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## Addressing Athletes Coexisting Conditions of Autism and Depression: Participants Self-Report Decreased Feelings of Depression Post Exercise

Joshua Sutton

*University of Nebraska at Omaha, joshtsutton@gmail.com*

Saundra Shillingstad

*University of Nebraska at Omaha*

Jessica Baldwin

*University of Nebraska at Omaha*

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***Addressing Athletes Coexisting Conditions of Autism and Depression: Participants Self-Report Decreased Feelings of Depression Post Exercise***

Joshua Sutton

University Honors Capstone

College of Education, Health, and Human Sciences

University of Nebraska at Omaha

University Honors Capstone

Advisors: Dr. Sandra Shillingstad, Dr. Lucy Morrison, Dr. Jessica Baldwin

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### **Abstract**

The goal of this study was to evaluate if exercise would decrease depressive symptoms of participants who reported having coexisting conditions of autism spectrum disorder (ASD) and depression. Research has reported that autistic people have increased rates of depression, in comparison to general populations (Unruh et al., 2020). The purpose of this research was to evaluate if exercise would decrease depressive symptoms of the Unified Fitness athlete participants who self-identified as having depressive symptoms and ASD. This research was conducted during the Fall 2023 semester as an extension of the class *Kinesiology Practicum*, using the University of Nebraska Omaha (UNO) Unified Fitness Club (UUFC) athletes. A survey was taken before and after each UUFC exercise class over the course of a 5-week period. The survey analyzed the effect of the athletes Rate of Perceived Exertion (RPE) to determine the degree of which exercise intensity influenced the magnitude of antidepressive effects. It was hypothesized that the Unified Fitness Athlete's mood would increase post exercise as measured by RPE. Following analysis of the data, the results supported that Unified Fitness athletes did on average achieve increased mood quality post exercise when compared to their pre-exercise baselines. The result revealed that exercise was causal in its ability to decrease depressive symptoms for the Unified Fitness athlete participants.

### **Background**

Young adults on the spectrum are at an increased risk for poor health and experiencing depressive symptoms due to social, physical, and psychological deficits reducing opportunities for activity in comparison to average populations (Hedley et al., 2017). Research has shown that autistic people are four times as likely to experience depression over the course of their lives in

comparison to their neurotypical peers (Weinstock et al., 2019). Although the likelihood of depression tends to be increased for those on the spectrum, simple lifestyle changes can be made to mediate their potential risk. Exercise has been shown as a viable treatment method for mediating the attainment of excess body fat and combating the onset of depression (Cooney et al., 2013). This study assessed participants' self-reported depression levels before and after a 6-week exercise program. Upon data analysis, it was evident that engaging in the exercise program significantly lowered their depression scores by the program's conclusion. Therefore, regular exercise emerges as a proactive measure to enhance overall mood, mitigating the effects of depression.

## **Introduction**

The rate of depression seen in the population of individuals diagnosed with autism is staggeringly different in comparison to national averages. According to a study by Tami et al. (2021), the incidence of depression in all U.S adults is 7%, while it is estimated to be around 26% for people with autism. This research aimed to assess the impact of exercise on reducing depressive symptoms and to examine how exercise intensity may either promote or inhibit antidepressive effects. Research has indicated that exercise of any intensity has an ability to improve upon feelings of depression (Meyer et al., 2016).

Although depression has an increased effect towards people with autism, current bodies of research analyzing the antidepressive effects of exercise still largely misrepresent the population of individuals who are on the spectrum. Therefore, this analysis between exercise and depression was based upon a population of six Unified Fitness athletes. The participants in the study were a group of athletes comprised of individuals who were diagnosed with autism

spectrum disorder. The surveys administered to the athletes required them to quantitatively measure their mood on a scale of 0 to 10, with 0 indicating an elevated mood and 10 representing a depressive state. Similarly, for the Rating of Perceived Exertion (RPE), a comparable scale was employed where 0 indicated no pain, and 10 indicated a severe workload. Recording both their current mood and RPE enabled cross-referencing to assess the correlation between mood improvement and perceived exertion.

### **Goal and Objectives**

The goal of this research study is to evaluate the relationship between consistent exercise and depression for people on the spectrum due to their predisposition towards depressive symptoms. Ghaziuddin et al. (2002) found that depression seems to be one of the most common psychiatric disorders that occurs in autistic populations. Therefore, highlighting the effectiveness of exercise as a means of treating depressive symptoms for people on the spectrum would be largely beneficial towards increasing their overall quality of life.

### **Participants**

The participants for this study consisted of six UNO Unified Fitness Club athletes. UUFC is an exercise club hosted at UNO that is comprised of individuals who have been diagnosed by a practicing medical physician with autism spectrum disorder (ASD). To obtain the athletes, UUFC gathers graduated Unified Fitness athletes from the various high schools around the Omaha metropolitan area. The club is sponsored and hosted by UNO, then lead by a group of undergraduate students enrolled in the 4000-level class *Kinesiology Practicum* along with the oversight from UNO instructor, Dr. Jessica Baldwin. The age demographic of the six UNO Unified Fitness athletes ranged from 23-26 and consisted of four male and two female

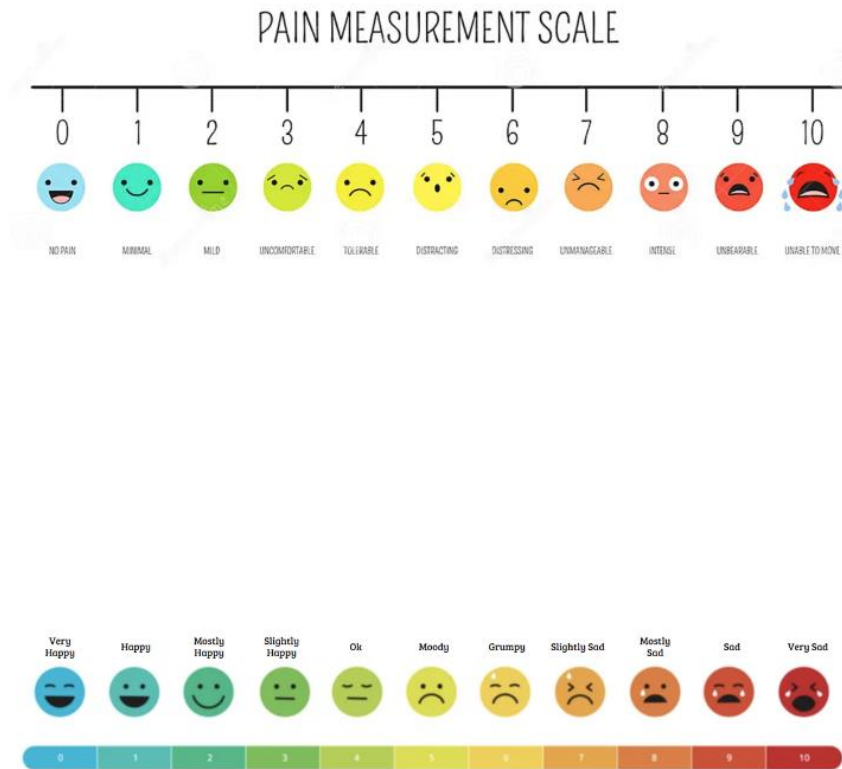
participants. The self-reported race of the athletes was primarily Caucasian with a singular Hispanic athlete. To maintain anonymity, each athlete was designated a specific participant number, to keep data analysis discrete and avoid potential bias. Similarly, each athlete was given identical survey graphs both before and after each bout of organized exercise to measure their current mood and RPE. Due to the nature of the class, attendance was not required and therefore certain athletes were not present consecutively over the course of every exercise class. Consent for data collection on the athletes was given verbally by each athlete prior to the beginning of data analysis and confirmed physically via their voluntary participation in the class.

### **Methods and Materials**

To assess exercises antidepressive effects towards people on the spectrum, a group of six Unified Fitness athletes was surveyed over the course of various exercise sessions hosted every Monday and Wednesday from 4-5pm over a 5-week period. The exercise class was held at the UNO in the Health and Kinesiology building as part of a *Kinesiology Practicum* class. The precise number of surveyable sessions recorded over that period was a total of 10 sessions. Each workout was developed by undergraduate students enrolled UNO's *Kinesiology Practicum* class and designed to ensure athletes achieve the American College of Sports Medicines (ACSM) guidelines for the recommended amount of daily physical activity. Current guidelines suggest individuals achieve 30 minutes of moderate-intensity cardiovascular exercise per week and perform strength training exercises involving each major muscle group using body weight, resistance bands, or free weights at least two days per week (American College of Sports Medicine, 2010).

To measure each exercise sessions intensity and correlated effect on overall mood, a survey was given to each participant after each exercise session. The survey given to the participants asked them to quantitatively measure their psychological state and RPE both prior to and post each bout of exercise. The scales used for measuring both RPE and mood consist of a spectral 0-10 scale. For RPE, a modified Borg's Scale for Perceived Exertion was used. According to the modified Borg's scale, a 0 indicated no pain while 10 indicated a significantly increased level of discomfort. The mood scale had a very similar 0-10 structure with 0 indicating a very happy mood and 10 indicating an increasingly depressive state. The faces placed near the bottom of both scales were implemented to assist the athletes with correlating their RPE and mood to a quantitative value for measurement. The animated faces underneath each scale consisted of a spectrum of facial expressions, directly correlated with each specific rating above. The happier faces were placed near the 0 markings on each scale to indicate a lower RPE, or happier mood. The faces on the opposite end of the scale consisted of faces with tears or frowns, to indicate to the athletes that these numbers would suggest increased levels of discomfort or negative feelings. Figure 1 is the survey given to each participant.



**Figure 1***Pain Measurement Scale*

*Note.* Figure 1 is the survey that was administered to Unified Fitness athletes before and after each bout of exercise.

The survey was printed on paper and participants filled out their survey before and after each bout of exercise. Overall, this survey acted as a tool for measuring the current RPE and psychological state of each athlete.

To analyze the data provided by the athletes across their exercise sessions, I initially entered the data into a Microsoft Excel spreadsheet. I identified changes in both recorded

variables, then calculated the difference for each value. This involved subtracting the prior exercise measurement from the post-exercise measurement for both the Rating of Perceived Exertion (RPE) and mood individually. For instance, an RPE change from 0 to 1 would be indicated as -1, while a change from 1 to 0 would be denoted as 1. After analyzing the differences of both RPE and mood, the average of each of these variables was taken by adding all the differences of RPE and mood separately, then, dividing the sum of those measurements by the total number of sessions attended by each of the athletes. Dividing the sums of each section by the athlete's own unique attendance is a vital detail to ensure that averages correlated to the ratio of their attendance, as it was not required to attend all sessions to be a part of the experimental population. To determine the ratio of participants who received psychological benefit from exercise, the number of participants who had an average positive psychological increase was divided by the total number of athletes.

## **Results**

Figure 2 represents the average changes seen in the UNO Unified Fitness athlete's RPE and mood during the 5-week survey period. Figure 3 highlights the average RPE values for each athlete before and after each bout of exercise. While some athletes may seem to not have any data, this merely indicates an average change of 0. Figure 4 shows the recorded psychological assessments taken using the 0-10 psychological assessment scale shown in Figure 1, before and after each exercise session. Figure 5 indicates the distribution of mood changes overall as a percentage of the total surveyable population.

**Figure 2**

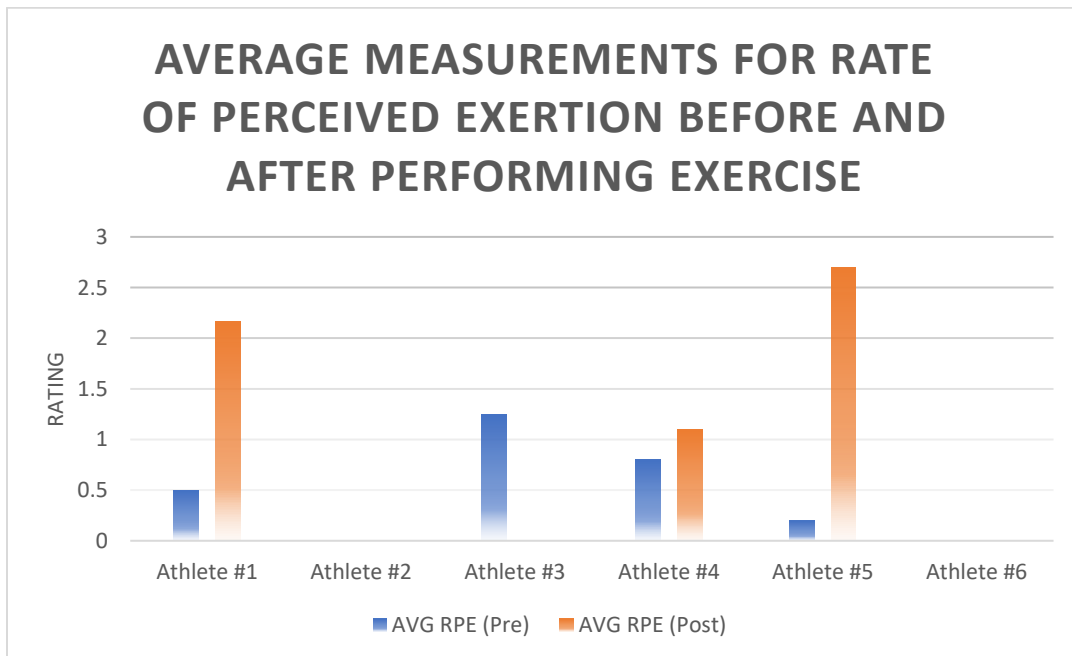
*Average Changes in RPE*

UNO Unified Fitness Athletes Average Changes in RPE and Mood Over 5-week Survey Period			
Participant	Avg Change in RPE	Avg Change in Psych State	Total Sessions
#1	-1.67	-0.17	6
#2	0	0	10
#3	-0.75	0.5	4
#4	-0.5	1.2	10
#5	-2.5	1.7	10
#6	0	3	1
<b>Overall</b>	<b>-0.90</b>	<b>1.04</b>	<b>~7</b>

*Note.* Figure 2 reports the average RPE and mood changes from the 5-week survey period.

**Figure 3**

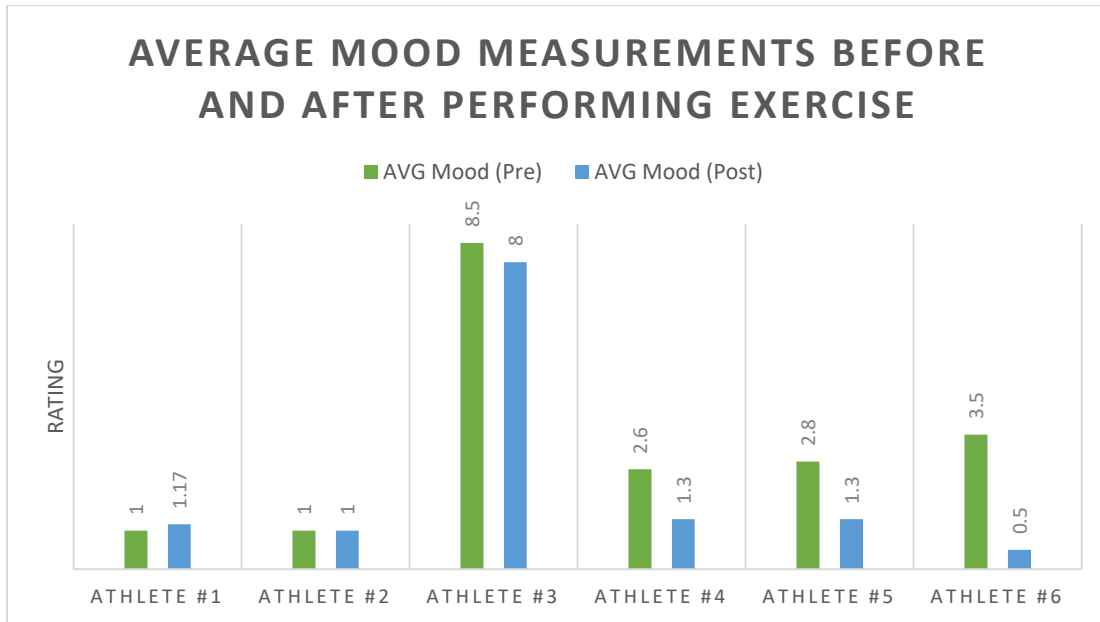
*RPE Before and After Exercise*



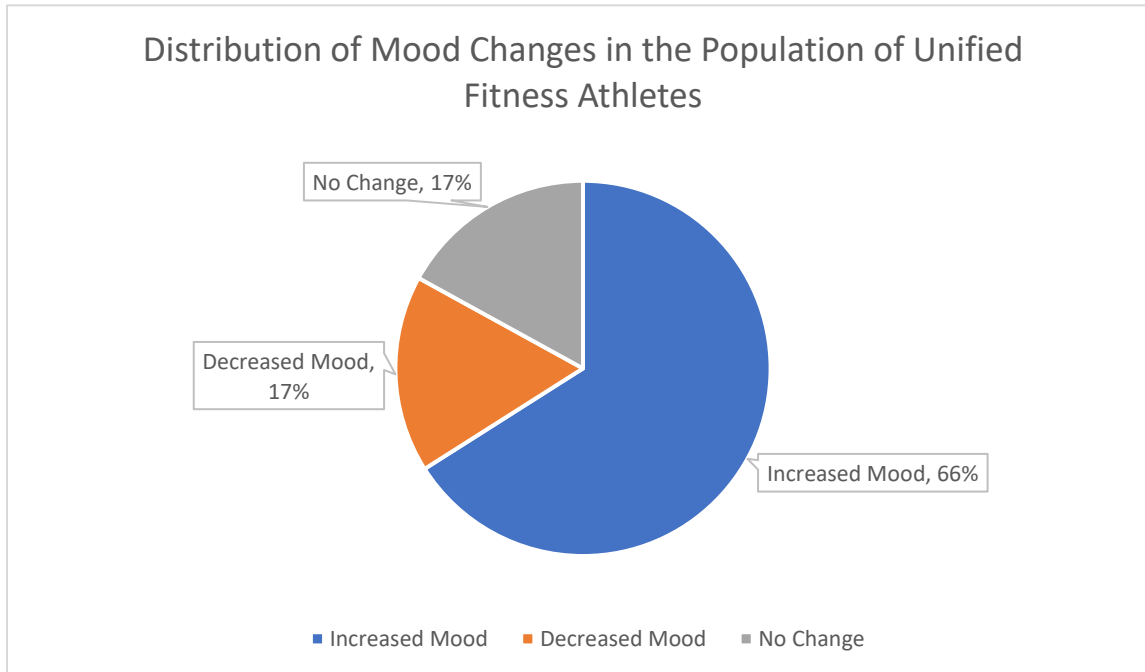
*Note.* Figure 3 reports the results of the Unified Fitness athlete's averages for self-reported RPE before and after exercise.

**Figure 4**

*Average Mood Measurement Pre and Post Exercise*



*Note.* Figure 4 reports the UNO Unified Fitness athlete's averages of self-reported mood before and after each exercise session.

**Figure 5***Mood Changes*

*Note.* Figure 5 reports the distribution of mood changes within the surveyed population of UNO Unified Fitness athletes.

**Discussion**

Research on average populations suggests that consistent exercise can have an inverse effect on feelings of depression. Consistent exercise has been shown to be as effective towards reducing the symptoms of Major Depressive Disorder (MDD) than pharmaceutical intervention (Blumenthal et al., 2009). However, while the relationship between exercise and depression has been heavily researched in average populations, significant studies have yet to be undertaken to analyze this relationship for people on the spectrum. The goal of this study was to assess the extent of the inverse relationship between exercise and depression and determine whether the relationship observed in average populations translates to individuals on the autism spectrum.

The data shown in Figure 5 shows that 66% of Unified Athletes who participated in consistent exercise tended to have an increased mood after each session. The average increase in mood quality among all Unified athletes after the 5-week survey period was calculated to be 1.04, shown in Figure 2.

The effect of RPEs magnification on the antidepressive effects of exercise can be observed in the data of Athlete #5 (see Figure 2). Athlete #5 had the largest average RPE change amongst all other participants, while similarly having the largest positive change in mood after the 10 sessions of exercise. Athlete #5 demonstrated perfect attendance at all 10 exercise sessions, emphasizing the importance of consistency in achieving maximum benefits from exercise. The overall data from this population supports the idea that consistent exercise, particularly at an increased intensity, can be effective in reducing feelings of depression for individuals on the spectrum.

### **Limitations**

The largest limitation of this effort to measure depression's effect on the Unified Fitness athletes was subject absences. Throughout the 30 days of observation, only 50% of the Unified Athletes attended all the 10 observed exercise sessions while 17% attended only 1. This low rate of attendance overall lowers the sophistication of the data and reduces the quality of the conclusions drawn from it as a result.

### **Conclusion**

In summary, this research substantiates the notion that individuals on the spectrum, when compared to average populations, derive positive psychological benefits from consistent exercise. Specifically, 66% of the Unified Fitness Athletes who participated in the study

reported, on average, a 1.04 increase in mood post-exercise compared to their pre-exercise measurements. While exercise may not be the sole factor contributing to the athletes' elevated mood, the consistent improvement in mood quality after exercise strongly suggests a positive correlation between the two variables.

Evaluating the feasibility of using exercise as a means of mitigating the symptoms of depression for people on the spectrum is crucial due to their increased susceptibility to depressive symptoms. Research has suggested that people diagnosed with autism are at an increased risk for self-harming behaviors such as loss of appetite, sleep disturbance, and social withdrawal. This is largely attributed to the higher probability for people on the spectrum to be ostracized socially by their peers and have impaired forms of communication (Stewart et al., 2006). To ensure people on the spectrum have an equal opportunity towards having a high quality of life, research must be conducted to equally evaluate the possible benefits of consistent exercise as a means of reducing depression for an increasingly susceptible population.

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