Exercise Used as a Therapeutic Intervention to Manage Anxiety in Adolescents

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Abstract

This paper examines the effect exercise has on reducing anxiety symptoms in adolescents. This literature review aims to explore the following: (1) What the *Diagnostic and Statistical Manual of Mental Disorders, (5th ed.)* classifies as anxiety and current treatment modalities; (2) what is classified as exercise for this research paper, how exercise impacts the brain, and current research conducted on anxiety reduction when exercise is implemented; (3) how mental health diagnosis comes with co-morbidity and how exercise can reduce the occurrence of co-morbid diagnosis; (4) how two different therapies, Complementary and Alternative Medicine and Problem Solving Therapy, can be used as gateways to implementing exercise for life-long self-sustaining symptom management; (5) and how participating is solo or group sports encourage Adler’s concept of social interest. These questions aim to understand the effects of exercise on the brain and if implementing exercise as an intervention will reduce anxiety symptoms particularly in adolescents. With adolescent anxiety disorders on the rise finding a safe intervention that is self-sustaining with positive side effects will be beneficial in reducing medical costs, produce life-long symptom management, and develop social interest. These findings will be beneficial to mental health providers because exercise is self-sustaining with positive side effects that reduce co-morbid problems and can reduce long-term mental health prevalence in adults. In conclusion, this paper aims to support the use of exercise as a therapeutic intervention either as a primary form of treatment or in conjunction with traditional CBT and SSRI therapy.
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Exercise Used as a Therapeutic Intervention to Manage Anxiety Symptoms in Adolescents

Introduction

Anxiety is one of the most commonly diagnosed mental health disorders with an estimated 30% of American adolescents aged 9-17 years having a diagnosis (Kantomaa, Tammelin, Ebeling, & Taanila, 2008). Moreover, 18% of the total American population is diagnosed with anxiety (Ratey & Hagerman, 2008). Anxiety symptoms hinder daily functioning and if left untreated can result in long-term, persistent mental illness in adults. Anxiety is one of the most commonly diagnosed mental health disorders that consequently places financial strain on society (Asmundson et al., 2013). Furthermore, if mental health disorders like anxiety are left untreated, various other mental, physical, and social problems become more prevalent for example early parenthood, low self-esteem, cognitive delays, and comorbid disorders (Saavedra, Silverman, Morgan-Lopez, & Kurtines, 2010).

Adolescents are developing mental health disorders at a staggering rate. While anxiety disorders are becoming increasingly more common, early intervention is vital to long term mental health success (Wuthrich, Rapee, Cunningham, Lyneham, Hudson, & Schniering, 2012). Fortunately, current treatments have been successful in treating anxiety symptoms in adolescents reducing life-long adult prevalence (Saavedra et al., 2010).

There are various ways to combat anxiety disorders. Cognitive behavioral therapy (CBT) in conjunction with serotonin-reuptake-inhibitors (SSRIs), are the most common and effective form of treatment for child and adolescents (Hogendoorn et al., 2013). Moreover, stress management techniques are also used to help reduce anxiety symptoms. Yoga and deep breathing have been shown to decrease stress by 40% when implemented as a stress management technique (Skowronek, Mounsey, & Handler, 2014). Although current treatments have been
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Successful, both, CBT and SSRIs come with potentially serious side effects including irritability; behavioral side effects such as motor restlessness, sleep disturbances, social disinhibition (Emslie, Weinberg, & Mayes, 1998). Additionally, four out of ten adolescents continue to have clinically anxious symptoms after treatment, which consequently demonstrates the need to improve current treatment outcomes (Hogendoorn et al., 2013). Finding and implementing a self-sustaining therapeutic intervention that has minimal or even positive side effects would be beneficial to long-term mental and physical success. Helpful interventions implemented early in the development of the disorder will help reduce the risk of long-term persistence.

Exercise can help adolescents feel connected to others through solo or group activities (Kantomaa, Tammelin, Ebeling, & Taanila, 2008). Alfred Adler believed in the idea of social interest and our need for others is something that is developed at birth between mother and child (Ansbacher & Ansbacher, 1956). While the desire for social interest is evident from birth, the skills need to be developed (Ansbacher & Ansbacher, 1956). In a community-driven society, implementing the concept of joining a community that promotes peer interaction and physical exertion through group or solo exercise has the potential to help manage symptoms of anxiety in adolescents by encouraging peer relationships.

**Anxiety Disorders**

Anxiety is one of the most diagnosed mental health disorders among adolescents and if not treated successfully may continue into adulthood (Varley & Smith, 2003). According to the *Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013)*, anxiety disorders are described as “disorders that share features of excessive fear and anxiety and related behavioral disturbances. *Fear* is an emotional response to real or perceived imminent threat, whereas *anxiety* is anticipation of future threat” (2013, p.189). The
primary difference between fear and anxiety is fear is responding to the natural flight or fight response to perceived danger; whereas, anxiety is more of a physical response including muscle tension or trouble breathing (American Psychiatric Association [APA], 2013). Fear is an instrument that helps to prepare the individual for the automatic fight or flight reaction when perceive danger or risk is nearby (Varley & Smith, 2003). Furthermore, anxiety is a future orientated mindset where the individual is anxious about perceived future events or settings whereas fear is a response to immediate danger (Craske, Rauch, Ursano, Prenoveau, Pine, & Zinbarg, 2009).

Individuals who suffer from anxiety experience various psychological changes due to anxiety symptoms such as the following: blood flow shifts, an increase in oxygen, and elevated heart rate (Varley & Smith, 2003). Anxiety can compromise visceral, cardiovascular, dermatological, and musculoskeletal systems. Headache, chest pain, insomnia, dizziness, fainting, and urinary frequency are other non-specific symptoms that can present. Various levels of intensity can be present depending on perceived danger or lack of control, ranging from low, moderate, and severe (Varley & Smith, 2003). Intense levels of anxiety can have negative side effects on the mind and body from remaining in the flight or fight stage for long durations. While symptoms can vary, the National Institute of Mental Health, lists several common symptoms people may experience:

1. Excessive worry
2. Trouble controlling constant worries
3. Awareness of excessive worrying
4. Trouble relaxing
5. Difficulty concentrating
6. Easily startled
7. Trouble falling or staying asleep
8. Constant fatigue
9. Headaches, muscle aches, stomach aches, or unexplained pains
10. Difficulty swallowing
11. Body fidgets
12. Irritability, excessive perspiration, light headed or shortness of breath
13. Frequent urination.

(NIMH, 4/26/2016)

Fear and anxiety are normal responses for people in selective situations, however, individuals who suffer from a diagnosed anxiety disorder harbor excessive fear or anxiety all the time (Varley & Smith, 2003). Fear and anxiety are not only produced by the interpretation of a threatening situation but also by the extent to which the child or adolescent feel out of control (Hogendoorn et al., 2013). Adolescents who discern to have less control over their environments are more likely to develop anxiety disorders (Hogendoorn et al., 2013).

**Diagnosing Anxiety**

The first step in assessing for anxiety is recognizing the symptoms and differentiating if the symptoms are dissimilar from normal child development. Contrastive symptoms could include excessive GI upset, headaches, missed school, inability to focus on tasks, or fidgeting (Varley & Smith, 2003). Second, looking at the family history could help when diagnosing adolescents. If there is a history if anxiety or other mental health diagnosis, looking at the family history might be a good starting point. Generally, if a parent harbors excessive fear or anxiety the adolescent could be impacted and start exhibiting similar characteristics (Varley & Smith,
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2003). The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) has specific criteria that need to be followed when diagnosing anxiety. There are, however, several tools and assessments that can be used to help diagnosis and assess the severity of symptoms. Two commonly used assessments are the Beck Anxiety Scale (BAI; Beck, 1993) and Generalized Anxiety Disorder-7 (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006; Bagha et al., 2012).

BAI and GAD-7 are two different tools used to assess and diagnose anxiety. The Beck Anxiety Scale (BAI) is a self-reporting 21 question measure of anxiety and developed for the use of assessing anxiety in adolescents and adults (Osman et al., 2002). The four point Likert scale ranges from zero to four allowing the individual to self-evaluate how often and severe the symptoms are daily (Osman et al., 2002). The BAI is administered by a mental health professional to help assess the severity of daily anxiety symptoms.

GAD-7 is a widely used mental health assessment tool and usually implemented in a general care setting (Bagha et al., 2012). The GAD-7 was developed to assess anxiety symptoms and can be used in conjunction with other assessments like the BAI or Patient Health Questionnaire-9 (PHQ-9; Pfizer, 1999). The GAD-7 is a seven question scale, with responses ranging from zero to three, these scores represent the severity of symptoms from mild, moderate, and severe anxiety (Bagha et al., 2012). Once the assessments are complete, using the outline diagnostic criteria in the DSM-5 can help to establish an accurate diagnosis.

Common Treatment Modalities

Clinicians have become increasingly aware of the beneficial impact psychological intervention has on mental health. With the ability to change a person’s perceptions and behaviors through various interventions, three primary treatment modalities have seen high
success when treating people who suffer from anxiety: cognitive behavioral therapy (CBT), a form of psychotherapy, SSRI implementation, and stress management techniques (Linden, 2006). According to the National Institute of Mental Health [NIMH], psychotherapy is also referred to as talk therapy and helps people to understand their illness through talking, stress, and symptom management.

**Cognitive Behavioral Therapy (CBT)**

Cognitive behavioral therapy (CBT) is an evidence-based intervention used for treating various types of mental health diagnosis such as generalized anxiety disorder, depression, and panic disorder (Allen et al., 2009). Cognitive behavioral therapy is defined as “a set of therapeutic procedures, derived from behavioral therapy that attempts to change behavior by modifying or altering faulty thought patterns or destructive self-verbalizations” (Goldenberg & Goldenberg, 1980, p. 516). Cognition is referred to as a person’s individual thoughts, beliefs, attitudes or expectations (Goldenberg & Goldenberg, 1980).

In addition, CBT has been established as the psychotherapeutic intervention of choice for children and adolescents (Bennett et al., 2013). In fact, currently there are 25 randomized controlled trials that provide and support evidence that cognitive behavioral therapy is impactful on youth and adolescents who suffer from anxiety (Saavedra et al., 2010). A research study done by Saavedra et al. (2010) aimed to answer the question around long-term gains on CBT and adolescents 8-13 years of age. The study consisted of 106 adolescents with diagnosed anxiety or phobic disorders. At a one year follow up, evidence supports CBT as an effective long-term success when use for treating anxiety or phobic disorders (2010). Furthermore, CBT is used to help individuals modify negative thought patterns and perceptions by modifying current thought processes. In addition, CBT teaches the idea of focusing on current problems and how to deal
with them. As well, with anxiety, the concept is to help the person to adapt better to perceived fear.

Concluding, CBT has been successful thus far due to its ability to change negative and dysfunctional thought patterns allowing for reduced anxiety symptoms. While CBT is a very effective form of treatment for anxiety patients, some people might have a difficult time committing to such a rigorous schedule (Bartley, Hay, & Bloch, 2013).

**Use of SSRIs with Anxiety Clients**

SSRIs are a class of antidepressants that are implemented by mental health professionals, specifically psychiatrists, to help treat various mental health diagnosis (Emslie, Weinberg, & Mayes, 1998). Four of the most commonly used and prescribed SSRIs are: fluoxetine, sertraline, paroxetine, and fluvoxamine. Several research studies have been conducted in order to test the validity of implementing SSRIs in patients’ suffering from anxiety. For instance, Emslie, Weinberg and Mays (1998), created a double-blind controlled trial using fluoxetine on adolescents age 14 years old and found a decrease in symptoms by 44% compared to those on the placebo. In addition, a second study was conducted on the validity of implementing Fluvoxamine on 120 subjects from 8-17 years of age. The study was a randomized double-blind controlled study and the results were parallel to the previous finding of reduced anxiety symptoms (Emslie, Weinberg, & Mayes, 1998).

Limited is available on the long-term side effects prescribing SSRIs has on adolescents, researchers believe newer antidepressants might have fewer side effects (Emslie, Weinberg, & Mayes, 1998). While positive side effects are prevalent and include reduced anxiety symptoms, negative side effects associated with SSRIs use should not be overlooked. Twenty-eight percent of patients taking SSRIs reported irritability, manic symptoms, behavioral side effects, insomnia,
social problems, and restlessness. Unfortunately, due to strong negative side effects, an average of 28% of patients had to be taken off of SSRI therapy during the research study. Furthermore, due to the lack of knowledge around prescribing SSRIs to children and adolescents, other factors need to be taken into consideration such as body habitus, other prescriptions being taken, and the rate the drug is metabolized (Emslie, Weinberg, & Mayes, 1998). Given the numerous side effects and the paucity of available research on SSRI use in youth and populations, the risk many outweigh the benefits. Thus, a safer and more efficacious option may be warranted.

**Stress Management**

In psychotherapy, stress and symptom management is one aspect of implementing a successful treatment plan. Utilizing stress management techniques and occasionally physical activity are common treatments modalities when working with adolescent (Larun, Nordheim, Ekeland, Hagen, & Heian, 2003). Stress management techniques can include: deep breathing, yoga, and mindfulness (Larun et al., 2003). A study conducted by Skowronek, Mounsey, and Handler (2014) found a 40% reduction in anxiety symptoms when yoga was implemented as either a solo intervention or adjunctive treatment. One random control trial including 813 participants age 18-76 having anxiety and stress symptoms participated in 20 minutes to one hour of yoga a day for 10 to 16 weeks (Skowronek et al., 2014). A total of 627 participants noted a significant reduction in anxiety and stress symptoms. Furthermore, “Yogic breathing is a unique method for balancing the nervous system and influencing psychologic and stress-related disorders” (Brown & Gerbarg, 2005, p. 189).

**Summary of Common Treatments Modalities**

While typical anxiety treatments like CBT and SSRIs have been successful thus far, do the negative side effects outweigh the benefits? While CBT is an effective form of
psychotherapy in treating anxiety, symptom relief can take several weeks. Often, clients have trouble committing to and maintaining the treatment schedule resulting in a lack of follow through. Similarly, researchers do not know the long-term effects that SSRIs will have on youth and prescribing them could produce more negative side effect results in comorbid diagnosis like insomnia and depression (Emslie, Weinberg, & Mayes, 1998).

Comparably, implementing stress management tools like yoga and deep breathing have seen success for clients diagnosed with anxiety. People who implemented yoga or yogic breathing for 20 minutes to one hour a day noticed significant symptom reduction when compared to people who did not practice stress management techniques (Skowronek et al., 2014). Results were noticed after a minimum of 10 weeks, similarly to CBT committing to a long-term treatment plan might be difficult without any immediate gratification.

While current treatments continue to reduce manifestation and maintain symptom management, research is starting to recognize the benefits of exercise as a therapeutic intervention. Researchers know exercise has many positive impacts on the brain, and people who exercise or participate in an activity have lower rates of anxiety, depression, and overall stress.

**Exercise Defined**

Exercise provides many positive physical benefits such as weight loss, cardiorespiratory improvements, and muscle and bone health (American College of Sports Medicine, 2016). According to the American College of Sports Medicine (ACSM), cardiovascular exercise is defined as, “Any sport or activity that works large groups of muscles, is continually maintained and performed rhythmically, is defined as an aerobic, or cardiovascular, exercise” (Heeter, n.d., para. 1). Exercise provides many benefits in preventing and reducing physical ailments like
obesity, but psychological benefits including mood, confidence, improved self-concept, and life quality, might be greater (Ten Hoor, Sleddens, Kremers, Schols, Kok, & Plasqui, 2015).

Cardiovascular exercise provides many psychological and physical benefits that include a lower body mass index (BMI), improved cardiovascular health and endurance, an increase in self-esteem and eliminating type 2 diabetes (Mailey, Wójcicki, Motl, Hu, Strauser, Collins, & McAuley, 2010). Physical activity has long been associated with various health benefits such as improving psychological health, boosting self-esteem and increasing perceptions of control; thus, physical activity is a successful behavioral intervention that reduces anxiety and depression symptoms in adolescents (Mailey et al., 2010). Utilizing exercise to help treat anxiety will not only help people control their anxious symptoms but will also provide added benefits that will contribute to healthy brain function, improved cognition and reduction in comorbid diagnosis.

**Exercise and the Brain**

It is known that people who suffer from anxiety lead a more sedentary lifestyle resulting in a lack of happy chemicals that are produced when the body is physically active (Radak, Kumagai, Taylor, Naito, & Goto, 2007). Exercise has been shown to provide both, physical and psychological benefits such as improved skeletal and cardiac muscle tone and decrease the prevalence of a diverse range of diseases including heart and vascular disease, cancers and type 2 diabetes (Radak et al. 2007).

Not only does physical inactivity have a negative effect on the brain but an increase in physical problems become more prevalent.

In agreement with Hogan (2006):

Exercise that challenges the brain increases neurochemicals including BDNF (Brain Derived Neurotrophic Factor), serotonin, and dopamine. This leads to increased neuronal development and synaptic activity that enhances the brain function, and it serves to
improve athletic performance as well as to symptomatically improve, forestall the progression of, and possibly prevent many disease states. (p. 14)

Furthermore, BDNF is part of the neurological system and when the body is active the development of new neurons is prevalent as well as the production of natural happy chemicals, serotonin, and dopamine. These brain-boosting factors are contributing to improved brain communication and opioid type responses resulting in overall cognitive health (Hogan, 2006)

With anxiety on the rise, an estimated 12-18% of college-aged kids have depression or anxiety boosting these positive brain chemicals naturally could act like a dose of Prozac without the negative side effects and establish a healthy long-term coping strategy for people who suffer from anxiety (Mailey et al., 2010). In addition, Praag (2009), supports the healthiest way to obtain and maintain a healthy brain and body over the course of a lifetime is through exercise. In addition, exercise has been shown to bring brain chemicals to baseline helping to normalize nerve tissue growth or neurotrophic effects (Zschucke, Gaudlitz, & Ströhle, 2013). As a result of brain chemical changes, cognitive effects such as attention, social adjustment, and coping skills begin to improve. For example, Pragg (2009) found a positive correlation between exercise and learning intelligence in school age adolescents, increased vocabulary learning with high intensity running in college age students and similar benefits in adults after a 12 week aerobic program.

With mental health and learning disabilities on the rise, these findings benefit not only the individual suffering with daily symptoms but also the therapists, medical doctors, and insurance companies. According to Praag (2009), specific to the hippocampus, a brain area important for learning and memory, is the robust increase in new neurons with exercise. The beneficial effects of running on cognition could be mediated, at least in part, by enhanced hippocampal neurogenesis (p. 4). The hippocampus is the part of your brain that is responsible for long and short term memory. Being able to maintain long-term hippocampal health could help reduce
age-related illnesses such as Alzheimer's and slowing cognition. There is an association in the
increase of neurons and an increase in cognition and is stated that the strongest stimulant in
increasing these neurons is exercise (Praag, 2009).

Furthermore, Praag (2009), supports the findings that exercise impacts the brain and
helps to produces similar chemical improvements as serotonergic medications. When an
individual engages in aerobic activity, the brain activates the monoamine system and releases a
chemical much the same as prescribed SSRIs. Exercise increases tryptophan hydroxylase, the
rate limiting enzyme of serotonin synthesis in the brainstem resulting in increased circulating
serotonin. Serotonin is a monoamine neurotransmitter that is found in blood platelets, the
gastrointestinal tract and central nervous system. It is widely believed to promote feelings of
happiness and wellbeing. Evidence also indicates that aerobic exercise can enhance opioid
function through the glutamatergic system (Praag, 2009). A large body of evidence indicates
that physical activity can positively alter the neurotransmitter systems resulting in what is
commonly referred to as the runners high. Both of these important neurochemicals act like the
communication link between the brain and the body and these results indicate that people
engaging in regular aerobic exercise will have a considerable about of serotonin and opioid
receptors in the brain resulting in reduced levels of depression and an increase in neurological
connections. While the psychological and physical benefits of exercise are endemic exercise
also protects against damage from stroke and can elevate recovery after injury (Praag, 2009).
Exercise is credited with producing more neurons to help with cognition as-well-as raising levels
of serotonin and dopamine.

Ploughman (2008) conducted a research study in order to understand what level of
intensity would produce the most brain boosting benefits and how much exercise is needed in
order to observe symptom reduction. Findings suggest while cardiovascular improvements and brain cognition were noted by all levels of intensity, benefits are subjective meaning better fitness levels does not always mean better cognitive functioning. In addition, children who displayed low levels of reading competency exhibited improved reading outcomes when challenged with a balance and coordination program (Ploughman, 2008).

**Benefits of Exercising**

The benefits of exercise last longer than the effects of most medications prescribed by practitioners and the side effects are almost solely positive and include advancements in physical, cognitive, cardiovascular, and social functioning (Mailey et al., 2010). Furthermore, an increase in self-esteem was noted in individuals who adhered to an exercise routine. These benefits would help to improve relationships with peers and boost cognitive performance in an academic setting by improving body image, producing feelings of control from completing a physically challenging program, and encouraging feelings of community (Norris, Carroll, & Cochrane, 1992). Implementing exercise as an intervention for people who have psychological diagnosis are suggesting to improve mood by distracting the person from their negative thought pattern by allowing for the release of endorphins through vigorous exercise (Parker et al., 2011). When the individual is operating at a high aerobic intensity, many of the same anxiety symptoms are present such as shortness of breath, rapid heartbeat, and trouble thinking. Allowing the person to remain at such a high intensity when performing aerobic activity might allow the individual to become more comfortable and less fearful when experiencing these symptoms when anxiety is induced.

When working with adolescents, the therapist needs to introduce a long-term therapeutic intervention that is stress and symptom reducing without producing negative side-effects. In the
article by Norris et al. (1992) the stress-illness relationship is discussed. Adolescents have high demand and high stress in their lives; potentially that is why they have high depression and anxiety statistics. The stress-illness relationship is alluding to the correlation between high stress in society and higher incidence of mental and physical health diagnosis. Norris et al. (1992) discuss the current demands on youth pointing out that not only are adolescents going through physical changes social pressures are also prevalent. Implementing beneficial exercise into the daily lives of adolescents could reduce stress and mental health prevalence by helping to balance out brain chemicals and establishing stress management techniques. In addition, lower life-stress and higher well-being was reported by adolescent who frequently exercised with peers as opposed to more sedentary individuals (Norris et al., 1992). While exercise reduces the incidents of anxiety and helps adolescents manage daily stress, exercise also includes various positive benefits like sense of community and belonging. Exercise could improve other negative factors adolescents face daily such as reducing the risk of co-morbid problems and long-term mental health persistency. Due to easy accessibility, life-long sustainability, and positive side effects, exercise is one of the best primary or conjunction therapeutic interventions to use with adolescents.

Exercise in the form of group sports is one idea that might be successful when working with adolescents. Group sports are an age appropriate intervention that is easily accessible to most adolescents who attend school. In addition, to better service adolescents treatment opportunities need to be youth-friendly, age appropriate and in an environment that is non-stigma causing (Parker et al., 2011). Utilizing both, Complementary and Alternative Medicine (CAM) and Problem Solving Therapy (PST) by implementing exercise as a stress reducing, age appropriate intervention without the negative stigma attached is in agreement with Larun et al.
(2003), who concludes that exercise is an age appropriate stress management intervention that provides many long term health benefits.

**Current Research**

Research has been conducted on the positive effects of aerobic exercise on the brain; most studies predominately focused on depression since the late 1970s (Pragg, 2009). Researchers are now starting to realize that physical activity can have a positive impact on several mental health disorders including anxiety, obsessive-compulsive disorder, panic disorder, and depression (Zschucke et al., 2013). Aerobic exercise can induce many of the same symptoms associated with anxiety such as increased heart rate, respiration and perspiration (Broman-Fulks & Storey, 2008). Repeated exposure to these anxiety related physical cues through aerobic exercise may decrease fears of these sensations. This concept parallels interceptive exposure therapy. Additionally, physical activity appears to be dose dependent when used as a treatment modality as exercise performed at higher intensities is more effective than exercise performed at lower intensities (Goodwin, 2003). Research has also demonstrated that physical inactivity is linked to an increase in depressive episodes at long term follow-up (Larun et al., 2003). As depression is projected to be the principal concern worldwide by 2020, exercise can be applied inexpensively to these populations without side-effects.

Broman-Fulks and Storey (2008) created a study to examine the viability of aerobic exercise as an intervention for the treatment of anxiety symptoms. The exploratory study included 35 male and female participants from an undergraduate psychology course at Appalachian State University. Gender breakdown included 28 female and 7 male students ranging from age 18 to 27 (Broman-Fulks & Storey, 2008). Participants were randomly assigned to either a high intensity aerobic exercise or no exercise condition. Exercise participants
performed six 20 minute aerobic sessions over a 2-week period. To mimic anxiety related symptoms, they were advised to maintain a heart rate between 60 and 90% of their predicted maximum heart rate through the use of a heart rate monitor for the 20 minute duration. Participants were then given the Anxiety Sensitivity Index - Revised (ASI-R; Reiss, 1995), a 16-item outcome measure at the end of each session (Broman-Fulks & Storey, 2008). The no-exercise condition participants were asked to avoid all forms of aerobic activity for two weeks. They were, however, required to report to the research lab to complete the ASI-R between two and four times a week for 2 weeks (Broman-Fulks & Storey, 2008).

Broman-Fulks and Storey (2003) concluded that physiologic arousal induced by high intensity aerobic exercise was associated clinically significant reductions in self-reported fears of anxiety related sensations. All four of the ASI-R sub-scales were positively affected indicating reduced fear of cardiovascular and respiratory symptoms, publicly observable anxiety symptoms and cognitive dis-control. Of importance, a single bout of 20 minute exercise was shown to significantly reduce anxiety sensitivity scores as well as all of the ASI-R sub-scale descriptors above. In contrast, individuals in the no-exercise control condition did not report any significant changes in anxiety symptoms. While aerobic exercise appears to be an effective intervention to manage anxiety sensitivity, more research is needed to determine if it can be employed as a stand-alone modality (Broman-Fulks & Storey, 2003).

Goodwin (2003) studied the association between exercise and general mental health. The study examined three key areas: an examination of physical activity and a correlation with mental health diagnoses in adults, the role demographics play in the contribution to mental health and if a dose response relationship exists between self-reported frequency of exercise and the likelihood of a mental health disorder.
Participants of this study were both male and female between the ages of 15 and 54 and are derived from various economic backgrounds (Goodwin, 2003). Goodwin used the National Comorbidity Survey and a modified version of the World Health Organization Composite International Diagnostic Interview to assess the participants on their exercise habits (Goodwin, 2003).

Goodwin concluded that 60.3% of Americans reported participating in regular exercise (2003). No significant difference was found between age, gender, economic statuses or race. A correlation was contrived between regular physical activity and a decreased likelihood of having assorted mental health disorders such as major depression, agoraphobia, panic attacks, GAD and social phobia (Goodwin, 2003). Similarly, findings indicate that a reduction in comorbid diagnosis was reduced in an individual who participated in regular physical activity (Goodwin, 2003).

Lastly, Norris, Carroll, and Cochrane (1992) found a similar correlation between exercise and less prevalent anxiety symptoms. The two-part study was based on previous research findings and aimed to determine generalizability to a larger portion of the population. The study included 147 students, both male and female participants, and spanned a wider age range of 13 to 17 years of age (Norris et al., 1992). The research was two-fold and aimed at re-examining issues of stress, well-being, and fitness in adolescents. First, participants were given a self-report questionnaire to measures of stress, physical fitness participation, and emotional well-being. The purpose was to measure and assess the “stress-illness relationship” and exercise in adolescents (Norris et al., 1992, p. 58). After assessing and reviewing the self-reported questioners, researchers concluded that a relationship between exercise and reduction in stress and depression could be measured in adolescents.
Further research was conducted by Norris, Carroll, and Cochrane (1992) in a hope to find a correlation between the type of exercise, duration, and intensity and which produced significant reduction in anxiety symptoms. The study divided participants into three primary groups, each group focused on varying activities, duration of activity, and intensity or activity, and recorded the results over a 10-week span. The high and medium intensity group participated in 25 to 30 minutes of activity per session maintaining 70 to 75% to their maximum heart rate. Whereas, the low-intensity stretching group had no increase in heart rate but participated in the activity for 25 to 30 minutes (Norris et al., 1992). The results concluded that a correlation could be measured between reduced anxiety symptoms and high-intensity aerobic exercise.

It should also be noted that participants in the high-intensity group also experienced a significant increase in their cardiovascular fitness level after the 10-week trial (Norris, Carroll & Cochrane, 1992). Participants in the moderate intensity group experienced a slight reduction in anxiety whereas the low-intensity group noted no change in anxiety, however, experienced an increase in anger and aggression (Norris et al., 1992).

The research studies of Broman-Fulks and Storey (2008), Goodwin (2003) and Norris, Carroll, and Cochrane (1992) aimed to correlate the relationship between aerobic exercise and mental health. While sample size, age of participants, and method of research varied, all three research studies produced the same outcome. A strong correlation was established between high and moderate levels of intense exercise and decreased mental health diagnosis. Not only is aerobic exercise beneficial to reducing anxiety symptoms but a decreased likelihood of developing specific mental health disorders such as major depression, agoraphobia, panic attacks, GAD, specific phobia, and social phobia are is prevalent (Goodwin, 2003). Research is
correlating exercise with positive mental health benefits as well as alleviating or reducing comorbid diagnosis (Ströhle et al., 2007).

**Comorbidity**

Comorbidity is defined as one individual with two or more mental health diagnosis (Allen, White, Barlow, Shear, Gorman, & Woods, 2009). Comorbidity is high among people with anxiety disorders, with approximately 30% to 50% of youth and adolescents having two or more diagnosis (Varley & Smith, 2003). Additionally, individuals receiving treatment for panic disorder noticed a higher incidence of comorbidity at 51% to 69%. Larger studies may suggest the rate is higher with generalized anxiety disorder at 60% (Allen et al., 2009).

Not all comorbid diagnosis are mental health related (Allen et al., 2009). Research suggests that people who suffer from mental health disorders also show greater incidents of other physical ailments such as cardio-vascular, neurological, respiratory and metabolic disease (Zschucke et al., 2013). In conjunction with these physical conditions come numerous negative lifestyle habits such as smoking and obesity. Thus, finding a resolution to anxiety that will reduce the likelihood of such negative comorbid physical diagnoses would be beneficial (Zschucke et al., 2013).

Treating people who suffer from mental health disorders early, in childhood or adolescence, can reduce the likelihood that the disorder will continue to adulthood (Asmundson et al., 2013). Implementing a safe and age appropriate intervention that brings about life long stress management skills and both physical and mental benefits is needed. Unfortunately, most physicians do not test for comorbid problems, many co-occurring problems tend to get overlooked resulting in health risk behaviors such as substance use, eating problems, and low levels of regular physical activity (Parker et al, 2011). Because the majority of people who
suffer from a mental health diagnosis also suffer from a physical comorbid problem utilizing exercise to treat most mental health disorders, in theory, will also improve their co-morbid diagnosis.

According to the National Institute of Mental Health. (4/26/16.) an average of 40 percent of adolescents who have a mental health diagnosis also meet the criteria for a second disorder. Furthermore, the Substance Abuse and Mental Health Services Administration (2012), states that 22.5 % of adults who have one mental health diagnosis also meet criteria for a secondary diagnosis (http://www.samhsa.gov/). Researchers know that people who participate in regular cardiovascular activity generally have lower stress levels, mental health diagnosis, and reduced rates of physical diagnosis such as type 2 diabetes, obesity and cardiovascular disease (Oeland, Laessoe, Olesen, & Munk-Jørgensen, 2010).

The development of anxiety is entirely dependent on how individuals respond to stress however there is developing evidence that there might be a genetic component to specific anxiety disorders (Varley & Smith, 2003). Persons who go through sever trauma may never develop an anxiety disorder whereas someone who suffered the same traumatic experience might develop two different anxiety disorders. Conforming, people who suffer from anxiety disorders might have an underlying vulnerability to its development thus certain individuals might react more intensely to external stimuli (Varley & Smith, 2003). While researchers cannot be sure why some people respond to stress by developing an anxiety disorder, they do know that people who participate in regular aerobic activity have significantly reduced rates of co-morbidity (Ströhle et al., 2007). Anxiety can induce symptoms of depression, panic attacks and a slew of physical problems that are a results of being in a heightened state of anxiety. One cross-sectional longitudinal study provides evidence that physical aerobic activity is connected to a reduction in
mental health disorders and greatly reduced the occurrence or development of co-morbid ailments. Furthermore, exercise benefits act like a protective barrier to the evolution of mental health developments (Ströhle et al., 2007). If physical activity can act like a buffering for anxiety symptoms, it would be beneficial to implement it into a patient’s treatment plan as one of the main goals.

**Complementary and Alternative Medicine**

With mental health disorders, specifically anxiety, on the rise, it would be beneficial for society to implement a more self-sustaining treatment option for adolescents. Mental health medical cost are high and if left untreated in adolescents, anxiety will continue and become more prevalent in adults (Asmundson et al., 2013). Mental health diagnosis comes with diverse negative consequences and side effects such as impaired social functioning, low educational achievement and higher incidents of self-harm (Parker et al., 2011). While mainstream treatments for anxiety have been successful thus far, implementing a long-term, safe and self-sustaining intervention would help to reduce medical costs and provide the individual with tools to manage anxiety symptoms for years to come. Similarly, early intervention has the potential to stop anxiety progression and reducing long term persistence by treating early stages of disease development (Parker et al., 2011). The following are interventions that promote whole body wellness as a form of anxiety treatment.

Both, Complementary and Alternative Medicine (CAM) and Problem Solving Therapy (PST) are therapeutic techniques that allow the incorporation of exercise into the treatment plan as a form of conjunction therapy or the primary source of anxiety management. Exercise has been found to be an effective form of anxiety management however, exercise was found to be less effective when compared to the use of antidepressant. In addition, when exercise was used
as a conjunction therapy with antidepressants both aerobic and non-aerobic exercise was found to be beneficial in the reduction of anxiety symptoms (Jayakody, Gunadasa, & Hosker, 2013).

Similarly, CBT has been found more beneficial when used as a conjunction therapy with exercise. Two separate clinical trials discovered that patients who participated in regularly scheduled aerobic activities noticed an increase in functional capacity and decreased anxiety symptoms when CBT and exercise was used in conjunction (Zschucke et al., 2013). With exercise improving anxiety symptoms, a reduced risk of developing comorbid disorders is significant. The primary concept of both, CAM and PST is the idea of allowing the individual to focus on current whole body wellness by implementing lifelong symptom management by holding the power of self-improvement.

Complementary and alternative medicine is an umbrella term for holistic interventions that range from herbal supplements, exercise, yoga, light therapy, and mindfulness meditation. The concept and implementation of these alternative and complementary treatments are becoming more prevalent as the research results are in their favor. In addition, CAM is a holistic treatment model that is patient-centered and believes the mind, body, emotions, spirit, and the environment are connected (Bernstein & Voll, 2015). The belief is focused on bringing all areas of individual’s life into balance resulting in reduced mental health symptoms.

The CAM approach can be used as a therapy intervention in conjunction with traditional treatments like CBT and SSRIs or as the primary source of treatment. Furthermore, CAM is a therapeutic approach to implement when people suffering from anxiety are interested in a whole body approach to healing. When treating anxiety, CAM implements techniques such as mindfulness, yoga, and Qigong and believes in holistic supplements, light therapy, animal assisted therapy and, acupuncture (Bernstein & Voll, 2015). Moreover, CAM is a concept that is
empowering to individuals who suffer from anxiety because it puts the control back into their hands. Giving people who suffer from anxiety the tools to identify their anxious thoughts and teaching them to utilize yoga or running, for example, as a coping skill is going to be self-sustaining, cost efficient, and empowering.

Another therapeutic approach that promotes a holistic view on treatment for anxiety is called, Problem Solving Therapy (PST).

As reported by Parker et al. (2011),

Problem-solving therapy aims to assist a person in learning to cope more effectively with their current difficulties, as well as developing skills that can be used in other settings and times in their life. PST aims to achieve this by systematically generating solutions to current problems and implementing a structured plan to resolve the difficulties, thereby introducing new behaviors and skills to effectively solve everyday problems. (p.3)

The concept behind Problem Solving Therapy is not focused on the past but helps to build and implement tools to deal with current daily problems. With 6% to 7% of adolescents under 18 years of age being the most diagnosed population with anxiety, implementing a PST intervention to help them deal with current stressors would help to eliminate unwanted anxiety in their daily lives (Bennett & Voll, 2013). Problem Solving Therapy (PST) would give individuals a readily available tool to use when anxious symptoms become prevalent. Easy access to the outdoors would allow for most anxiety suffers to go outside and participate in a walk or run to reduce symptom impact. In addition, adolescents who suffer from panic disorder noticed a significant reduction in anxiety symptoms when a structured exercise like running was implemented into their daily life (Jayakody et al., 2013).
Adler and Community

One of Alfred Adler’s key concepts is known in German as *gemeinschaftsgefühl*, which translates into English as social feeling, community feeling, or social interest (Ansbacher & Ansbacher, 1956). In addition, community feeling or social interest are the feels one obtains from belonging to a community or group of people. Adlerians believe in the power of social and community engagement and *gemeinschaftsgefühl* is the general interest in other people’s overall well-being (Ansbacher & Ansbacher, 1956).

In the first six years of life, youth are striving to identify their belonging and significance (Ansbacher & Ansbacher, 1956). Adlerian therapists believe an individual’s *style of life* or their *style of movement* is set before the age of six (Ansbacher & Ansbacher, 1956). These developmental years are critical to creating productive members of society later in life. Social interest is a concept of genuinely being interested in the well-being of others. Empathy for others is not something humans are born with but something that needs to be developed. Children learn and develop empathy or social interest for others by watching and learning from their surrounding environment (Mosak & Maniaci, 1999). Adler believed people are in a constant state of movement or striving forward; forward movement is the natural motion of all life (Mosak & Maniaci, 1999).

The idea of social interest is to be socially intertwined in a community and to be a productive member of society by having the best interest of others in mind (Ansbacher & Ansbacher, 1956). Adler believed the concept of social interest is something that is born within us. For example, when a child is born, they are completely reliant on their caregivers for survival; the reliance is developed by nature and is a natural consequence of being born. Similarly, the initial relationship between caregiver and child is the first possible opportunity for
social interest to start developing. Being able to empathize fully with another is something that is to be developed over time, however, this concept is crucial to connecting and being present with others. Relationships and being connected to others are the foundation of social interest. Furthermore, the ability to identify empathy comes from growing up surrounded by an encouraging environment that allows the individual to feel like a part of the community (Ansbacher & Ansbacher, 1956). The key component of social interest is allowing people to feel a part of the whole, by being connected to each other. Adler believed the way to measure one’s mental health is through connections with others and how invested one is with their well-being.

**Suggested Application**

With anxiety on the rise for adolescents, persistent symptoms such as feelings of worthlessness, low self-esteem, lack of concentration and motivation can hinder normal cognitive and social development (Varley & Smith, 2003). Symptoms for example, low self-esteem, lack of motivation, and excessive worry can make having friends difficult resulting in feelings of isolation, problems in academic settings due to concentration issues, and interpersonal relationships are strained due to feelings of inadequacy (Varley & Smith, 2003).

A new concept of integrating an internet base exercise program might be something that would appeal to today’s technology driven society. Due to stigma attached to mental health and the lack of accessibility to help, an average of 1 in 4 adolescent who need treatment for mental health related issues never receive proper intervention (Wuthrich et al., 2012). Joining an internet community is easy and accessible anywhere a computer is located. The continuous internet community of support, therapist, and exercise coaches would help implement a daily programs that would potentially alleviate anxiety.
While not much significant research has been conducted on internet-based interventions two on-line therapy programs have recently been developed: BRAVE and Cool Teens. According to Wuthrich et al. (2012), both programs are described as,

BRAVE is Internet-reliant, has 15 sessions 1 hour in length with staggered access to content and with online homework tracking and excludes 4 of the anxiety disorders. In contrast, Cool Teens is CD-ROM based and has high-quality audio and video components, eight modules 30 minutes in length and has free access to all content with recommended order, and includes all anxiety disorders. (p. 262)

The study conducted by Wuthrich et al. (2012), used 43 adolescents ranging form from 14 to 17 years of age with varying anxiety diagnoses. Both programs noted a significant reduction of anxiety symptoms in 26% to 41% of participants (Wuthrich et al., 2012).

Applying Adler’s concept on social interest might be one of the reasons why these two internet interventions were successful. With isolating side effects anxiety can produce, these two interventions might be an easy way to help adolescents feel connected and included in a group on their terms. In addition, by incorporating an exercise component, co-morbid aliments are also being addressed resulting in long-term whole body wellness. One primary successful component of implementing aerobic exercise as a therapeutic intervention may be the encouragement within the community and the continuous engagement with other community members (Parker et al., 2011).

Adolescents who participate in an individual sport or group sports have a greater sense of social interest and reduced anxiety symptoms.

Kantomaa et al. (2008) states,

Playing sports both in organized and informal settings can be an excellent way of discharging feelings, and it also teaches cooperativeness and complying with rules. Improving in teamwork, tolerance, and self-directness through many types of physical activities might explain why active adolescents have fewer social problems than their inactive counterparts. (p. 1754)
Furthermore, it is implied that exercise in a sports setting can act as a natural buffer from anxiety symptoms while encouraging social interest within the individual. Team settings encourage empathy and understanding of peers (Kantomaa et al., 2008).

**Conclusion**

Adolescents are the population with the highest rate of diagnosed anxiety disorders (Kantomaa et al., 2008). If left untreated, mental health disorders can become more prevalent in adulthood so early intervention is imperative to long term mental health success. Common treatments such as CBT and SSRIs have been successful in treating anxiety thus far; however, long-term success is lacking in long-term symptom reduction (Hogendoorn et al., 2013). Various research studies conducted by Broman-Fulks and Storey (2008), Goodwin (2003), and Norris, Carroll, and Cochrane (1992) aimed to understand the impact aerobic exercise would have on decreasing anxiety symptoms in adolescents. Results were parallel across all studies indicating a positive correlation between participating in aerobic activity and reduced anxiety symptoms. Furthermore, CBT and SSRI treatment in conjunction with aerobic exercise was significantly more successful than exercise alone.

Implementing exercise as a therapeutic intervention has been shown to reduce symptoms of anxiety and is a long-term solution to symptom management. If anxiety is not caught and treated early, long-term persistency can continue into adulthood. Using tools like CAM and Problem Solving Therapy to implement exercise in group or solo form has been shown to produce lasting benefits while reducing comorbid diagnosis (Jayakody, Gunadasa, & Hosker, 2013).

Adolescents who suffer from anxiety have a higher prevalence of developing co-morbid diagnosis, social difficulties, and trouble concentrating in school resulting in low self-esteem,
lack of social connections, and low grades (Saavedra et al., 2010). With negative stigma attached to mental health disorders, internet-based therapeutic interventions are one option when working with adolescents and have shown success when treating this population (Wuthrich et al., 2012). Given the current research, exercise as a therapeutic intervention has been proven to reduce symptoms of several forms of anxiety, however not all (Mailey et al., 2010). In conclusion exercise is beneficial as a co-therapeutic intervention when paired with other forms of treatment.

**Future Considerations**

Further research is needed on the accountability of people maintaining long term aerobic exercise programs. Vast amounts of research has been conducted on the positive benefits of exercise; however, more research is needed on the long-term outcomes and accountability of client willingness to maintain a long-term symptom management schedule. Also, does indoor versus outdoor exercise have a greater impact on symptom reduction or does environment not impact the outcomes. Throughout my research, not one study conducted focused on environmental factors and symptom reduction.
References


EXERCISE USED AS A THERAPEUTIC INTERVENTION


