychotherapy are heavy monetary costs and the cost of your time. Therefore, we can conclude that exercise can provide benefits to the body beyond relieving symptoms of depression and can be attained with relatively low costs. Exercise treatment helps not only reduce symptoms of depression, but promote a healthy lifestyle as well.

The efficacy of exercise has been established by several studies. In a meta-analysis of 58 randomized controlled trials, Craft and Landers (1998) examined studies that reported on the effect of exercise on depression. The results from this meta-analysis showed that when exercise was compared to psychotherapy, exercise was found to be similarly beneficial as psychotherapy. Additionally, a meta-analysis conducted by Blumenthal et al. (2007) compared exercise to the antidepressant Setraline (Zoloft) and a placebo group in order to discern whether or not there was a difference in efficacy between the two treatments. Results showed that exercise and medication had nearly

identical remission rates of 45% for exercise and 47% for medication, which suggests that exercise can be just as effective as medication in leading to remission for depression.

The effect of exercise on depression is rooted in the intricate relationship between psychological and neurobiological mechanisms (Strohle, 2009). Therefore, both psychological and neurobiological mechanisms must be reviewed.

Depression heavily effects cognition and attacks psychological wellbeing in terms of self-concept. Studies provide evidence supporting the fact that exercise can alleviate problems with cognition as well as provide additional benefits which include: increased self efficacy, a sense of mastery, distraction, and enhanced self concepts (Fox & Taylor, 2005; Strohle, 2009). The role of exercise in terms of psychological wellbeing is demonstrated in a study by Ossip-Klein et al. (1989). The study was designed to detect what changes occur in self concept in a population of clinically depressed women in a one year period. The Beck Self-Concept Test was administered to assess self-concept scores at baseline and various time periods throughout the year. Participants were assigned to one of three conditions: running (aerobic), weight lifting or a control group. Results showed that there was a significant effect of exercise on self-concept and that both exercise groups of aerobics and weight training reported improved self-concept over time. According to Ossip Klein et al. (1989), as self esteem increased, reported levels of depression decreased, which suggests that self esteem plays an important role in lowering depression. The distraction hypothesis offers exercise as a method to distract people with depression and give them a break from constant worries and depressing thoughts (Leith, 1994). Another antidepressant effect of exercise is offered through the improvement of self-efficacy. Self efficacy is determined by the belief that one already has the required

skills to complete an assignment and the confidence that the assignment can be completed with the preferred result obtained (Bandura, 1997). People with depression are described as often lacking confidence in their abilities and therefore having low self-efficacy. Given this problem, exercise has been suggested as a solution to give depressed people a means by which to accomplish tasks and gain a sense of mastery, which would enhance self-efficacy

Physiological symptoms of depression typically result from chemical deficiencies. However, physical activity leads to a sequence of actions that restore or increase these deficiencies in the body. Effects of exercise specifically target: β endorphins, Vascular Endothelial Growth Factor (VEGF), Brain-Derived Neurotrophic Factor (BDNF), serotonin, dopamine, and norepinephrine. Ernst, Olson, Pinel, Raymond, and Christie (2006) identifies the connection between exercise and the production of adult neurogenesis (development of new neurons in the brain) as the essential neurobiological action which leads to decreased symptoms of depression. Four physiological components (β endorphins, VEGF, BDNF, and serotonin) are explored as vital components to the success of adult neurogenesis. Specifically, these four mechanisms are crucial to the growth and survival of new neurons in the brain.

Over 25 years ago reports began to surface regarding β endorphins levels post exercise. (Ernst et al., 2006) The endorphin hypothesis states that exercise has a beneficial effect on depression because exercise increases the release of β endorphins. Endorphins target overall mood and well-being symptoms associated with depression. The roles of β endorphins and serotonin in adult neurogenesis are to promote the growth of new neurons while VEGF and BDNF contribute to the survival of these newly formed

neurons (Dey, Singh & Dey, 1992; Gallagher, 1988; Meeusen et al., 1996; Persson et al., 2003; Wilson & Marsden, 1996). The active role of SSRIs is to restore levels of serotonin and exercise is presumed to produce the same effects, so exercise is offered as an alternative therapy to medication (Ernst et al., 2006).

The Monoamine hypothesis is offered as another mechanism through which exercise lowers levels of depressive symptoms. Serotonin, dopamine, and norepinephrine are the three neurotransmitters that have been linked to depression through the monoamine hypothesis, which states that a lack of these three neurotransmitters can account for multiple symptoms of depression. Specifically, depletion of norepinephrine may correspond to energy and attention levels, a lack of serotonin may cause anxiety and compulsions and lack of dopamine can lead to lower levels of motivation and pleasure (Nutt, 2008). In terms of exercise, the monoamine hypothesis states that physical activity leads to a greater availability of the aforementioned brain neurotransmitters (Craft & Perna, 2004). However, the direct link of the appearance of these neurotransmitters in the brain post exercise has yet to be determined. Studies have shown that exercise boosts levels of these neurotransmitters in plasma and urine, but it has proven difficult to definitively conclude whether there is an increase in the brain neurotransmitters. The lack of conclusive evidence is due to the invasive operations that would have to be performed in order to report on changes of neurotransmitters in the brain (Ebert, Post, & Goodwin, 1972; Post et al., 1973; Tang et al., 1981).

In review of the current literature offered for exercise and the treatment of depression, various modes of exercise (aerobic, weight and resistance training) are presented as viable treatment methods for depression. The need for a less invasive and

cheaper alternative has been established as well as the efficacy of exercise as a monotherapy. Now that exercise in general has been proven to be a suitable option, dance will be considered as a form of exercise treatment and its effect on depression.

Beginning in the 1950's, Dance Movement Therapy (DMT) emerged in the western world (Palo-Bengtsson & Ekman, 1997) and seeks to help people improve their body image and reduce cognitive distortions. The motivation to pursue innovative therapy such as dance as a treatment for depression was inspired by inefficient responsiveness and undesirable side effects of psychotherapy and antidepressants.

A study conducted by Young-Ja, Sung-Chon, Myeong, and Min-Cheol (2005) used DMT as a form of exercise treatment for adolescents with mild depressive symptoms. The program ran for 12 weeks and yielded results consistent with the hypothesis that DMT helps reduce depressive symptoms through increased levels of serotonin and dopamine. It was concluded that given the positive results of the study, DMT can be promoted as an alternative to traditional treatment, offering a more easily accessible and inexpensive action plan (Young-Ja et al., 2005).

Koch, Morlinghaus, and Fuchs (2007) implemented the Joy Dance on 31 patients in order to investigate its effects on depression. Three groups emerged from this study where the dance group was compared to a music only and movement only group. The dance group was directed to perform a circle dance from Israel, which was accompanied by lively music and aimed at provoking joy. A significant decrease in depression was recorded for the dance group while no signs of change in depression appeared for the music only and movement only groups. DMT therapy is attractive for female patients because of the positive effects on body and self perception (Koch et al., 2007).

Significant pre test/ post test changes were found in lowering symptoms of depression, lifelessness, anxiety, tension and tiredness while increasing motivation, coping strength, energy, and enjoyment. In addition to these results, participants in the dance group showed higher response to treatment than participants in the music only group.

As expressed earlier, exercise can help alleviate symptoms of low self-worth by providing a mastery experience. DMT also acts in this way and provides an opportunity to change perceptions of the body and see it as more strong and capable. This experience can alter low self-worth and eliminate negative self-concepts. Ritter and Low (1996) propose the idea that DMT can offer people with depression the opportunity for nonverbal expression and joy-evoking activity.

In light of the current literature on exercise and depression, it has been demonstrated that there is a positive relationship between exercise and depression, but little research has been conducted on the effects of dance on depression. DMT is a relatively new therapy and is offered as an innovative approach to using a form of exercise to treat depression. Although studies are innovative in their use of DMT, no studies have assessed the effects of West African Dance on depression. Therefore, the current study aimed to assess the effects of West African Dance on reported symptoms of depression in a population of women who are not professional dancers. Given the recent research of the benefits of exercise on depression, we can hypothesize that psychological factors such as self-concept will improve as well as physiological factors. In summary, based on the several studies reviewed in this article, it was predicted that participants will report higher levels of depression before dance class and lower levels of depression directly after dance class. At a two week follow up administered before dance class, it

was hypothesized that depression levels will have risen since the post test scores were taken, but not to a point as high as the original pre test scores because participants will have been dancing for two weeks at this time.

Method

Participants

Participants were 13 female undergraduate students at the Claremont Colleges. Their age ranged from 18-22 years. Participants were recruited by their enrollment in African dance class. The African dance class had a range of women who were taking the dance class for fun, as part of a physical education requirement, or as part of their dance major. Participants were not offered compensation for this study.

Design and Procedure

The design of this study was an experiment with a repeated measures design between subjects. Data was collected at a dance studio on Pomona College's campus. Participants in the dance class were told the study dealt with stated feelings of depression as calculated by the Beck Depression Inventory. Participants were then asked if they would agree to participate in the study. After agreeing to do the study, participants were told they would be given the Beck Depression Inventory at three separate times: once before dance class, once after dance class, and once before dance class two weeks later. Permission was obtained from the dance instructor to start class ten minutes late and end ten minutes early in order to accommodate the study. Participants were given the informed consent form once everyone had arrived. They were told to read the informed consent form and sign the bottom of the form if they agreed to participate in the study. Once these informed consent forms were collected, the participants who agreed to

participate were given the Beck Depression Inventory-II, which takes ten minutes to complete. The study was administered to all 13 participants at the same time. Participants were told not to put their name in the space provided on the inventory sheet in order to protect their privacy. Instead, they were told to create a unique identifier that was comprised of a sequence of numbers that included their birthday and favorite number. Participants were also asked to remain quiet and not discuss their answers with anyone else. Once participants completed the inventory, they were instructed to put their sheet in a large envelope and proceed to dance class.

After dance class on the same day; participants were asked to fill out a new inventory sheet and mark it with the same sequence of numbers as provided on the first sheet. The experimenter reminded participants to refrain from speaking to others during the study. Upon completion, participants were once again instructed to put their inventory sheet in a separate envelop. Participants were thanked for their participation before being excused to leave the dance studio. A two week follow up was given to participants before dance class. Following the same procedure guidelines, participants were told to remain silent during the study and to mark their inventory with their unique series of numbers. Participants were reminded that this series of numbers consisted of their birthday and favorite number. After completing the inventory, participants were prompted to put their sheet in an envelope before proceeding to class.

Materials

Participant symptoms of depression were assessed by the Beck Depression Inventory- II (BDI-II), which is a 21-item self-report inventory that evaluates different levels of reported feelings of depression. The BDI was created by Dr. Aaron T. Beck in

its original form in 1961, but has been revised twice since. The most current form of the BDI is the Beck Depression Inventory- II, which was created in 1996 after the release of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders, which altered the guidelines used for diagnosing depression (Beck, Steer, Ball & Ranieri, 1996). The BDI-II was designed to assess the severity of depressive symptoms that include: hopelessness, feelings of guilt and punishment, fatigue, weight changes, and satisfaction (Beck, 2006). The BDI- II contains 21 questions including the aforementioned symptoms of depression. Each question is rated on a scale ranging from 0 to 3, which allows for the assessment of severity. An example item on the BDI-II deals with disappointment and is presented like this: (0) I don't feel disappointed in myself. (1) I am disappointed in myself. (2) I am disgusted with myself. (3) I hate myself. This shows the severity of a symptom ranging from minimal to severe. All 21 items are presented in this format and calculated to give a total score for depression. The minimal range is 0-13, mild is considered 14-19, moderate is 20-28 and the severe range is 29-63. Therefore, the higher scores indicate more severe depressive symptoms. See Appendix for a copy of the BDI-II.

Results

Main Effects

The main effect of West African dance on depression was investigated through a series of t-tests and One-Way ANOVAs were run on the pre-test, post-test, and two-week follow up variables. A dependent samples t- test was run on the dependent variable of depression scores as calculated by the Beck Depression Inventory-II. This test was run in order to examine the hypothesis that dance helps lower reported feelings of depression.

This hypothesis was tested by using a repeated measures t-test which compared pre-test and post-test scores to determine if the independent variable (dance) had an effect on the dependent variable (depression scores). This t-test was run with the pre-test variable being the total score derived from the sum of the pre-test scores of individuals, which was compared to the total score derived from the post-test scores. This test revealed a significant difference in the comparison of the two variables, which satisfies the alpha level .01. Results (M for pre-test= 6.71, M for post-test=3.85, $t= 4.9$) were consistent with the hypothesis that the effect of dance lowers reported feelings of depression. See Figure 1 for results of the pre-test/post-test t-test.

Furthermore, the effect of West African dance was examined through a dependent samples t-test on the pre-test and two-week follow up variables, which yielded insignificant results (M for pre-test =6.71, M for two-week follow up = 5.64, $t= 1.15$). However, looking at Figure 1, we can see that there is a small difference in the hypothesized direction that the two-week follow up scores would be lower than pre-test scores. Therefore there is a slight trend that could possibly confirm the hypothesis if power was increased, but for now this difference is not significant at the alpha level of .05.

Another dependent samples t-test was run on the post-test and two-week follow up variables. The results from this test (M for post-test= 3.85, M for two-week follow up=5.64, $t= -2.48$) satisfy the significance level at .05 and confirm the hypothesis that post-test scores would be significantly different than the two-week follow up.

Lastly, a One-Way ANOVA was run to compare all three variables (pre-test, post-test, two-week follow up) and determine if there was a significant difference. This test

passed the homogeneity of variance test and yielded an $F(2, 39) = 2.84$, but just barely missed the cutoff alpha level of .05. Given that this is a different test than a t-test, significance levels changed slightly between the three variables, but we can tell from the t-tests and Figure 1 that there are significant differences among these three variables. Overall, in Figure 1, we can see that the results follow the hypotheses that pre-test scores would be the highest, post-test scores would be the lowest, and two-week follow up scores would rise higher than post-test, but would not reach the level of pre-test scores.

Additional Analyses

Psychological variable

The literature on exercise and dance suggests that exercise can specifically target psychological symptoms of disturbed self-concept. Therefore, a psychological variable was created in order to isolate the psychological symptoms from the inventory and determine if West African dance targets these specific symptoms. This variable included these items from the inventory: sad, discouraged, failure, satisfaction, disappointment, and blame. It was hypothesized that there would be a significant difference in the pre and post psychological symptoms in the direction that pre-psychological symptoms would be higher than post-psychological symptoms. Results from a dependent samples t-test revealed (M for pre-test psych variable = 2.08, M for post-test psych variable = .31, $t = 4.68$) that this test was significant at the alpha level of .01. The data suggests that pre-test psychological scores are much higher than post-test psychological scores. These results are consistent with the hypothesis that dance positively effects psychological symptoms of self-concept. See Figure 2 for pre-test, post-test, and two-week follow up results for the psychological variable.

A One-Way ANOVA was also run on the psychological variable for all three time periods (pre-test, post-test, and two-week follow up). This test did not pass the homogeneity of variance test, so results can't be deemed significant, but we can look at trends in the data. The M for the two-week follow up was .80, which is different than the 2.08 and .31 for the pre-test and post-test means. The $F(2, 34) = 6.98$, which would have been significant at the .01 level if it had passed the test for homogeneity of variance. Figure 2 displays these differences.

Physiological variable

Similar to the psychological variable, a physiological variable was created to capture the effect of dance on physical symptoms of depression as provided in the BDI-II. The physiological symptoms of depression include low levels of neurotransmitters and this translates into physical side effects of disturbed sleep. Two items (sleep and tiredness) from the inventory were included in order to assess this issue. A dependent samples t-test was conducted on the pre-test and post-test scores for the physiological variable and results (M for pre-test=.53, M for post-test=.46, $t=.56$) did not yield any significant results at the alpha level of .05. These results can be seen in Figure 3.

These effects were also assessed in a One-Way ANOVA in order to include the two-week follow up variable. The M of the two-week follow up score was .80, which appears to be different than the other two means. The $F(2, 34) = .55$, was not significant at the .05 level. This test passed the homogeneity of variance test, but significance at the .05 level was not attained. Figure 3 shows these results. Even though there are minimal differences, there is a little evidence that the direction of these results are promising and

could potentially support the hypothesis that dance helps alleviate physiological symptoms of depression.

Discussion

Depression is a common mental disorder which can escalate into being life threatening if left untreated. The vast amount of people that are affected by depression worldwide and the toll it takes on one's life is enough incentive to find the most effective treatment. Given the serious concern that depression provokes, treatment has been researched for several decades now. The two dominant forms of treatment for depression include psychotherapy and antidepressant medication. Both forms of treatment are efficacious and have proven to relieve symptoms of depression (DeRubeis et al., 2005; Olfson & Klerman, 1993; Rush et al., 1975). Response and remission rates show that after a certain time period, medication and psychotherapy have been shown to work equally as well and some researchers have shown that the combination of these two treatments is the optimal treatment which provides the best outcome (Manber et al., 2008). Although both treatments are suitably effective, the costs associated with each treatment are cause to find an alternative treatment (Daley, 2008; Rethorst et al., 2009). The costs associated with these treatments include: undesirable side effects (nausea, weight gain, sexual dysfunction), high monetary costs, and delayed response times. In regards to these problems, exercise has been offered as a cheap and side-effect free alternative that also provides additional benefits like better overall health and lowering risk of disease (Kelly & Kelly, 2000; Taylor et al., 2004; US Department of Health and Human Services, 1996; Warburton, Nicol, & Bredin, 2006).

Exercise as a form of treatment for depression has grown in popularity and studies have shown that this popularity is supported by data that reveals it has the efficacy to be provided as a monotherapy (Blumenthal et al., 2007; Craft & Landers, 1998). Evidence of its popularity is provided by worldwide public announcements and medical programs referring patients to an exercise physiologist for depression (Minister for Health and Ageing, 2005). The efficacy of exercise was established through the comparison of exercise to psychotherapy and antidepressants, which results showed that exercise is equally as effective as both therapies (Blumenthal et al., 2007; Craft & Landers, 1998).

The mechanisms of exercise target both psychological and physiological symptoms. The specific psychological mechanisms include disturbed self-concept and various cognitive issues while the physiological mechanisms include decreased levels of brain neurotransmitters like serotonin and dopamine (Daley, 2008; Ernst et al., 2006). Given the positive response that exercise evokes, it is offered as a cheap alternative to medicine and psychotherapy. From the field of exercise, dance movement therapy (DMT) developed as a form of exercise treatment for depression. Dance provides not only a mastery experience, but improvements in psychological and physiological disturbances (Koch, Morlinghaus, & Fuchs, 2007; Young-Ja et al., 2005).

Given this information, it was hypothesized that West African dance would have a positive effect on depression in a sample of college women. In particular, it was hypothesized that depression scores would be higher before dance class and lower directly after dance class. Then at a two week follow up, depression scores would most likely rise again but not to the pre-test levels because of the effect of dance after two weeks would help lower scores.

Results were mostly consistent with these hypotheses, indicating that West African dance has a significant effect on depression. Specifically, the t-test that was run on pre-test and post-test total depression scores yielded significant results, which implies that there is a significant difference between pre-test and post-test scores. The difference between scores shows that dance affects depression scores by lowering them after the administration of dance. These results support the main hypothesis that West African dance will have a positive effect on stated feelings of depression. The One-Way ANOVA run on the same set of variables did not yield significant results, but the data shows the hypothesized trend that pre-test scores would be the highest, post-test scores would be the lowest and the two-week follow up scores would be somewhere in between the other two levels. Although this test was not significant, the trend implies that West African dance has a direct effect on depression. Additionally, the data suggests that West African dance has an immediate effect as provided by the post-test results. In the two-week follow up we can see that dance has an effect after two weeks because depression scores were still lower than the original pre-test. However, it also shows that dance is the main effect, so two-week follow up scores most likely rose to a higher level because it was administered before dance class. Most importantly, the results of these t-tests and One-Way ANOVA provide evidence to support the claim that West African dance has a significant positive impact on depression.

Similar to the main effects, the psychological variable derived results that further supported the hypothesis that West African dance has a positive effect on depression. Six items from the BDI-II were included to create a psychological variable and it was hypothesized that West African dance would help lower the psychological symptoms of

depression as presented on the BDI-II. The dependent samples t-test yielded significant results which support the hypothesis that dance positively effects psychological symptoms of depression. The One-Way ANOVA run did not pass the homogeneity of variance, so no concrete conclusions can be drawn, but the data still show trends in the directions towards supporting the hypotheses. The results indicate that there are differences among all three variables, but there was likely not enough power to capture the significance of these differences.

A physiological variable was created to identify the physical symptoms of depression and included two items from the BDI-II. However, the two tests run on this variable were both insignificant. As seen in Figure 3, the direction of these results suggests that physiological symptoms are reduced after dance. A possible explanation for the lack of significance could be the small amount of variables included in this variable (two) versus the six items included for the psychological variable which did yield significant results.

Although these tests yielded significant results, they should be interpreted with some caution given the small sample size of 13 people. Subject number 14 was omitted from this study due to their extreme outlying scores and an incomplete data set.

Overall, the results suggest that West African dance has a significant impact on pre-test/post-test scores and psychological symptoms of depression. The data also shows differences among the three time periods for all three variables (main effect, psychological, physiological). Most of the results support the hypotheses concerning West African dance and its positive impact on depression. Therefore, the results imply

that West African dance could be promoted as a form of exercise treatment for depression.

West African dance is performed to the beat of drums. Drummers perform live on traditional Djembe drums, which provide a different musical experience for the dance participant and offers more of a rhythmic beat than music played through a stereo. The study of West African dance and its effects on depression are therefore unique because current literature focuses on either traditional aerobic workouts like running or dancing to prerecorded music. West African dance offers a less traditional aerobic workout program and a different experience through live drumming. The study of rhythmic movement and its effects on depression is limited, but a study was conducted to investigate the effects of Tai Chi, which is a traditional exercise with roots in the Chinese culture. Tai Chi is considered to embody dance-like movements, which is why it is considered rhythmic. Li et al. (2001) found that a six month Tai Chi program for the elderly helped lower depression while improving other mental health symptoms. Particularly, the experimental group showed a decrease in average depression scores as calculated by the Center for Epidemiologic Studies Depression Scale. At Time 1 for the experimental group, the M was .64, at Time 2 it was .45 and at Time 3 it was .46. In contrast, the control group maintained an average M of .65 at all three time periods. Given these results, Li et al. (2001) concluded that Tai Chi provides an alternative to traditional exercise programs and helps lower depression. Therefore, rhythmic movement may be partly attributed to the effect of West African dance on depression.

The future direction of research in the field of exercise and dance should be aimed at prevention, access to treatment, determining the long-term effects, and the barriers to starting an exercise program for people with depression.

Due to the fact that anyone is easily susceptible to developing depression at any point in their lives, it is imperative that we take care of our citizens by finding and incorporating an action plan that aims at prevention. A study conducted to investigate the effects of exercise on depression prevention concluded that there is a relationship between lack of physical activity and being at risk for developing depression in a normal population (Camacho et al., 1991). Specifically, this population was sampled at three different time intervals and revealed that the participants who were inactive in 1965 were not more susceptible to developing depression than those who were active the entire time up until 1983 as long as they increased their activity level by 1974. However, if participants had originally been active in 1965 and lowered their activity level by 1974 were at a higher risk for developing depression in 1983 in comparison to those who kept up with high activity levels. Due to these results, Camacho advocates for the implementation of community programs which focus on depression prevention.

The current state of health coverage in the US and worldwide presents an issue in terms of access to therapy treatments like psychotherapy and medication. Not only are the costs high, but a mere 25% of those affected by depression actually receive proper treatment (WHO, 2010). In light of these issues, some governments like Australia are trying to encourage and provide alternative more cost effective treatment plans like offering service of an exercise physiologist. Also the direction that this provides is to not just to tackle depression as it comes, but to aim at prevention of depression.

In terms of long-term effects, if a new therapy is going to be recommended for a serious disease like depression, the long-term effects should be investigated and found to be a viable option that has positive results for the long run. A treatment that corresponds to offering benefits for the long run must also be deemed sustainable by the individual, which seems to present an issue for those already suffering from depression. A barrier to starting an exercise program is presented by Craft & Perna (2004) who propose that people with depression are typically inactive and will find it challenging to find the motivation to begin an exercise program because it may seem overwhelming.

In conclusion, it is clear from the evidence that West African dance helps alleviate depressive symptoms. The future implementation of exercise, specifically West African dance, as a treatment for depression is very promising. Findings like these established in this study should encourage researchers to search for non-traditional forms of treatment for depression. As long we don't give up trying to find the most effective treatment for depression, there is hope that we could help restore the health and productivity to individuals around the globe.

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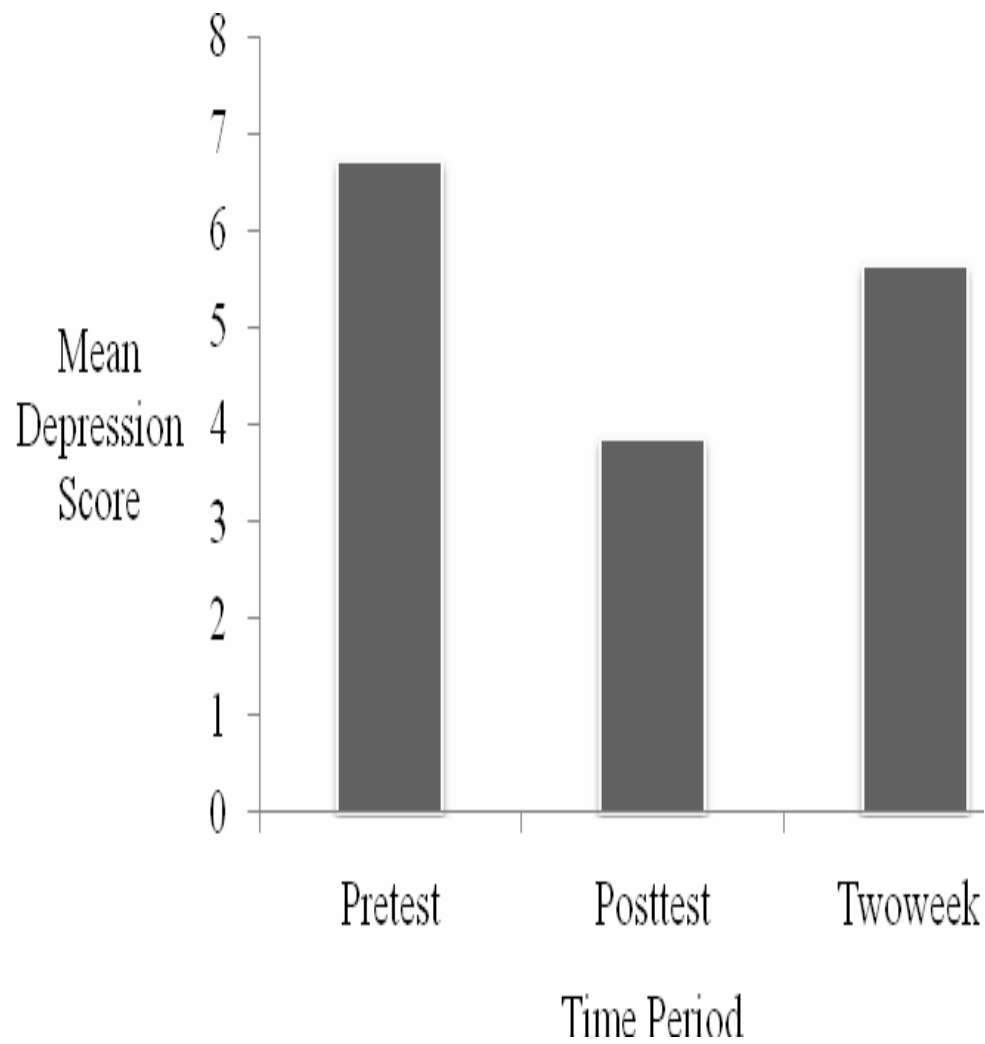


Figure 1. Mean scores on the total depression score variable for the three time periods of pre-test, post-test, and two-week follow up. M for pre-test is 6.71, M for post-test is 3.85, and M for two-week follow up is 5.64.

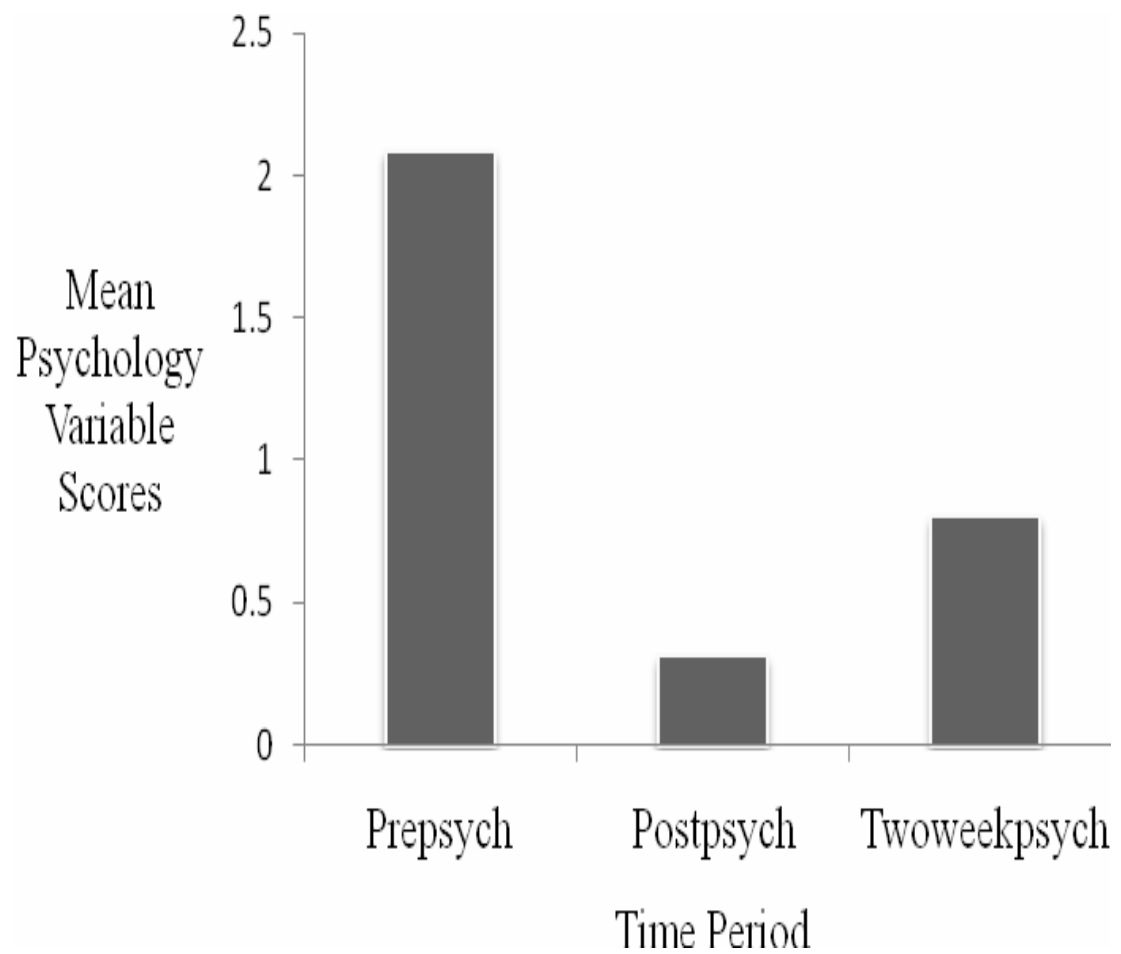


Figure 2. Mean scores for the psychology variable for the three time periods of pre-test, post-test, and two-week follow up. The M for pre-test is 2.08 , the M for post-test is .31, and the M for the two-week follow up is .80.

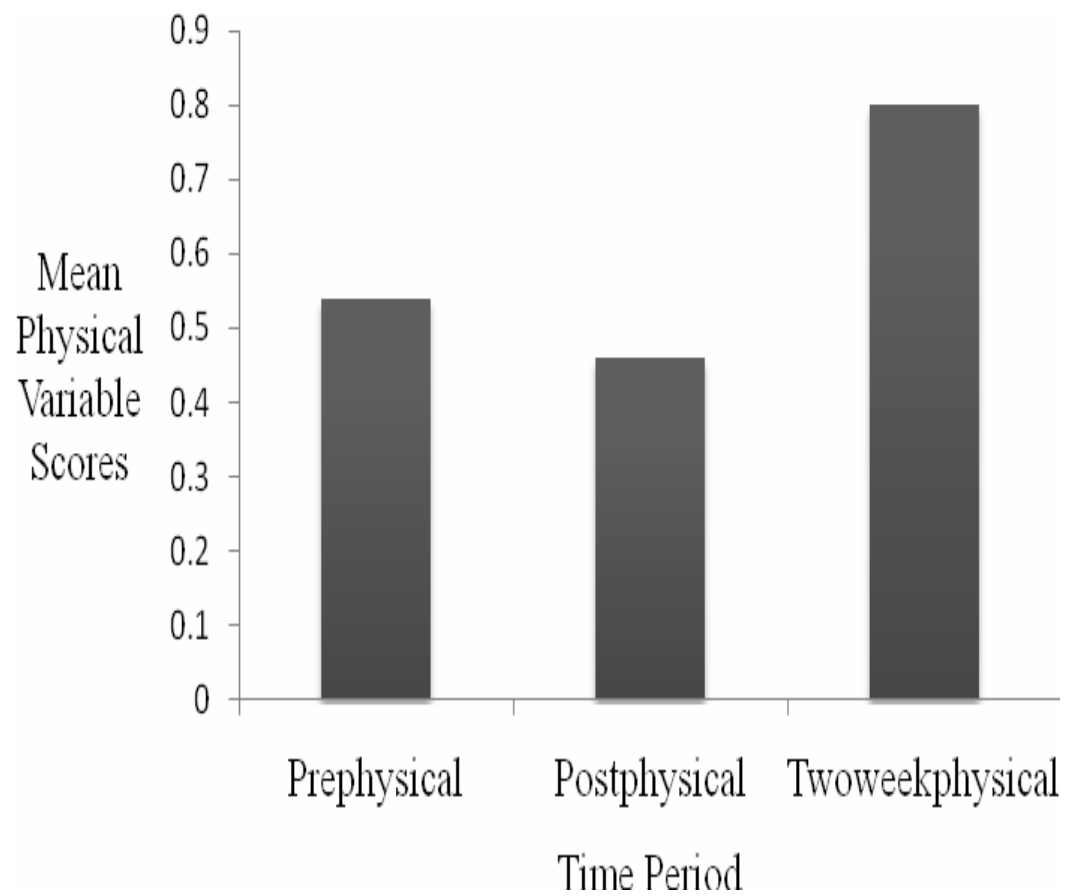


Figure 3. Mean physiological scores for the three time periods of pre-test, post-test, and two-week follow up. The M for pre-test is .53 , the M for post-test is .46, and the M for two-week follow up is .80.

Appendix

BECK INVENTORY

Name _____

Date _____

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY: Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

- | | |
|--|---|
| 1 0 I do not feel sad. | 12 0 I have not lost interest in other people. |
| 1 I feel sad. | 1 I am less interested in other people than I used to be |
| 2 I am sad all the time and I can't snap out of it. | 2 I have lost most of my interest in other people |
| 3 I am so sad or unhappy that I can't stand it. | 3 I have lost all of my interest in other people. |
| 2 0 I am not particularly discouraged about the future. | 13 0 I make decisions about as well as I ever could. |
| 1 I feel discouraged about the future. | 1 I put off making decisions more than I used to. |
| 2 I feel I have nothing to look forward to. | 2 I have greater difficulty in making decisions than before. |
| 3 I feel that the future is hopeless and that things cannot improve. | 3 I can't make decisions at all anymore. |
| 3 0 I do not feel like a failure. | 14 0 I don't feel I look any worse than I used to. |
| 1 I feel I have failed more than the average person. | 1 I am worried that I am looking old or unattractive. |
| 2 As I look back on my life, all I can see is a lot of failures. | 2 I feel that there are permanent changes in my appearance that make me look unattractive |
| 3 I feel I am a complete failure as a person. | 3 I believe that I look ugly. |
| 4 0 I get as much satisfaction out of things as I used to. | 15 0 I can work about as well as before. |
| 1 I don't enjoy things the way I used to. | 1 It takes an extra effort to get started at doing something. |
| 2 I don't get real satisfaction out of anything anymore. | 2 I have to push myself very hard to do anything. |
| 3 I am dissatisfied or bored with everything. | 3 I can't do any work at all. |
| 5 0 I don't feel particularly guilty. | 16 0 I can sleep as well as before. |
| 1 I feel guilty a good part of the time. | 1 I can't sleep as well as I used to. |
| 2 I feel quite guilty most of the time. | 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep. |
| 3 I feel guilty all of the time. | 3 I wake up several hours earlier than I used to and cannot get back to sleep. |
| 6 0 I don't feel I am being punished. | 17 0 I don't get more tired than usual. |
| 1 I feel I may be punished. | 1 I get tired more easily than I used to. |
| 2 I expect to be punished. | 2 I get tired from doing almost anything. |
| 3 I feel I am being punished. | 3 I am too tired to do anything. |
| 7 0 I don't feel disappointed in myself. | 18 0 My appetite is no worse than usual. |
| 1 I am disappointed in myself. | 1 My appetite is not as good as it used to be. |
| 2 I am disgusted with myself. | 2 My appetite is much worse now. |
| 3 I hate myself. | 3 I have no appetite at all. |
| 8 0 I don't feel I am any worse than anybody else. | 19 0 I haven't lost much weight, if any, lately. |
| 1 I am critical of myself for my weakness or mistakes. | 1 I have lost more than 5 pounds. |
| 2 I blame myself all the time for my faults. | 2 I have lost more than 10 pounds. |
| 3 I blame myself for everything bad that happens. | 3 I have lost more than 15 pounds. |
| 9 0 I don't have any thoughts of killing myself. | 1 I am purposely trying to lose weight by eating less. Y N |
| 1 I have thoughts of killing myself, but I would not carry them out. | 20 0 I am no more worried about my health than usual. |
| 2 I would like to kill myself. | 1 I am worried about physical problems such as aches and pains; or upset stomach; or constipation |
| 3 I would kill myself if I had the chance. | 2 I am very worried about physical problems and it's hard to think of much else. |
| 10 0 I don't cry any more than usual. | 3 I am so worried about my physical problems that I cannot think about anything else. |
| 1 I cry more now than I used to. | 21 0 I have not noticed any recent change in my interest in sex. |
| 2 I cry all the time now. | 1 I am less interested in sex than I used to be. |
| 3 I used to be able to cry, but now I can't even though I want to. | 2 I am much less interested in sex now. |
| 11 0 I am more irritated now than I ever am. | 3 I have lost interest in sex completely. |
| 1 I get annoyed or irritated more easily than I used to. | |
| 2 I feel irritated all the time now. | |
| 3 I don't get irritated at all by the things that used to irritate me. | |