

Exercise and mental health—Implications for treatment: A review of the literature

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This paper reviews the literature regarding the positive effects of exercise and physical activity on the human psyche. In particular, the focus of this paper is to examine mental health benefits of exercise in clinical and nonclinical populations. Exercise as treatment for mental illness is thoroughly examined. Exercise interventions have been found to be effective in alleviating symptoms of depression, schizophrenia, and bipolar disorder. General physical activity and aerobic exercise have potential to be used as alternative or adjunctive treatments for mental disorders in addition to or instead of medications. Green exercise—exercising in nature—is also explored. The use of psychotherapy combined with exercise and other types of physiologically-based health interventions are explored. Suggestions for future research are provided.

Keywords Exercise & Mental Health

Introduction

Research supports exercise as beneficial to physical health and overall well-being, along with preventing major health issues such as obesity and coronary heart disease, which are common consequences of living a sedentary lifestyle. The dangers of living a sedentary lifestyle are no secret and research has shown that less physical activity is related to adverse consequences on health such as obesity, stroke, diabetes, and some cancers (Fox, 1999; Pretty, Peacock, Sellens, & Griffin, 2005). In recent years, research attention has been drawn to the positive effects of physical activity on mental health. Exercise not only positively influences physical well-being but can also affect mental well-being (Fox, 1999; Pretty, et al., 2005). The benefits of exercise have been documented in both clinical and nonclinical populations (Fox, 1999).

Research also suggests that exercising outdoors in nature can induce positive affect, improve cognitive factors, and reduce stress (Bratman, Hamilton, & Daily, 2012; Kaplan, 1995). Exercising in natural settings is believed to further enhance the overall benefits of exercise (Pretty, et al, 2005). Research indicates the benefits of exercise on the brain are further enhanced in conjunction with other alternative therapies, including experience in nature and nutritional interventions (Pretty, et al., 2005; Meeusen, 2014). Researchers have found evidence that physical health and mental health are connected in many ways (Meeusen, 2014).

General effects on mental health

In nonclinical populations, the general public assumed to be without diagnosable mental illness, physical activity is linked to many mental health benefits. People have frequently reported the “runner’s high” or “post-workout feel-good” after bouts of physical activity that is akin to feelings of euphoria. This is thought to be caused by the release of endorphins, particularly β -endorphins (Fox, 1999). There is also research interest in examining the interaction between exercising and central serotonin (5-hydroxytryptamine [5-HT]), which may enhance

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mood post-workout (1999).

The general consensus of health research recommends at least 30 minutes daily of moderate physical activity at least four times per week for a healthier lifestyle (Fox, 1999; Ekkekakis, Hall, & Petruzzello, 2002; Pretty, et al., 2005). Physical activity is generally linked to reduced anxiety, resilience to stress, better sleep, improved mood and cognition, and enhanced self-esteem through improved self-perceptions (Fox, 1999). Resistance training, yoga, and aerobic exercise have been shown to reduce negative mood states (Fox, 1999; Yeung, 1996). Improved cognition has been found in older adults who exercise (Fox, 1999).

Cognition

Brisswalter, Collardeau, & Arcelin (2002) found that following bouts of physical activity, participants in various studies experienced slightly improved cognitive functions such as reaction time. Fox (1999) also mentioned that exercise can positively influence reaction time, memory, and fluid intelligence in older adults. In a 2008 article by Hillman, Erickson, & Kramer, physical activity was linked to better academic performance in school age children. Laboratory studies have examined the biological effects of exercise on the brains of rodents and found that exercising is associated with hippocampal neurogenesis, which tend to have positive effects on memory and learning (2008). Bratman, et al. (2012) and Pretty, et al. (2005) have also found that exercise can improve cognitive functioning, especially when combined with experience in nature.

Self-esteem

The effects of exercise on self-esteem are hypothesized to be indirect (Spence & Poon, 1997). Regular exercise leads to weight loss, which leads to positive physical self-concept and higher self-esteem (Spence & Poon, 1997). Some of the reasons people exercise are to get in shape and lose weight. Weight loss is often accompanied by feelings of accomplishment and higher bodily satisfaction (Fox, 1999). Global self-esteem is largely influenced by physical appearance (Fox, 1999). Therefore, when people experience higher confidence and self-efficacy with their bodies from achieving weight loss and fitness goals, their self-esteem generally increases (Fox, 1999).

Exercise as treatment of mental illness

Numerous meta-analyses and research studies have been conducted to evaluate the effectiveness of physical activity in alleviating symptoms of mental disorders (Knapen, Vancampfort, Morien, & Marchal, 2015; Malchow et al., 2013). The literature is most prevalent on exercise as a treatment for depression. There is growing research on the effects of exercise on anxiety, schizophrenia, and other affective disorders. Research is lacking in exercise effectiveness with bipolar disorder and postnatal depression but what does exist illustrates some promise (Stanton, Happell, Hayman, & Reaburn, 2014).

Mood, depression, and anxiety

Mood

A plethora of research studies have proven that moderate exercise can induce positive affective states (Bratman et al., 2012; Fox, 1999; Knapen et al., 2015). Fox (1999) reported that worldwide surveys have indicated a moderate association between physical activity and subjective physical and emotional well-being. Physical activity and fitness are also associated

with prevention of depression, which will be explained in further detail later in this paper (Fox, 1999). Exercise, particularly in natural contexts, can be effective in inducing positive moods (Ekkekakis et al., 2002; Pretty, et al., 2005). The benefits of exercise combined with nature—green exercise—will also be explained in detail later in this paper. Yeung (1996) stated that moderate intensity physical activity is good for short-term remediation of psychological distress, regardless of age or gender. Fox (1999) also maintained that daily exercise and physical fitness can help generally reduce the stressors and anxieties of day-to-day living.

Ekkekakis et al. (2005) stated that a moderate intensity workout is ideal for improved post-workout mood. They maintain that the high drop-out rates of gym participation and lack of motivation for exercising is due to the potential aversion of *high* intensity workout programs (Ekkekakis, et al. 2005). Metabolic landmarks such as the lactate threshold are responsible for determining an individual's range of moderate physical activity (Ekkekakis et al. 2005). Any physical activity below the lactate threshold is categorized as moderate intensity and can be performed for continuous periods of time without aversive effects (Ekkekakis et al. 2005). This is due to the stabilization of blood lactate concentration and oxygen uptake, which sustains energy repletion (2005). Other literature also suggests that moderate intensity workouts are preferred for improved post-workout affective states. Ekkekakis et al. (2005) and Yeung (1996) have examined many research studies investigating mood states during and after exercise and have found that while moderate intensity exercise is largely preferred, some individuals do tend to report feeling better after a high intensity workout.

The largest body of exercise as treatment exists for depression. A recent review has found that over 75 studies exist that have examined exercise as a remedy for depressive symptoms (Stanton et al., 2014). Aerobic exercise, resistance training, and combined aerobic/resistance activities have all been found to reduce depressive symptoms, with large effect sizes ranging from -0.80 to -0.85 (Stanton et al., 2014). The long-term effects of exercise on depression have not been extensively researched, but the studies available suggest that once one stops exercising, the positive benefits of exercise diminish after a few months (Stanton et al., 2014). This decline in effect could be attributed to the post-workout “runner's high” only occurring 10 minutes to one hour after physical activity (Ekkekakis et al., 2002). A regular exercise schedule is recommended for both depressed and nonclinical individuals in order to maintain positive benefits of physical activity (Stanton et al., 2014; Fox, 1999).

Fox (1999) proposed that exercise and general physical activity are associated with a decreased risk of developing depression. Exercise interventions for depression have also been shown to be just as effective as counseling and psychotherapeutic interventions (Stanton et al., 2014; Knapen et al., 2015). Some studies have shown that exercise is just as effective as antidepressant medication in reducing depressive symptoms (Stanton et al., 2014; Cooney, Dwan, & Mead, 2014). Due to the findings that exercise therapy is at least as effective as counseling and medication, when combined with the two, exercise therapy for depression has the potential to be quite effective in alleviating symptoms. Exercise therapy that occurs over the course of eight to 10 weeks, three to four days per week for 30 to 40 minutes is recommended as a useful treatment for depression (Stanton, et al., 2014). Walking, cycling, and pram walking appear to be effective physical activities in reduction of depressive symptoms (Stanton et al., 2014).

The research on exercise interventions for postnatal depression currently presents mixed findings. Structured exercise classes and low-intensity workouts such as walking have been weakly correlated with improvement of postnatal depressive symptoms (Stanton et al., 2014).

The evidence may be scarce but it supports the theory that some physical activity is better than none [in treatment for postnatal depression]. More research is needed to substantiate the possible benefits of exercise intervention for postnatal depression, specifically with randomly controlled trials and specific exercise prescriptions (Stanton et al., 2014).

Studies have indicated that both state and trait anxiety can be reduced with exercise (Fox, 1999; Acil, Dogan, & Dogan, 2008). Aerobic exercises such as running can create a post-workout reduction in feelings of anxiety (Fox, 1999). Research has been conducted to examine the effects of exercise on reactivity to public speaking and other psychological stressors (Fox, 1999). Half of the studies investigating exercise and psychological stressors found that participants showed lower levels of anxiety post-workout (Fox, 1999). Fox (1999) maintained that exercise intervention is useful for treatment of anxiety; more research is encouraged in this area.

Bipolar disorder

Physical activity and exercise therapy has been found to remediate and prevent depressive symptoms and elicit a “feel good phenomenon” post-workout in both clinical and nonclinical populations. The findings indicate that exercise therapy works well with depression, however, the research is limited on bipolar and other affective disorders (Malchow et al., 2013). Stress reduction in bipolar disorder has been found to result from exercise intervention, along with alleviation of depressive and anxious symptoms (Malchow et al., 2013). Exercising at least 30 minutes per day three times a week is recommended for normal populations and the same is suggested for those who have bipolar disorder (Stanton et al., 2014).

Individuals with bipolar disorder have reported that exercise assists in management of symptoms, except during severe manic or depressive episodes (Stanton et al., 2014). It is suggested that exercise therapies for bipolar disorder be personalized to the client’s affective state at the time of intervention, such as more rhythmic exercise during manic episodes (Stanton et al., 2014). Social isolation, lower education status, and medical co-morbidity have been associated with lower physical activity in individuals with bipolar disorder; there is a need for more research examining the relation between these variables (Malchow et al., 2013). More research is called for examining exercise and bipolar disorder.

Schizophrenia

The amount of research on physical activity and exercise interventions for schizophrenia is growing. The current research suggests that aerobic exercise and some resistance training can be effective for treatment of schizophrenia and assists in management of both positive and negative symptoms (Acil et al., 2008). Schizophrenia is also linked to poor physical health such as obesity and diabetes, which are believed to be side effects of the commonly prescribed antipsychotic medications (Acil et al., 2008; Malchow et al., 2013). Smoking is also common among individuals with schizophrenia, which can cause respiratory and cardiovascular problems leading to premature death (Acil et al., 2008; Malchow et al., 2013).

Exercise interventions in schizophrenia can help improve quality of life by introducing new, healthy activities to individuals. Individuals with schizophrenia typically have lower physical activity levels, which could be due to the side effects of the medication. Exercise interventions have been shown to help schizophrenia patients in outpatient and inpatient settings (Malchow et al., 2013). Effective exercise interventions have included yoga, aerobic exercises, cycling, and resistance training (Malchow et al., 2013). Resistance training and higher intensity

exercises can involve a higher cardiovascular demand, which is not recommended for all patients (Malchow et al., 2013). The moderate intensity workout recommendation for the general population also appears to be beneficial for individuals with schizophrenia (Malchow et al., 2013).

Acil et al. (2008) conducted a study evaluating the effectiveness of exercise intervention with schizophrenia patients. The aerobic exercise program implemented lasted for 10 weeks. The participants exercised three days per week for 40 minutes at a time. A statistically significant decrease of positive symptoms (i.e. delusions, hallucinations) was found after the exercise program was executed, as indicated by the Scale for the Assessment of Positive Symptoms (SAPS) (Acil et al., 2008). The Brief Symptom Inventory (BSI) was used before and after implementation of the aerobic exercise program and a decrease in schizophrenic symptoms was found to be statistically significant (Acil et al., 2008). After the exercise program ended, a statistically significant decrease was found in the following areas of symptomology: somatization, interpersonal sensitivity, anxiety, and hostility (Acil et al., 2008). A statistically significant increase in patient quality of life in the physical and mental domains was found by using the World Health Organization Quality of Life Scale Turkish Version (WHOQOL-BREF-TR) (Acil et al., 2008).

Exercise therapy research for schizophrenia has also illustrated decreases in symptoms such as abnormal body movements, depressive mood, irritability, and psychotic features (2008). Malchow et al. (2013) also confirms the effectiveness of exercise interventions in schizophrenia symptom reduction in a meta-analysis, especially when exercise interventions are moderate intensity, such as aerobics. Patients after the Malchow et al. (2008) study have reported feeling “more relaxed, untroubled, powerful, and healthy” following the exercise intervention program. Yoga is also recommended as an effective exercise intervention for schizophrenia (Malchow et al., 2013). The literature examining the effectiveness of exercise on cognition in schizophrenia is lacking, however, one study found a 34% improvement in patients’ short-term memory scores after participation in an aerobic exercise intervention (Malchow et al., 2013). Future research is needed to examine the physical activity and cognitive factors for those with schizophrenia.

Green exercise

Exercise and physical activity alone are associated with lower risk of disease and premature death, but exercise in nature—green exercise—has been shown to have positive effects on mood and cognition (Bratman et al., 2012; Pretty et al., 2005). Being out in nature itself has been proven to enhance affect and cognitive functioning (Bratman et al., 2012; Berman, Jonides, & Kaplan, 2008; Kaplan, 1995). Connection to nature and experiences in natural environments can help restore involuntary attention, as detailed in attention restoration theory (ART) (Bratman et al., 2012; Berman et al., 2008; Kaplan, 1995). According to stress reduction theory (SRT), experiences in nature can unconsciously reduce stress (Bratman et al., 2012). Evolutionary psychology theorizes that humans have an innate attraction to and desire to be connected with nature, which can explain the restorative benefits of nature experience (Bratman et al., 2012).

ART contends that attention is divided into two components: voluntary (directed) attention and involuntary attention (Bratman et al., 2012). Directed attention is theorized to involve cognitive control (Bratman et al., 2012; Kaplan, 1995). Concentration, impulse control, and working memory all involve directed attention (Bratman et al., 2012). Involuntary attention is used when individuals are presented with stimuli that are “inherently interesting” and do not

have to consciously focus on the stimuli, such as seeing a rainbow or a wild animal (Bratman et al., 2012).

According to ART, in order for a natural setting to be restorative, it must give the individual a feeling of “being away,” give a sense of “extent” (extent? – please clarify) or feeling as if one is in an entirely different world, be fascinating, and be compatible (Kaplan, 1995). Compatibility here refers to the connectedness between humans and nature and that for many people, functioning in nature requires less effort than functioning in civilization or urban settings (Kaplan, 1995). Natural settings, particularly areas with many trees and greenery, are theorized to enhance cognitive functioning and directed attention because of the novelty of the nature experience (Kaplan, 1995). Experiences in extensive natural settings can give people the feeling that they are in a different world, “away from it all,” like on a vacation. People typically feel “refreshed” and “restored” after taking vacations, and the experience in nature can be akin to a smaller vacation for the mind. Involuntary attention is often utilized in novel [natural] environments because of the four components of ART. Natural settings are inherently interesting, often rife with beauty, and can help people feel more like they are one with nature, thus restoring their attentional capacities (Kaplan, 1995). (are those the 4 components – interesting, beautiful, at one and restored attention?)

Viewing and experiencing natural settings such as landscapes near bodies of water or vegetation have been theorized to help reduce stress and negative thoughts, according to SRT (Bratman et al., 2012). SRT has been supported by studies involving stress and affect before and after participants viewed photographs of nature (Bratman et al., 2012). In one study, participants were students, stressed because of a final exam, that were divided into two groups. One group viewed pictures of urban settings and the other group viewed pictures of natural settings. The nature group reported enhanced mood and lower levels of fear after viewing the photographs (Bratman et al., 2012). Another study connected viewing of urban settings after watching a stressful movie to more negative affective states and lower recovery from stress (Bratman et al., 2012). The participants who viewed natural settings in this study were able to recover from stress faster and had more positive affective states (Bratman et al., 2012). The findings from these studies, along with theories in evolutionary psychology, suggest that nature is not only restorative and mood enhancing, but is related to stress reduction. Humans have an innate longing to feel connected to nature to some degree, and urbanization can be hypothesized to help create and maintain stress, due to the disconnection from nature (Bratman et al., 2012; Pretty et al., 2005).

Once again, green exercise refers to exercising in nature. Nature alone has been proven to have healing properties on the psyche, but when combined with physical activity, the positive effects are even greater (Pretty et al., 2005). According to ART and SRT, nature has restorative effects on mood and cognition, and exercise has been recognized to also improve mood and cognition. Researchers have studied the added benefit of exposure to nature while exercising. Greater reductions in blood pressure, increases in self-esteem and positive affect have been found in participants who were in the green exercise groups (Bratman et al., 2012; Pretty et al., 2005).

Nutrition and Exercise

Research on how nutrition combined with exercise affects mood and cognition is surprisingly scarce. The majority of scholarly articles examining how the interaction between physical activity and nutrition affects the brain were conducted with regard to obesity and/or

eating disorders. Exercise programs have been shown to be effective in improving self-esteem in obese individuals (Annesi & Whitaker, 2009). Food and energy intake, energy expended through exercise, and specific types of foods have been found to influence cognitive factors (Fox, 1999; Meeusen, 2014).

Sedentary lifestyles are associated with poor nutrition and lower physical activity, which have all been linked to obesity, diabetes, cardiovascular problems, and premature death (Meeusen, 2014). Children's poor academic performance and poor cognitive factors have been linked to deprived nutrition (Meeusen, 2014). It appears that poor nutrition and lack of physical activity go together. Fox (1999) called for more research examining the specific effects on mood and cognition when exercise is combined with healthy nutritional interventions. Nutritional and exercise interventions in clinical populations are also an area in need of research.

Implications for Counseling and Conclusion

Physical activity has many positive benefits on physical and mental health. It has been shown to improve mood and enhance cognition, such as memory tasks and concentration. Moderate intensity exercise for thirty to forty minutes per day, three to five days per week, is the recommended dose for a healthier lifestyle among the general public. This exercise prescription is also recommended for clinical populations and is supported as treatment for depression, schizophrenia, and bipolar disorders. Exercise interventions for mental illness are just as effective as psychotherapy and medication (Knapen et al., 2015; Malchow et al., 2013). Exercise intervention combined with traditional counseling and psychotherapy could be very effective in treating mental disorders. Future research could be focused on implementing exercise interventions in order to reduce or eliminate the use of psychotropic medications in the treatment of some psychiatric disorders.

Green exercise has added benefits to mood and cognition, as illustrated in various studies examining attention restoration theory (ART) and stress reduction theory (SRT) (Kaplan, 1995; Pretty et al., 2005; Berman et al., 2008). Nature alone has can possess healing properties on the mind, thus enabling improvement of cognitive functioning and increase of positive affect (Pretty et al., 2005; Berman et al., 2008). Nature combined with exercise has the added benefits of attention restoration and stress reduction from a novel environment, further improving mood and cognition (Berman et al., 2008). Green exercise in conjunction with psychotherapy in treating mental illness such as schizophrenia and mood disorders could enhance the treatment outcome. The combined effects of exercise and nutrition need to be examined further and its usefulness in managing psychiatric symptoms is also worth researching.

Exercise in conjunction with psychotherapy opens new doors for counselors and other mental health workers. Counselors could assign light to moderate exercise (i.e. instruct client to take a thirty minute walk three times per week) as homework for clients. They could also provide psychoeducational materials to clients, such as pamphlets on wellness and nutrition. Counselors should keep in mind that not all clients may be able to perform physical activities of certain intensities. Collaboration between counselor and client is critical to success in therapy and that transcends into discussing client comfort levels about physical activity and alternative treatments. The counselor and the client should reach an agreement about exercise treatment strategies and goals.

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