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Working Out the Woes: An Analysis of the Impact of Exercise on Depression

Steven Tate Anderson
Maggie Dorris
Matrice Littles
Tanya Rodriguez
Marcia Spear, DNP, ACNP-BC, CWS, CPSN

The purpose of this review is to examine existing research to determine whether exercise has a significant effect on improving emotional well-being and symptoms of depression. At any given time, it is estimated that greater than 15% of Americans are plagued by a depressive mood disorder (L. Andrew, 2014). Plastic surgical nurses will encounter individuals with symptoms of depression who seek elective plastic surgical and cosmetic procedures. With a broad spectrum of symptoms and presentations, both practitioners and those suffering may have difficulty identifying depression. Even after being identified, it can be quite challenging to effectively treat depressive mood disorders. The integration of exercise into the plan of care not only helps tackle one's mental health condition but also benefits any physical health concerns. The plastic surgical nurse can advocate for evidence-based practices and educate the plastic surgical patient on the benefits of physical exercise. Additional research is needed to determine the most effective amount and types of exercise to be used in clinical settings.

Steven Tate Anderson is a senior nursing student at the Jeanette C. Ruby School of Nursing at Cumberland University, Lebanon, Tennessee.

Maggie Dorris is a senior nursing student at the Jeanette C. Ruby School of Nursing at Cumberland University, Lebanon, Tennessee.

Matrice Littles is a senior nursing student at the Jeanette C. Ruby School of Nursing at Cumberland University, Lebanon, Tennessee.

Tanya Rodriguez is a senior nursing student at the Jeanette C. Ruby School of Nursing at Cumberland University, Lebanon, Tennessee.

Marcia Spear, DNP, ACNP-BC, CWS, CPSN, received her Doctor of Nursing Practice from Vanderbilt University School of Nursing. She is faculty at both the School of Medicine and School of Nursing at Vanderbilt University. She has over 25 years of experience in plastic surgery and wound care and is presently working as a nurse practitioner and Certified Wound Specialist for the Department of Plastic Surgery at Vanderbilt University Medical Center. She is an Adjunct Professor at the Jeanette C. Ruby School of Nursing at Cumberland University in Lebanon, Tennessee, where she teaches nursing research.

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Address correspondence to Marcia Spear, DNP, ACNP-BC, CWS, CPSN, Jeanette C. Rudy School of Nursing, Cumberland University, Lebanon, TN 37090 (e-mail: mspear@cumberland.edu).

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INTRODUCTION

It is estimated that one in six Americans are suffering from a depressive mood disorder at any time, and two of the three depressed individuals do not realize they are living with a treatable illness (Andrew, 2014). Similar to physical pain, feelings of depression are subjective by nature; therefore, depressive symptoms often manifest differently in individuals. Depression can be crippling to some, rendering them unable to function in their daily lives, whereas others can function at home and at work. Personal suffering can be potentiated by feelings of depression and associated with physical health problems and is costly to the health care system. Depression can also be lethal and lead to suicide. Depression is expected to be the highest cause of disability in high-income nations in the next 20 years (Andrew, 2014). According to the American Society of Plastic Surgeons, there were 15.6 million cosmetic procedures, including both minimally invasive and surgical, and 5.6 million reconstructive procedures performed in the United States in 2014 (Plastic Surgery Statistics, 2014). There is a high probability that the plastic surgical nurse will encounter individuals with a diagnosis of or exhibiting signs and symptoms of depression seeking plastic and cosmetic surgery on a routine basis. Women, who comprise the overwhelming majority of patients seeking cosmetic procedures, are diagnosed with depression nearly twice as often as men (Ambro & Wright, 2010).

Depression is integral to many psychiatric diagnoses listed in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) (APA, 2000). However, this review focuses exclusively on major depressive disorder because it is one of the most common illnesses in the United States (Andrew, 2014). The DSM-5 defines a major depressive episode as having five or more of the following symptoms during a 2-week period: depressed mood most of the day; diminished interest in pleasure in almost all activities; significant weight loss or weight gain; psychomotor agitation or retardation; fatigue; feelings of worthlessness or guilt; diminished ability to concentrate or make decisions; and recurrent thoughts of death or

suicidal ideation ("Criteria for Major Depressive Episode: DSM-5", NAMI, 2013).

For many reasons, depression can be a difficult disorder to treat effectively. Medications and various forms of psychotherapy are frequently used to treat depression with varying degrees of success. However, research is consistently being conducted to find new methodologies of treatment. Treatments such as electroconvulsive therapy, transcranial magnetic stimulation, and light therapy are often used as well (Duckworth, 2014). There is also evidence that suggests physical exercise can improve depressive symptoms (Elliot, Kennedy, Morgan, Anderson, & Morris, 2012). The purpose of this literature review is to examine the efficacy of physical exercise as a means to treat depression, whether as a primary or supplemental modality.

BACKGROUND AND SIGNIFICANCE

Unfortunately, depression is often overlooked in the health care system as an important illness to treat. There are two primary reasons why depression should be taken seriously and treated effectively: physical health problems and suicide. First, as the paradigm of health care shifts toward disease prevention and health promotion, it is a mistake to underestimate the physical effects depression can precipitate within the human body. In this climate of health care and cost containment, identifying depression with early treatment is essential in preventing the associated costly diseases. It also stresses the importance of a careful health assessment before cosmetic or reconstructive procedures to optimize patient outcomes.

Second, the most lethal aspect of depression is suicide. The rate of suicide has been perpetually rising, and in 2009, the number of deaths from suicide surpassed the number of deaths from motor vehicle accidents (Rockett et al., 2012). Previous studies have consistently suggested and have heightened the awareness of an increased risk of suicide among women who have undergone cosmetic augmentation surgery (Jacobsen et al., 2004; Koot, Peeters, Granath, Grobbee, & Nyren, 2003; McLaughlin, Wise & Lipworth, 2004; Pukkala et al., 2003). Brinton and colleagues (2001) retrospectively examined the risk for completed suicide in over 13,000 women who had received cosmetic breast augmentation surgery. During the study period, on average of 14 years after the surgery, the standardized mortality rate (SMR) (i.e., the ratio of the observed mortality rate to the predicted mortality rate in the general population) for suicide in this study population was 1.54. In a subsequent study of these 13,000 women 5 years later, the SMR for suicide was 1.63 (Brinton, Lubin, Murray, Colton & Hoover, 2001; Brinton, Lubin, Murray, Colton & Hoover, 2006). There were 290,000 breast augmentation surgeries performed in 2013 alone, suggesting a high probability of encountering women with depression and possibly suicide potential (Plastic Surgery Statistics, 2014).

Patients with preexisting psychological conditions are more at risk for developing psychological complications after surgery (Rankin & Borah, 2009). Depressed individuals are more likely to develop cardiovascular disease and type 2 diabetes, which are common and costly diseases in the United States (Andrew, 2014). To understand the significance and relevance of this fact, it is important to identify the prevalence of depression among U.S. citizens. As previously stated, it is estimated that one in six Americans are suffering from depression, with an annual cost of $30 billion to$44 billion, and depression is predicted to be the highest cause of disability in high-income nations in the next 20 years (Andrew, 2014). With more individuals suffering from depression, diagnosed or not, these patients will not be uncommon in a plastic surgical practice.

This is clearly relevant to the profession of nursing, including plastic surgical nursing, because these individuals will be presenting to our clinics, hospitals, and offices for elective surgeries. Rankin and Borah (2009) found plastic surgical nurses were delegated the responsibility to provide suggestions for treatments or interventions that alleviate patients' emotional disturbances from surgery. In addition, plastic surgical nurses are involved in primary prevention education, secondary prevention screening programs, and are advocates for change in health care policy. Potential patients may express concerns, allowing the plastic surgical nurse to identify unsatisfactory outcomes before they occur.

Although depression is among the most frequently observed mood disorders in the United States, many individuals never seek treatment (National Institute of Mental Health, 2012). Steps have already been taken to identify depressed individuals more successfully. In an effort to provide treatment to individuals silently suffering from depression, many health care organizations have incorporated screening tools (e.g., questionnaires and surveys) into their care, aiming to identify patients living with an untreated mood disorder. Appropriate screening is essential to promote positive outcomes, recognize patient expectations, and promote positive outcomes in the plastic surgical practice.

PICO QUESTION

For numerous reasons, depression can be a difficult disorder to treat effectively and, if not identified, can undermine patient outcomes and satisfaction. Because of the brain's complexity and intricacies, pinpointing an exact, concrete etiology of depression has not been achieved (Mayo Clinic, 2014).

However, there are several theories grounded in biology and cognition about depression's etiology that are plausible, albeit debatable. Because there is such a

nebulous understanding of the science behind depression, choosing a treatment for depression and finding a type of therapy and/or medication that is effective is essentially a process of trial and error using educated guesses (Schuyler, 2009). Consequently, researchers have delved into studying a variety of other treatment methods, such as electroconvulsive therapy, transcranial magnetic stimulation and light therapy (Duckworth, 2014).

These methods have had varying degrees of success; however, there is evidence that physical exercise, whether it is supplemental or primary, can improve mood among depressed individuals (Elliot et al., 2012). It has been found that physically active individuals have 30% lower odds of experiencing a depressive onset and symptoms when compared with inactive persons (Elliot et al., 2012). It is crucial to investigate interventions to treat depression, especially when considering the substantial cost to modern health care. Physical exercises (e.g., walking and jogging) are essentially free and easily accessible to almost anyone; therefore, the evidence has been evaluated to explore the foreground question, "in clinically depressed adults, does exercise improve emotional well-being, when compared to no exercise?"

THEORETICAL FRAMEWORK/CONCEPTUAL MODEL

Psychologist Albert Bandura has defined self-efficacy as one's belief in one's ability to succeed in specific situations or one's capabilities to organize and execute the courses of action required to manage prospective situations. Bandura described these beliefs as determinants of how people think, behave, and feel. The theory of self-efficacy is the focus of Bandura's social cognitive theory (Bandura, 1994). This theoretical framework was used to support this review of the evidence evaluating exercise as an adjunct or alternative treatment to reduce depressive symptoms, and that an individual's self-efficacy relative to the exercise interventions can also predict the outcomes.

An individual's sense of self-efficacy is a significant determinant in how one approaches goals, tasks, and challenges. Self-efficacy can impact psychological states, behavior, and motivation (Bandura, 1994). Improvements in self-efficacy were significantly related to improvements in depression. Early improvements in confidence to maintain lifestyle changes even during times of stress explained part of the observed subsequent improvements in depression (Ludman, 2013).

LITERATURE REVIEW

A review of the literature has highlighted the lack of published studies evaluating and assessing the presence of depression in plastic surgical patients before elective procedures. Not everyone seeks treatment for depressive symptoms; therefore, it goes untreated, unrecognized, and unassessed. Even with the best estimation of the prevalence of depression in plastic surgical patients, it would probably be underestimated. Most published studies have examined the psychological impact of cosmetic surgery on outcomes and satisfaction, but there is little evidence in the literature on screening and assessing for depression in patients seeking plastic and reconstructive surgery before the procedure is performed (Rankin & Borah, 2009; Rohrich, Adams & Porter, 2007; Shridharani, Magarakis, Manson & Rodriquez, 2010). The depressive symptoms may not surface until after the surgery, undermining outcomes and patient satisfaction. Many may be hesitant to seek treatment for depression because of fear of being labeled with a diagnosis. They may not want to be treated with medications and would rather seek other means of treatment. Is there a simple treatment modality for depressive symptoms? Is medication the only effective treatment? The purpose of this review was to examine the efficacy of physical exercise as a means to treat depression, whether as a primary or supplemental modality. This will provide the nurse with evidence-based treatments to guide patients who express experiencing depressive symptoms.

Silveira and colleagues (2013) conducted a meta-analysis to evaluate the effect of aerobic training and strength training as a treatment for depression in patients diagnosed with a major depressive disorder. The researchers used aspects such as remission and response to treatment, type of exercise, frequency, duration of intervention, and intensity of exercise. Ten of the 918 articles were included in this meta-analysis and were classified by their interventions and controlled training modality. The trials that used physical exercise as a single treatment for the group were defined as exercise monotherapy, or combined with pharmacological treatment. In the latter case, exercise was defined as secondary or adjuvant treatment (Silveira et al., 2013).

The meta-analyses revealed no significant change in response to treatment related to the frequency, intervention period, intensity, and duration of exercise, or whether it was supervised or not. However, many of the studies reviewed for this meta-analysis did have similar protocols such as 30–60 min of moderate intensity at a low frequency (3 days a week), only one had a 5-day week frequency, and none investigated vigorous intensities. The results concluded that mood was best affected with moderate intensity two to three times a week. The meta-analyses was able to confirm that physical exercise provides moderate benefits as a treatment for depression and promoted a 49% increase in the probability of response to treatment (Silveira et al., 2013). Age and symptom severity was found to influence efficacy of exercise in treating depression. Older persons with mild depressive symptoms

presented a better treatment response. This finding might contribute to decreasing the use or dosage of medications and in promoting independence in activities of daily living in older persons.

Eriksson and Gard (2011) conducted a systematic review and evaluated physical exercise as a possible intervention to treat major depression. The eight randomized controlled trials in this review focused on methodology, mechanism of action, types of physical exercise, and treatment outcomes. The studies included patients of all ages and gender, and the participants were required to have a baseline status of depression diagnosed according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition,* criteria. The studies included patients receiving pharmacological treatment in combination with exercise. The pharmacological component of the studies varied. Five of the studies excluded all individuals taking medication before the study, and all studies had similar exercise protocols. Five used aerobic exercise two to three times a week at various intensities, and the other three used resistance training twice a week. There was not a significant difference in treatment outcomes related to the type of exercise; however, there was a significant finding that the intensity of exercise produced better outcomes when compared with the frequency of exercise (Eriksson & Gard, 2011). More importantly, seven of the eight studies revealed that physical exercise reduced depressive symptoms. One limitation cited included the inability for the participants to be unaware of the type of treatment they were receiving (exercise versus other treatment modalities); therefore, the benefits of a double-blind study were unachievable. Another limitation was only the efficacy of psychotropic medications was compared with the efficacy of physical exercise. The efficacy of other treatment methodologies, such as psychotherapy or light therapy, versus the efficacy of physical exercise was not included in this systematic review (Eriksson & Gard, 2011).

Mata, Joorman, Hogan, Waugh, and Gotlib (2013) conducted a study to examine whether exercise attenuated the effect of sad mood inductions. The researchers tested whether engaging in acute exercise served as a protective factor in reducing the adverse effects of repeated sad mood inductions in individuals who had recovered from depression. The negative affect (subjective feelings of distress and depression) and positive affect (enthusiasm, alertness, and activity) of participants were compared after either 15 min of exercise or a period of quiet rest before a sad mood induction, which was composed of the viewing of two film clips that are reliable to induce a negative mood (Mata et al., 2013). Depressed participants who had engaged in acute exercise and healthy control participants showed no increase in negative affect (NA) in response to the repeated sad mood induction. Participants who exercised reported higher positive affect (PA) after a bout of exercise (Mata et al., 2013). One of the most significant findings of the study was that exercise served as a protective factor to individuals who are repeatedly exposed to emotional stressors. This applied mostly to NA of previously severely depressed participants (Mata et al., 2013). One limitation of the study was an exclusive sample including only female participants.

Helgadottir, Ekblom, and Forsell (2014) conducted a longitudinal population-based study consisting of 4,631 people aged 20–64 years to evaluate the influence of expectations on effectiveness of exercise reducing psychological distress. Psychological distress was measured using the Major Depressive Inventory, which has been shown to have good validity (Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001; Meehan, Lamb, Saltzman, & O'Carroll, 1992). Expectations toward exercise were combined with exercise. The authors found that individuals who exercised regularly and were indifferent toward exercise as a self-help method were less likely to be psychologically distressed compared with exercisers with positive expectations. The authors further concluded that an individual's personal expectations might not be needed for treatment to be effective. These results are important to further comprehend the role of expectations when using exercise to alleviate psychological distress (Helgadottir et al., 2014). Among the strengths were the large sample size and the longitudinal design; however, the response rate can be viewed as a limitation (Helgadottir et al., 2014). The original questionnaire was mailed to over 19,000 people, and only 4,631 responses were used for study analysis. Participation in the study was found to be higher among older females, with higher incomes and a higher level of education (Helgadottir et al., 2014). These respondents had no previous history of a psychiatric diagnosis. Another limitation could be the use of self-reported data. This type of data is associated with many complications such as social desirability bias. Cohen and Shamus (2009) conducted a literature review to examine the effects of various forms of exercise upon mental health and to examine the findings of the relationship between aerobic exercise, anaerobic exercise, and psychological well-being. It is important to differentiate the various forms of exercise before examining how physical activity affects mental health. Aerobic exercise occurs when oxygen is metabolized to produce energy. This occurs during periods of vigorous activity lasting greater than 3 min. Anaerobic exercise occurs when the energy required to produce the activity is provided without the use of inhaled oxygen. It is usually short bursts of activity, uses oxygen stored in the muscles, and usually lasts less than 1 min. Meditation and yoga are alternative forms of physical activity that are gaining popularity. These activities do not fall neatly into either category of exercise. They both use focused relaxation combined with specific body positions

that exercise the body while also relaxing the mind. Cohen and Shamus (2009) evaluated aerobic, anaerobic, and alternative forms of exercise in their review.

Aerobic exercise had the greatest mood-boosting effects when it was performed continuously for a prolonged period. This was because of the release of beta-endorphins, which create a positive effect on a person's mood. In addition to endorphin-related effects from physical activity, the cortisol level was altered by exercise and was reduced with as little as 30 min of moderate aerobic exercise. The lower level of cortisol was found to be related to positive emotional mental states (Cohen & Shamus, 2009). Some of the mood-elevating effects of aerobic exercise were found with both low- and moderate-intensity workouts. These workouts ranged from 20 to 30 min in duration. It has not yet been determined how high-intensity aerobic workouts affect mental health. Some of the extremely high-intensity aerobic workouts were shown to actually increase anxiety levels in some participants, and it was determined that some of the higher level intensity workouts were conducted in highly competitive situations. In these situations it was determined that a person's anxiety level was increased before and after the competitive activity (Cohen & Shamus, 2009). This form of exercise may not be for everybody.

When anaerobic exercise was performed at high intensity, there was a buildup of lactic acid and lactate in the muscles (Cohen & Shamus, 2009). Beta-endorphins are associated with the release of this lactate. The authors' concluded for anaerobic activity to have a positive effect on mood it had to be performed for at least 1 hr but does not have the same mood-elevating effects as aerobic exercise does (Cohen & Shamus, 2009). Low-intensity aerobic exercises were shown to have a positive effect on a person's psychological functioning (Cohen & Shamus, 2009). These included yoga, meditation, qigong, and tai chi. These exercises used coordinating gentle movements and breathing, which helped to relax and decrease anxiety in people with psychological distress (Cohen & Shamus, 2009). Limitations cited in this review included data reported used self-report measures and can be unreliable. The authors further stated that not all studies reviewed showed a significant relationship between aerobic exercise and an increase in mental health; however, Cohen and Shamus (2009) noted that some studies had small sample sizes and regular continued exercise is necessary to have the maximum benefit. The authors further concluded the effects of exercise on mental health would only last as long as the participants continued participation in the exercise program. The plastic surgical nurse must stress the need to continue the exercise in order for individuals to receive the maximum benefits, and patients should be encouraged to continue even when their symptoms of depression improve.

In conclusion, Cohen and Shamus (2009) found that physical activity was demonstrated to improve self-esteem, self-acceptance, self-concept, and self-efficacy. Physical activity was also found to reduce depression, anxiety, tension, and stress. The review found that aerobic exercise was the best activity for reducing psychological symptoms. Cohen and Shamus (2009) found that it was important for the person to choose an activity they found enjoyable. This was crucial for the success of exercise in reducing psychological symptoms. If a person enjoyed the activity, they are more likely to continue the activity over an extended period and gain more positive effects.

Bridle, Spanjers, Patel, Atherton, and Lamb (2012) conducted a systematic review and meta-analysis to provide clinically meaningful synthesis of evidence to support treatment decisions and to estimate the effect of exercise on depression severity among older people with significant symptoms of depression. Because of possible ambiguity and varying interpretations of the term, Bridle et al. (2012) defined exercise as "any planned or structured movement of the body performed systematically in terms of frequency, intensity and duration." Bridle et al. (2012) found data that supported exercise had a statistically significant influence on improving depression severity in older adults when compared with usual antidepressant medications and psychotherapies. Their analysis uniquely examined alleviating clinically significant symptoms of depression with exercise. Limitations included some degree of bias determined by deviations from or absence of the use of the intention-to-treat principle, participant knowledge of outcome assessment, and incomplete participant follow-up.

Eyre, Papps, and Baune (2013) conducted a literature review of 230 articles related to the effects of exercise on immune response and/or depression. To create consistency, studies were excluded with a definition of exercise that deviated from their description of "planned, structured, and repetitive bodily movements done to improve or maintain one or more components of physical fitness" (Eyre et al., 2013). From their review of the literature, Eyre et al. (2013) found exercise to be effective in improving depression and reducing depression-like symptoms. In addition evidence suggested that alterations in the neuroimmune system strongly contributed to the development of depression. Additional findings supported a belief that exercise can greatly benefit the neurobiological system, thereby improving symptoms of depression (Eyre et al., 2013). Specifically, the researchers attributed that these neurobiological changes to the physical activity's neuroimmune effects were likely involved in the enhanced neuroplasticity, reduced oxidative stress, increases in serotonin, dopamine, and noradrenaline, and enhanced glucocorticoid sensitivity (Eyre et al., 2013). This study was limited due to conclusions drawn from singular cohesive datasets and from interpretation by combining supporting evidence from various studies and opens the door to data selection bias.

PRACTICE RECOMMENDATIONS AND AREAS FOR FUTURE RESEARCH

All of the evidence reviewed strongly supported that exercise improved emotional well-being in adults. In an effort to best benefit those diagnosed with depression, the authors recommend a more in-depth analysis of exercise as a clinical treatment. It is suggested that future researchers investigate not only what types of exercise are most beneficial, but also how much exercise and how often is required to reach a therapeutic level and maintain.

It may be most effective to compare the statistical significance of several types of supervised exercise. Once various types of exercise are selected, researchers could subdivide participants into low-intensity, moderate-intensity, and high-intensity groups for each type of exercise. If the sample size is large enough, interpretations can be drawn on the basis of several factors including severity of depression, age of the participant, race/ethnicity, type of exercise, intensity level, and duration of exercise. In order to allow adequate time for the interventions to be effective, we recommend including data collection at least 6 months after implementation. Improvements or deteriorations from baseline can be calculated using multiple types of weekly analysis. Client interviews, questionnaires, surveys, and daily journals have the capability to adequately track mood changes and alterations in depressive symptoms. Patients with a diagnosis of depression should be encouraged to engage in some type of physical activity.

SUMMARY

At any given time, approximately one in six Americans will be suffering from a depressive mood disorder (Andrew, 2014). To treat the patient and decrease the health care cost for treating depression, it is beneficial to utilize evidence-based interventions of treatment. It is important to find effective ways to decrease depressive symptoms because it has been shown that depressed individuals are more likely to develop chronic diseases (e.g., cardiovascular disease and type 2 diabetes), substance abuse problems, and suicidal ideation, increasing the burden of cost to an already struggling health care system (Andrew, 2014). More patients with preexisting psychological conditions are at increased risk of suffering psychological conditions after plastic surgery (Rankin & Borah, 2009). As nurses, we are all too familiar with the health benefits from exercise and recommend that our patients exercise. It has been found that physically active individuals have been shown to have 30% lower odds of developing depression (Elliot et al., 2012). This is significant because physical activity is accessible to almost anyone even if just simple walking. The evidence presented in this review overwhelmingly validates that exercise can alleviate and/or improve depressive symptoms as monotherapy or in combination with other forms of treatment. The plastic surgical nurse should be encouraging patients to exercise. More research is needed in the plastic surgical patient population.

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