Exercise: An Alternative Solution for Reducing Experiential Avoidance

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Abstract

People who suffer from an anxiety disorder experience both mental and physical impairments that can affect their ability to participate in daily activities. With the prevalence of anxiety disorders continuing to grow within the general population, there is a need for new cost-effective and more accessible forms of treatment. An alternative to pharmaceuticals and psychiatric treatments may be to target anxiety vulnerability factors through exercise. Research suggests that by completing at least 150 minutes of exercise per week, one may improve his or her physical and psychological health, as well as contentment with one's self and cognitive functioning. Though several studies report the effectiveness of exercise in lowering anxiety sensitivity (i.e., the fear of anxiety-related symptoms), there is little to no research on other well-known vulnerability factors such as experiential avoidance (i.e., control and/or avoidance of aversive stimuli). The purpose of this study was to see if engaging in exercise reduces the effects of experiential avoidance in adults who experience high levels of AS. Twenty-three participants were randomly assigned to one of two conditions (exercise vs. rest) and had their AAQ-II scores measured at three different times throughout this study (pre, post and follow-up). The results of this study found that there was a significant decrease in AAQ-II scores between the exercise and rest condition from pre to post, with the exercise condition reporting lower levels of EA.

Key words: anxiety disorder(s), exercise, vulnerability factors, anxiety sensitivity, experiential avoidance

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Introduction

Anxiety disorders affect over 30% of people in the United States and are one of the most commonly diagnosed mental illnesses (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005). This category of the Diagnostic and Statistics Manual (DSM-5) includes disorders such as specific phobia, social anxiety disorder (SAD), panic disorder (PD), agoraphobia, and generalized anxiety disorder (GAD). Anxiety disorders are related to extreme fear and are often associated with impairments in many domains of life (American Psychiatric Association, 2013). Anxiety disorders also display a high prevalence in the general population, which contributes to a growing cost of treatment (Gum, King-Kallimanis, & Kohn, 2009).

Research suggests that it costs the United States approximately $42.3 billion annually, or $1,542 per individual with an anxiety disorder (Greenberg, Sisitsky, Kessler, Finkelstein, Berndt, Davidson, Ballenger, & Fryer, 1999). Regarding the healthcare portion of this cost, the amount is split between non-psychiatric medical treatment, psychiatric treatment, mortality, and pharmaceutical expenses (Greenberg et al., 1999). According to Hoffman, Dukes, and Wittchen (2008), the billions being spent on anxiety disorders are not just on healthcare from treatments, but also include losses attributed to low productivity.

This study revealed that a person with an anxiety disorder is absent from or unproductive at their place of employment for an average of three-and-a-half business days per month. These absences can cost a workplace hundreds of dollars per month/person in order to make up the lost work (Hoffman, et al., 2008). This negatively affects the economy with a loss of about one million dollars in revenue per month based on the current recorded

prevalence of those with anxiety disorders. Due to the pervasive nature of anxiety disorders, as well as the amount of funds being spent on managing them, it appears that anxiety disorders continue to be a salient issue for society. Thus, there is a need to investigate new strategies to offer cost- effective treatments for anxiety disorders. Adding to the cost of anxiety disorders, the overall impairment these disorders can have on the lives of those who struggle with it is also a concern.

Those who suffer from some form of anxiety disorder experience both mental and physical impairments that stem from the anxiety itself. Lang (1968) claims that the three main symptoms of anxiety include increased worrying, avoidance of anxiety-related situation/sensations, and tension of the muscles. Lang (1968) also reported the physical symptoms of anxiety include, but are not limited to, sweating, shaking, or trembling, tachycardia (rapid heart palpitations), nausea, and even tachypnea (rapid shallow breathing). These symptoms have the potential to impair those who suffer from anxiety disorders by affecting their ability to participate in activities of daily living. Current treatment methods used to reduce the symptoms of anxiety disorders include anxiety medications such as benzodiazepines (Gorman, 2005), psychotherapy, such as CBT (a short-term psychotherapy method that incorporates goal-based practices and techniques for how patients can maintain goals outside of treatment; McGinn & Sanderson, 2001), and exposure therapy (a technique in which patients take steps to confront a stimulus that provokes fear, in a safe environment; Telch, Cobb, & Lancaster, 2014).

Traditionally, interventions for anxiety disorders generally include different forms of exposure to a feared or uncomfortable stimulus (McGuire, Lewin, & Storch, 2014). However, another form of intervention shown to be effective is exercise.

The Effectiveness of Exercise

By completing the recommended duration of at least 150 minutes of exercise per week for adults (Asmundson, Fetzner, DeBoer, Powers, Otto, & Smits, 2013), an individual can improve his or her physical and psychological health, as well as contentment with one's self and cognitive functioning (Goodwin, 2003). Along with the positive effects on an individual's physical health from daily exercise, there are reasons to believe that these activities can have a beneficial impact on the reduction of anxiety-related problems. Asmundson et al. (2013) conducted a meta-analysis of various studies comparing the effects of exercise on anxiety disorders, such as PD, SAD and GAD, and found that exercise could alleviate many of the symptoms of anxiety.

In terms of PD, three different 10-week studies were compared to see the impact of exercise, anti-depressant-type drugs and placebo pills in relation to PD. Broocks and colleagues (1998) randomly divided participants in groups that completed an aerobic exercise three times a week, took the anti-depressant clomipramine, or took a placebo pill. The results revealed that those who took the anti-depressants or participated in the exercise group exhibited a greater reduction of the PD symptoms than those who took the placebo pill (Asmundson et al., 2013; Broocks, Bandelow, Pekrun, George, Meyer, Bartmann, Hillmer-Vogel, & Ruther, 1998). Wedekind and colleagues (2010) also completed a 10-week study looking at the effects of exercise on PD with agoraphobia. Participants either completed relaxation activities paired with the drug paroxetine, exercised and took the drug paroxetine, exercised and received a placebo pill, or took part in relaxation activities paired with a placebo pill (Asmundson et al., 2013; Wedekind, Broocks, Weiss, Engel, Neubert, & Bandelow, 2010). The outcomes indicated that those who took paroxetine over the placebo

pill and exercised instead of doing relaxing activities experienced a greater reduction of PD symptoms (Asmundson et al., 2013). In the third study, Hovland and colleagues (2013) compared the effects of exercise and Cognitive- Behavioral Therapy (CBT) on panic symptomology. Though the results of the study indicated those who received CBT treatment exhibited the overall greater reduction of PD symptoms, those in the exercise group still exhibited lowered symptoms (Asmundson et al., 2013; Hovland, Nordhus, Sjobo, Gjestad, Birknes, Martinsen, & Pallesen, 2013). These findings suggest exercise may be an effective intervention for reducing the symptoms of panic disorder.

Exercise has also been shown to reduce symptoms of SAD. For example, Jazaier, Golden, Werner, Ziv, and Gross (2012) conducted an eight-week randomized control trial comparing aerobic exercises to mindfulness-based stress reduction (MBSR) with no accompanying treatment. The three-month follow-up revealed that, despite both groups' decreased symptoms of SAD, those who paired exercise with MBSR demonstrated higher overall reduction of symptom scores (Asmundson et al., 2013; Jazaieri et al., 2012). Herring and colleagues (2012) conducted a six-week study where those with GAD were put into a resistance-training group, into aerobic exercise or on to a wait list. Those in both exercise groups reported a noteworthy decline in symptoms of worry (Asmundson et al., 2013; Herring, Jacob, Suveg, Dishman, & O'Connor, 2012). Also included were several mixed studies that incorporated the effects of reducing the symptoms of anxiety disorders in participants who had either SAD/social phobia, agoraphobia, GAD, and/or PD.

For instance, an 8-week study by Merom, Phongsavan, Wagner, Chey, Marnane, Steel, and Bauman (2008) analyzed participants with SAD, GAD, and PD who received CBT and either did activities, psychoeducation, or aerobic exercises five times a week for a total

of 150 minutes. Those who participated in CBT treatments paired with weekly exercise were reported to have higher reduction of the symptoms of the previously listed anxiety disorders, over those who received psychoeducation (Asmundson et al., 2013; Merom et al. 2008). Martinsen and colleagues (1989) had participants with agoraphobia, social phobia, and/or GAD randomly divided into one of two exercise conditions completing anaerobic or aerobic activities for one-hour sessions, three times a week for eight weeks. Both groups reported significant reductions in the levels of symptoms from the specific anxiety disorders (Asmundson et al., 2013; Martinsen, Hoffart, & Solberg, 1989).

Overall, it was concluded that exercise did have some impact on lowering the symptoms of certain anxiety disorders. The results of the meta-analysis also suggest that the type of exercise, duration, and intensity can impact the level of anxiety reduction. Several researchers indicated that the most successful studies on the reduction of anxiety symptoms from exercise are those that last at least 10 weeks, 3-4 times a week, and value intensity over duration of session. Walking, running, or gym-based activities were also reported to significantly decrease the effects of symptoms of anxiety disorders (Asmundson et al., 2013).

Though the specific mechanisms through which exercise affects anxiety disorders remain unclear, research suggests that exercise influences anxiety disorders through certain vulnerability factors, such as Anxiety Sensitivity (AS).

Vulnerability Factors of Anxiety Disorders

Anxiety Sensitivity

Anxiety Sensitivity (AS) is the fear of anxiety-related symptoms due to the belief that the symptoms will negatively impact one's cognitive, social, and/or physical abilities (Reiss & McNally, 1985). There are different levels at which one may be impacted by AS. For

instance, an individual with high AS may regard tachypnea, a possible symptom of anxiety, as a life-threatening issue concerning one's breathing capability. Conversely, someone with low AS may see the tachypnea as more irritating than terrifying. Over the years, the importance of AS has grown in that it has been identified as a specific risk factor in the progression of panic attacks and anxiety disorders, such as PD with and without agoraphobia, GAD, SAD, Obsessive Compulsive Disorder, and Post-Traumatic Stress Disorder (Mantar et al., 2011).

Treatments that have been demonstrated to reduce anxiety symptomology also have comparable effects on AS (i.e., medicine, CBT, and exposure therapy). Exercise is one intervention that has been shown to have positive effects on anxiety and AS. For instance, Broman-Fulks, Berman, Rabian, & Webster (2004) conducted a study that looked at the effectiveness of lowering the symptoms of AS through exercise.

In a study by Broman-Fulks et al. (2004), 54 participants with high levels of AS completed six 20-minute exercises on a treadmill at either high or low-intensity. Participants completed several pre-assessments including the ASI, the Body Sensations Questionnaire (BSQ), the State-Trait Anxiety Inventory (STAI), and a demographic questionnaire, which was used as a screening method (Broman-Fulks et al., 2004). The assessments were given to each participant before the first exercise activity, after the cool down at their last session, and at a post-assessment follow-up a week after their last session.

Once randomly assigned, those in the high-intensity group were asked to begin with a two-minute stretching warm-up and two-minute treadmill warm-up, followed by 20 minutes of walking briskly or jogging, and then ending with a slow cool down. The participants' heart rate was determined through Polaris heart monitors, which were worn during each exercise

session for both the low and high-intensity groups. The goal was to get the participants briskly walking or jogging at a target of 60%-90% of maximum heart rate based on guidelines from American College of Sports Medicine (ACSM) for 2-4 times per week for two-weeks (Broman-Fulks et al., 2004). The low-intensity group completed the same warm-up as the high-intensity group, but for the actual 20-minute exercise activity, they were asked to keep a speed of one mph so they would not exceed 60% of maximum heart rate, which the ACSM considers high-intensity (Broman-Fulks et al., 2004). In comparison, Smits, Berry, Rosenfield, Powers, Behar, and Otto (2008) led a similar study that showed how the effects of exercise, specifically aerobic exercises, can contribute to the reduction of AS.

In a two-week study by Smits et al. (2008), 60 participants with reported high levels of AS were randomly assigned to an exercise intervention group (EX), an exercise with cognitive restructuring group (EX+C), or a wait-list control group (WL). Before starting the exercise portion of this study, all participants were asked to complete the Anxiety Sensitivity Index (ASI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and Credibility and Expectancy Questionnaire pre-assessments, which were also taken by the participants three-weeks post-treatment to see if any reductions in anxiety occurred (Smits et al., 2008). Participants in the EX group were asked to run on a treadmill for 20 minutes with a three-minute warm-up in the beginning and three-minute cool-down at the end, and then repeat this six times during the two-week period. The duration of the exercise, along with participants' maximal and target heart rate were tracked through the computer-controlled management system of the treadmill (Smits et al., 2008).

Participants in the EX+C group completed the same exercise as the EX group, however, there were two variations. Before the EX+C group did the exercise intervention,

they first watched a 15-minute video that explained the study as well as the effectiveness of exercise in treating AS. After the video, the experimenters asked the participants to summarize the video in order to see if they understood what they had just watched. The second difference between the EX and the EX+C group was that during the actual exercise activity, experimenters asked every three-minutes for the participants to rate their Subjective Units of Distress (SUDs) from 0 (no distress) to 100 (extremely distressed) based on the intensity of body sensations as well as anxiety level. The difference from the straightforward exercise condition was that they received a cognitive restructuring intervention. Finishing the exercise activity, those in the EX+C were praised for their work and also asked to conceptualize their anxiety ratings based on SUDs. Finally, those in the WL group completed the same pre-assessments with the same time span as the EX and EX+C group, but did not participate in the exercise portion (Smits et al., 2008). The results of the study based on the post-treatment assessments indicated that those completing the six sessions of exercise for 20 minutes during the three-week time span demonstrated the greatest reduction of AS-related symptoms (Smits et al., 2008).

Similar to the Broman-Fulks (2004) study, participants in both the low and high-intensity groups reported an overall reduction in AS-symptoms. However, those in the high-intensity aerobic group exhibited the greatest reduction of AS-symptoms, suggesting that there may be causation with exercising and the intensity level in order to achieve the greatest amount of reduction (i.e., the level of intensity may be a contributing factor in the reduction of AS; Broman-Fulks et al., 2004). Besides exercise being an effective method to reduce high levels of AS, Experiential Avoidance (EA) is another vulnerability factor of anxiety disorders

that has been receiving attention, but there is limited research and evidence proving if exercise can also reduce these symptoms.

Experiential Avoidance

Experiential avoidance can be defined as an unwillingness to stay in contact with difficult private experiences, such as emotions, cognition, sensations, and memories, when doing so results in further psychological distress and impairment (Hayes, Strosahl, Wilson, & Bissett, 2004). EA has been shown to be a strong predictor for anxiety disorders such as PD with or without Agoraphobia, SAD, GAD, and Agoraphobia without panic (Spinhoven, van Hemert, & Penninx, 2017). Currently, Acceptance and Commitment Therapy (ACT) is the main treatment method used to reduce the effects of EA, the core focus of ACT (Harris, 2006). ACT is a third-wave mindfulness behavioral therapy that targets EA in the treatment of anxiety disorders by having individuals interact with difficult thoughts, feelings, and emotions in a more flexible and value-based way (Harris, 2006). Though empirical evidence has shown ACT to be effective with a wide range of emotional and behavioral disorders, including anxiety disorders, little to no research has investigated the effectiveness of exercise alone in reducing levels of EA. Thus, exercise may offer a cost-effective and accessible intervention to influence an important vulnerability factor in the development of anxiety disorders.

By replicating somatic sensations associated with anxiety disorders, exercise acts as a type of controlled exposure to the symptomology that are typically avoided when an individual who fears anxiety sensations uses EA as a coping mechanism. Using exercise for exposure, it is hoped an individual will become accustomed to the uncomfortable sensations and eventually learn new ways to cope with the physical activities apart from EA. Exercise

provides an alternative activity to help those with EA focus on something besides controlling and/or avoiding difficult experiences.

Despite evidence that supports the benefits of exercise in the treatment of anxiety disorders and vulnerability factors such as AS, there is limited research that investigates the impact of exercise on EA as an anxiety vulnerability factor. In the current study, participants with high AS were recruited and randomly assigned to either an exercise or control condition. Their levels of EA were measured before the exercise and after the exercise. The purpose of this research is to see whether engaging in exercise reduces experiential avoidance in adults. It is hypothesized that people will report lower levels of experiential avoidance, as measured by the AAQ-II, after exercise, relative to before. It is also predicted that levels of experiential avoidance reported by the control condition will not vary across the same time period.

Method

Participants

The following information is based on archival data from a longitudinal study that examined the effects of exercise on psychological vulnerability factors for anxiety disorders. Of 1,025 potential participants, 23 met the criteria and were included in the study. Study criteria included being 18 years or older, able-bodied, currently not (at the time of the study) involved in any kind of regular exercise routine that exceeded more than once a week, and having obtained a score of 18 or higher based on the Anxiety Sensitivity Index-3 (Taylor, et al., 2007).

The sample of participants used was 65% female and 35% male, and 87% Caucasian, 4.3% African American, 4.3% Hispanic, and 4.3% Asian. In completing the study,

participants received compensation of both $20 and course credit. Before beginning the study, informed consent was obtained from each participant. The Institutional Review Board (IRB) at Appalachian State University approved both the consent forms and the research protocols for the Protection of Human Subjects.

Measures

Originally created in 1999, the *Anxiety Sensitivity Index- 3* (ASI-3) is an 18-item self-report questionnaire. The ASI-3 is used to measure anxiety sensitivity both in a general sense and in three subscales (Taylor et al., 2007). The subscales that are used in the ASI-3 include physical fear (e.g., *"When my chest feels tight, I get scared that I won't be able to breath properly"),* cognitive *(e.g., "When my thoughts seem to speed up, I worry I might be going crazy"),* and social concerns *(e.g., "When I tremble in the presence of others, I fear what people might think of me").* Participants report what level they agreed with each question on a five-point Likert-type scale, where *0=very little* and *4= very much* (Taylor et al., 2007).

The *Acceptance and Action Questionnaire- II* (AAQ-II) is the most widely used measure of experiential avoidance (Bond et al., 2011). Constructed by experts in the field of Acceptance and Commitment Therapy (ACT), the AAQ-II is a one-factor self-report measure with 7-items. Participants indicate how much they agreed with each question based on a 7-point Likert-type scale, where *1= never true*, *4= sometimes true,* and *7= always true* (Bond et al., 2011). The AAQ includes items that measure Experiential Avoidance, such as "I'm afraid of my feelings," and "emotions cause problems in my life" (Bond et al., 2011).

Procedure

The participants were recruited through the Appalachian State University Psychology Department participant recruitment site. In order to determine if the participants met the

criteria for the study, they first completed a brief online survey. The survey included the ASI-3, a demographics questionnaire, and general questions about individual health. Once participants completed the survey, and if they met the criteria for the study, they were contacted through email regarding their interest in taking part in the study. The final sample size of the 23 participants (13 in aerobic and 10 in control) are those who met the criteria indicated previously, and agreed to participate in the physical aspects of the study. Participants were randomly assigned to a control or an experimental group and asked to wear comfortable clothing. Those in the experimental group completed six sessions of aerobic exercises for two weeks, while those in the control had six sessions of rest period for two weeks.

Before the participants began the study, those in both conditions provided the experimenters with informed consent and completed the Appalachian Screening Questionnaire for Research Involving Exercise to certify that they were qualified for the study. After the forms were obtained, the participants' height, weight, and age were evaluated by the researchers. Next, each participant was given a Polar heart rate monitor and asked to place the chest strap around their sternum and the wristband-monitor on his or her wrist. Once the monitors were on, the participant was asked to sit quietly for five minutes. During this time, the researchers recorded the participants' baseline heart rates as well as had them complete a series of questionnaires that obtained information about their basic demographics, ASI-3, and AAQ-II. Participants completed the AAQ-II at pre (baseline), post, and a one-week follow-up. Once this information was gathered, the participant began either the exercise or the rest part of the study.

Exercise

Those in the experimental group completed aerobic exercises, which can be defined as cardio-related exercises. Cardio-related exercises for this study included walking or jogging on a treadmill. Each participant of this condition began with a short period of stretching, followed by a two-minute warm-up on the treadmill. Once this warm-up was completed, the participant either walked quickly or jogged for 20-minutes on the treadmill. After the 20-minutes, the participant had a two-minute cool-down period on the treadmill finally concluding with another short stretching period. Throughout the 20-minute aerobic exercise portion, the participant's heart rate was recorded and the speed of the treadmill was adjusted at two-minute intervals to keep the participant's heart rate between a lower range of 65% max and an upper range of 75% of maximum target heart rate for this exercise.

Rest

Those in the control group did not complete exercise and instead rested. Participants in this condition were asked to sit quietly in a chair and to only sit in the chair (i.e., not use their phones or any other objects, or interact with the researcher or anything around them). Those in this condition also wore the Polar heart rate monitor. Their heart rate was monitored and recorded every two-minutes by the researchers.

Results

Preliminary analyses indicated that the two conditions were comparable at baseline with regard to demographic and relevant outcome variables (see Table 1).

A 2 (exercise vs. rest) x 3 (time: pre, post, follow-up) mixed model analysis of variance was performed to test if the exercise condition reported significantly lower levels of experiential avoidance compared to the control group at post-treatment and follow-up. Results revealed a significant main effect of time, $F(2, 42) = 21.58$, $p < .001$, as participants'

average scores in the AAQ-II decreased from pre to post measurement. In contrast, participants' average scores in the AAQ-II from post measurement to follow-up remained constant (see Figure 1). There was no main effect of condition, $F(1, 21) = 0.13$, $p = .727$. However, there was a significant condition by time interaction effect, $F(2, 42) = 4.02$, $p = .025$, $n_p^2 = .16$. Post hoc analyses indicated that the AAQ-II scores for the exercise condition significantly declined from pre (M= 25.08, SD= 7.68) to post (M= 17.08, SD= 8.05) and follow-up (M= 16.85, SD= 7.36), whereas scores in the rest condition did not significantly change from pre (M= 23.10, SD= 9.76) to post (M= 19.60, SD= 10.28) and follow-up (M= 20.10, SD= 11.07).

Discussion

The overall aim of this research was to see if engaging in exercise reduces the effects of experiential avoidance in adults who reported high levels of AS. It was predicted that those in the exercise condition would consistently report lower AAQ-II scores than those in the rest condition. The results supported the hypothesis in that there was a significant decrease in AAQ-II scores between the exercise and rest condition from pre to post measurement, with the exercise condition reporting lower levels of EA. By comparison, the levels of EA reported by the control group remained constant throughout the study. The effect size observed in this study ($n_p^2 = .16$) was comparable to the effect sizes observed in previous research investigating the effects of exercise on other prominent anxiety vulnerability factors , such as AS (e.g., $n_p^2 = .12$ - .18) (Broman-Fulks et al., 2004; Broman-Fulks, Kelso, & Zawilinski, 2015; Broman-Fulks, & Storey, 2008). The effect size of the current study was within the range of the findings of previous studies, which increases the reliability of the effectiveness of exercise interventions for vulnerability factors associated

with anxiety disorders, finding that exercise reduces levels of EA. The results of the study above illustrate that exercise may be the solution for a more cost-effective and widely accessible means of reducing high levels of EA.

In addition to being more affordable, this study can further the research on EA by broadening existing intervention methods from ACT interventions to activities such as exercise. ACT practitioners may find it useful to utilize exercise as an effective intervention for anxiety disorders. For instance, clinicians can possibly encourage clients to engage in exercise between sessions to practice ACT techniques to reduce levels of EA. This study also suggests the need for further research into EA as a vulnerability factor in the development and maintenance of anxiety disorders. For instance, one may look into the effectiveness of exercise lowering levels of distress tolerance, which can be defined as the toleration of aversive psychological situations (Simons & Gaher, 2005). Exercise may be a more cost-effective and accessible form of exposure in the treatment of EA and anxiety disorders.

There are several strengths within this research that are worth noting. First, collecting data across multiple time periods demonstrated that exercise has a lasting and sustainable effect on levels of experiential avoidance past the termination of treatment. Additionally, this study utilized a randomized controlled design, which, according to Asmundson et al. (2013), is the gold standard in efficacy research.

However, there are several possible limitations to this study as well as ideas for future research that are worth addressing. The first limitation comes from the sample size. Faul, Erdfelder, Buchner, & Lang (2009) stated that, in order to determine if there are significant changes with at least a moderate effect size between compared groups, there should be a sample size of at least 22 participants. Though the study included 23 participants, the effect

found within the study was large enough to suggest that increasing the sample size would only increase the magnitude of the effect. Furthermore, increasing the sample size, would allow for further research to investigate gender effects in the utilization of exercise for reducing experiential avoidance (McLean, Asnaani, Litz, & Hoffmann, 2011). Medina, DeBoer, Davis, Rosenfield, Powers, Otto, & Smits (2014) conducted a study to test if gender was a factor for the effect of exercise on reducing AS. Through this study, it was determined that there was a significant effect for the interaction between time, treatment (condition), and gender. Results indicated that those in the exercise condition had the lowest reports of AS and that males had the greatest reduction of AS overall (Medina et al., 2014). This study not only supports that exercise is useful in lowering anxiety vulnerability factors (i.e., AS and EA), but it also may signify that there are differences in the effectiveness of exercise between men and women. Also, several studies report that men and women report physical and psychological symptoms differently, such as women are more likely to engage in avoidant behavior than men (Karekla & Panayiotou, 2011). This may suggest that though in this current study exercise was effective in lowering EA, this may vary to a certain extent based on one's gender.

Furthermore, only aerobic exercise was used in this study, and may limit the generalization of the findings. An alternative form of exercise to consider investigating to determine its effectiveness on lowering vulnerability factors (EA) is resistance training. Resistance training (i.e., weight lifting) refers to exercises that increase muscular strength and endurance (Lima, Camilo, Gobbo, Trevisan, Nascimento, Silva, & Ramos, 2018). LeBouthiller & Asmundson (2017) analyzed the effectiveness of exercise on anxiety-related disorders and found that resistance training improved general psychological distress and

reduces levels of AS. Though several studies have reported the success of aerobic exercise and resistance training in lowering AS (Broman-Fulks et al., 2004; Broman-Fulks et al., 2015; Broman-Fulks et al., 2008; Smits et al., 2008), there is limited research on the effects of different types of exercise for reducing EA. Future research may find it beneficial to investigate the ability of other forms of exercise to reduce EA.

Another limitation to consider within this study involves sampling methods. A convenience sampling method was employed within this study due to the proximity and ease of finding suitable test subjects. Thus, participants were all college-age students from Appalachian State University. The result is a limited sample size and similar demographics for the participants in the current study. Because of this, results should be generalized with caution. In terms of age, older adults, age 30 to 59, account for over 40% of the prevalence of anxiety disorders (Susukida, Mojtabai, & Mendelson, 2015). Participants within this study ranged from 18 to 29 years old, who generally account for less than 20%, of diagnosed anxiety disorders, which does not represent the majority age demographic of those diagnosed with anxiety disorders (Susukida, et al., 2015). Finally, we did not account for those with varying levels of AS. As started in the Method section, participants of the study were those indicated as having high levels of AS based on their ASI-3 score. This suggests that it's worth considering if the effectiveness of exercise in lowering anxiety vulnerability factors will generalize to those with low AS. Future studies may include more diverse range of characteristics.

Based on the findings from this present study, aerobic exercise had a significant effect on decreasing levels of experiential avoidance in adults who experience high levels of AS. Future research on using exercise to reduce EA may benefit from incorporating a larger

sample size. Increasing the population of the study not only would increase the magnitude of effect, but also allow future researchers to determine if this effectiveness differs between genders. It would also allow for the use or participants from more diverse demographics. In addition, research for EA and exercise may also benefit from incorporating different types of exercise.

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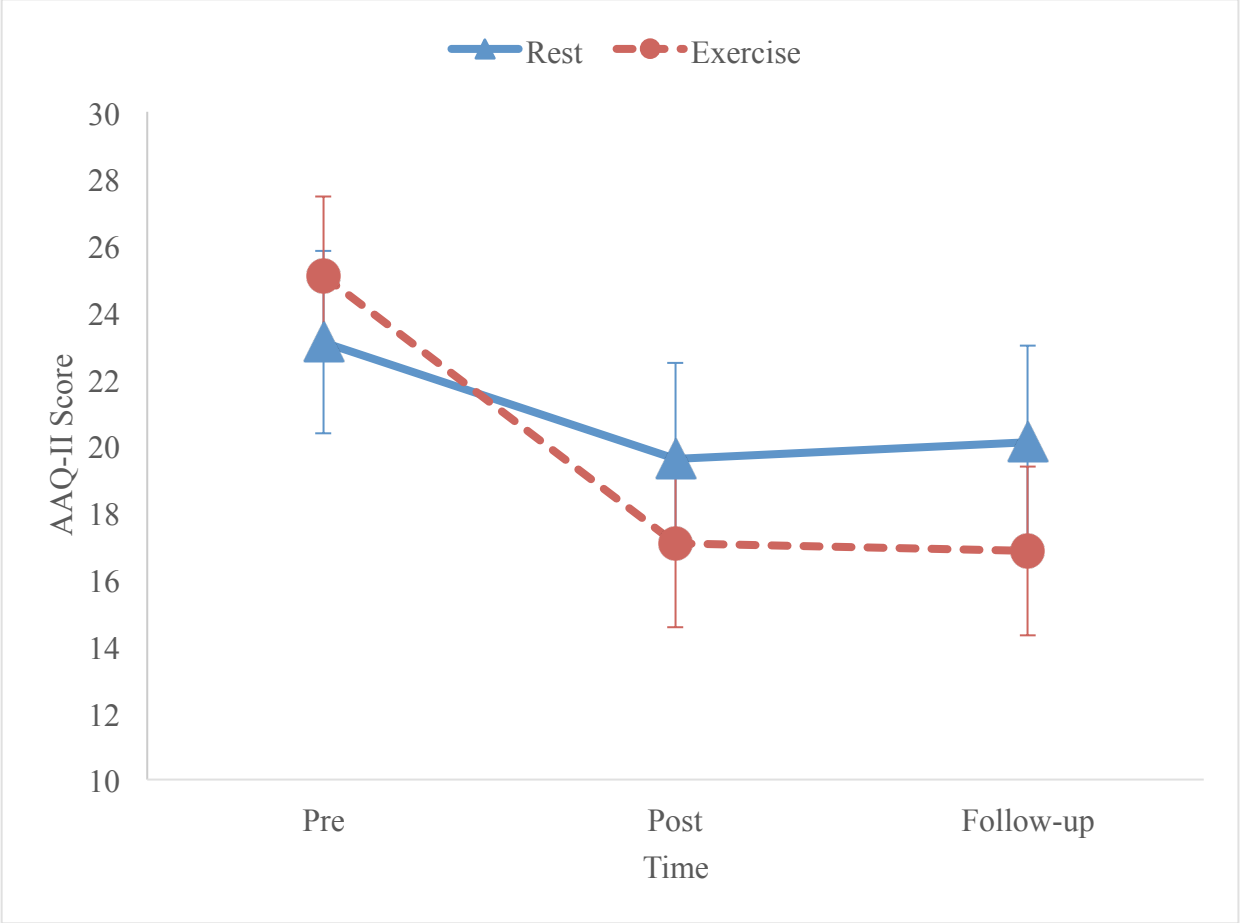

Figure 1. AAQ-II scores of the rest and exercise conditions at three different times

Table 1

Demographics for participants in the rest (control) and exercise (experimental) conditions

Condition	Rest	Exercise
Age	19.10 (1.00)	19.23 (1.74)
Gender		
Women	70%	61.5%
Men	30%	38.5%
Ethnicity		
Caucasian	90%	84.6%
Asian	10%	0%
African American	0%	7.7%
Hispanic	0%	7.7%