Effects of Aerobic and Mental Exercises on College Students' Stress

By Ashley Lorah

A capstone project submitted in partial fulfillment of graduating from the Academic Honors Program at Ashland University May 2016

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The goal of this study was to determine whether aerobic and mental exercise would have a statistically significant effect on reducing stress in college-aged non-athlete students. The data were collected from 25 undergraduate students at a private university in Ohio. The results were analyzed to determine if significant differences existed between the aerobic, mental and control groups. The study found that there were no statistically significant differences among the three groups.
INTRODUCTION

Much pressure is placed on college students. A study at the University of Basel found that in recent years high levels of stress fell on younger Americans, specifically university students, causing burnout (Gerber, Brand, Elliot, Holsboer-Traschsler & Pühse, 2014). Pupils may feel pressure to perform well in school and sports, get a good job or internship, take leadership roles in clubs, have successful friendly and romantic relationships and fit in with pop culture. One study reported that 60% of students ranked their stress levels as high or very high and another shows that students are experiencing unacceptable levels of stress (Nguyen-Michel, Unger, Hamilton & Spruijt-Metz, 2006). Students can feel these pressures from peers, parents, siblings, professors, and themselves. The transitional nature of college is especially challenging as youths are adjusting to living away from family and home for the first time, a different social scene and environment and higher academic standards (Arazi, Benar, Esfanjani, & Yeganegi, 2012; Ross, Niebling, & Heckert, 1999).

Stress can lead students to take drastic actions. According to the Suicide Prevention Resource Center, suicide is one of the leading causes of death among college-aged students and is a major worry for universities (Reed, 2014). Risk factors may increase, alter, or become more apparent during college years. They include behavioral issues like depressive disorders, substance abuse, anxiety and eating disorders. Researchers have found a direct relationship between anxiety, depression, and stress (Arazi, et al., 2012). Adverse or stressful life circumstances like school, work or financial problems can also be risk factors
(Reed, 2014). These are all factors that could alter drastically in making the leap from high school to college and can be difficult for students to cope with properly.

A less drastic alternative to dealing with stress but wildly prevalent and potentially dangerous is drinking alcohol. Research states that students turn to drinking in an attempt to cope with a stressor but that this action is particularly dangerous because it demonstrates an inability to properly handle stress (Kenney, Paves, Grimaldi, & LaBrie, 2014). Stress in higher education students derives from “new time demands, greater workload, financial strains and examinations” (Magrys & Olmstead, 2015). College students often engage in binge drinking, five or more drinks on a single occasion. This can lead to a wide array of consequences like poor academics, strained relationships with peers and family, and related injuries like motor vehicle accidents (Bodenlos, Noonan, & Wells, 2013). Finding alternative ways to relieve stress may decrease the negative consequences that accompany binge drinking in college students.

One study found that “prolonged stress is an important risk factor for depression, anxiety, drug addiction, cardiovascular disease, ulcers and cancer (Stankeiwicz, Goscik, Majewska, Swiergiel & Juszczak, 2015, p. 1). The potential harm stress can cause leads scholars to study it in depth and determine ways to reduce, prevent, and alleviate stress. This study will look at it whether working out physically and mentally has significant impact in reducing stress among college students. It is imperative for college-aged students to develop healthy and effective ways to deal with stress. Those participating in health-related activities are more likely to continue those throughout life as an adult and it would
be beneficial to develop successful stress-reduction habits while young (Spivey & Hritz, 2013).

**REVIEW OF LITERATURE**

*Stress*

Stress is defined as “the pattern of specific and nonspecific responses an organism makes to stimulus events that disturb its equilibrium and tax or exceed its ability to cope” (Gerrig & Zimbardo, 2002, p. 243). Other people, unexpected events, the anticipation of upcoming occasions, and more can cause stress. Stress is an ordinary part of life but can become dangerous when it impedes the capability of living a normal life over a long period of time.

The General Adaptation Syndrome (GAS) is a concept created by Hans Selye to describe the body’s reaction to short- and long-term stress disrupting homeostasis (Lucille, 2014). GAS is divided into three stages the body undergoes when faced with stress as seen in Figure 1. The line in the figure represents the physical capabilities of the subject undergoing stress.

*Figure 1.*
The first stage is the alarm stage when someone is immediately reacting to a stressor with a fight or flight reaction. The person decides whether to fight the stressor or flee the problem. In the second stage, the resistance stage, the body adjusts internally to the stress in order to reduce the effects of the stressor and find homeostasis (Lucille, 2014). Finally, the third stage, the exhaustion stage, occurs after a longer amount of time. At this point in time, the person has either confronted the stressor or given up. It is at this time that the body, mainly the immune system, is almost completely broken down from the stressor and becomes more susceptible to disease and illness (Lucille, 2014). A larger amount of stressors and improper coping methods can drive people to depend on alcohol or resort to suicide.

There are two forms of stress: acute and chronic. Acute stress can be characterized as episodic stress that results from recent events, past, present, and future (Hammen, Kim, Eberhart, & Brennan, 2009). A fast run down a ski slope or the hours leading up to a big presentation are examples of acute stress. Chronic stress can be identified as an ongoing environmental condition and/or a stressor that leaves an enduring impact (APA, 2016a). Marital issues, parent-child discord, serious illnesses, and poverty are examples of this long-term stress (Hammen, et al., 2009).

People may recognize the short-term impacts stress has on their physical and mental health like loss of sleep, the inability to focus, shortened temper, among others. However, society might not necessarily realize the long-term
effects stress can have and therefore do not take proper precautionary actions to prevent any long-term damage.

The various systems in the body each react to stress differently. Muscles tense up when someone is stressed and over a long time can lead to headaches and migraines. Typically not a problem, increased breathing during stressful periods can be difficult for those with asthma or a lung disease (APA, 2016b). Acute stress can cause momentary increased blood pressure due to constricted blood vessels and overtime those constricted blood vessels can lead to hypertension, a heart attack or stroke (APA, 2016b). For those with Type 2 diabetes, stress can be dangerous because the release of the catecholamines, besides increasing heart rate, blood pressure, and breathing rate cause the liver to produce more glucose and if not all of the glucose is used for energy, the body won’t be able to reabsorb it like a normal person could (APA, 2016b).

Stress can have various effects on the gastrointestinal system. Under stress, people can over or under eat. Some people smoke or increase alcohol intake. These changes can lead to heartburn or acid reflux (APA, 2016b). If the stress is severe enough, nausea and vomiting may occur and one may also develop ulcers. Since stress affects gastric motility, people under a lot of stress can find themselves with diarrhea or constipation (APA, 2016b).

People with depression or obesity reported significantly higher average stress levels than those who don’t have depression or obesity (APA, 2012). It was found that obesity and depression are also intensified by stress. For people with depression and obesity, methods of alleviating stress by watching TV or
eating are harmful to the situation and do not end up easing stress (APA, 2012). While short-term stress causes the body to enter a momentarily harmless fight or flight stage, over a long period of time the body can become worn due to continual activation of the nervous system (APA, 2016b).

In America, stress is caused by various factors. The most prevalent factor is money followed by work, the economy, relationships, familial responsibilities, family health problems, personal health concerns, job stability, housing costs, and personal safety (APA, 2012). Every one of these factors is something college students can relate to. It is imperative to develop healthy stress-reducing habits while students are young so they can use those practices throughout the rest of their lives.

*Physical Activity*

While students are working to earn money to pay for tuition, maintain good grades and preserve a social life, they discover the need to remove unnecessary parts from their busy schedule and physical activity is usually the first to go.

The American College of Sports Medicine (ACSM) published guidelines in 2011 recommending certain frequency, intensity, times and type of workouts for cardiorespiratory exercise. ACSM recommends five or more days a week for moderate intensity or three or more days a week for vigorous intensity (Kravitz, 2011). The exercises should be “purposeful, continuous, rhythmic exercise involving the body’s major muscle groups” and 30-60 minutes is recommended...
for moderate intensity and 20-60 minutes for vigorous exercise (Kravitz, 2011, p.19).

Studies examining physical activity levels of students attending a 2-year community college reported, “only one fifth [of students] were meeting the minimum guidelines for physical activity” (Young, Sturts & Ross, 2015; Nguyen-Michel, et al., 2006). This reiterates the earlier point that students usually cut out exercise from the schedule if they even included it in the first place at all. While physical activity encompasses both aerobic and anaerobic training, this study only explored the effects of aerobic activity.

Mental Activity

College students regularly face mental strain through hours of internships, homework and studying for tests. Although students already engage in a lot of mental exercise, they can find ways to use their brain to reduce stress. Within the past decade, mindfulness-based stress reduction (MBSR) programs have been implemented into grade schools with positive results on students’ academic performance and well-being (Bennett & Dorjee, 2016).

Additionally, yoga is a type of calming physical activity that combines body poses with meditation and controlled breathing. This activity has been used to manage symptoms and risk factors for diseases like “cancer, diabetes, hypertension, cardiovascular disease and AIDS” (Agarwal, Kumar, & Lewis, 2015, p. 153).
MATERIALS AND METHODS

Sample

Participants were 22 college students from Ashland University, a private school in Ashland, Ohio. 25 students took the preliminary surveys, but 22 (88%) completed the whole study. The three students who dropped out did not give reasons why they did not complete the study. Students were a mix of all class levels. There were nine seniors, four juniors, four sophomores and five freshmen. Five males and 17 females participated.

Student recruitment and procedures

To gain student participation, emails were sent to 44 clubs, sororities/fraternities and educational groups on Ashland’s campus. Those who were interested were to email the researcher who would follow up with further information about initial meeting times. Exercise science professors also offered to advertise the opportunity to their classes and one proposed extra credit to those who completed the study. Students had five weeks to sign up for the study from the day the initial email was sent to club presidents and exercise science professors. There is no way to determine the number of students who received the email, besides the club presidents, so there is no way to determine the response rate.

For those who participated, questionnaires were administered with paper and pencil. Approval to begin this project was given by Ashland University’s Human Subjects Review Board (Appendix A). Volunteers were required to
complete the preliminary survey, complete the six-week study, and complete a post-survey. The six-week study required two of the three groups, the aerobic and mental exercise groups, to dedicate one hour each week to either complete aerobic or mental exercise depending on the assigned group. The third group, the control group, did not have any responsibilities for the study during the six weeks except to continue life as usual.

Questionnaire.

The 10-question Perceived Stress Questionnaire (Appendix B) by Dr. Sheldon Cohen was used to assess student stress. The survey and analysis information is public domain for nonprofit academic purposes online. The questions were designed to determine how unpredictable, uncontrollable and overloaded respondents felt. Perceived Stress Questionnaire (PSQ) scores are obtained by adding the answers, ranging from zero to four together from each of the 10 questions. Four of the questions’ answers are reversed. To reverse the scores, one takes the opposite from zero to four, e.g. 0 to 4, 1 to 3, 2 to 2. The answers to numbers four, five, seven, and eight are reversed. A higher score is representative of more stress. More specifically below 13 is considered low stress. A score of 13-20 is average. A score above 20 is representative of high stress.

Participants were asked to complete a questionnaire that assessed their current physical and mental exercise practices (Appendix C). The questions gathered information about what physical and mental exercises participants
currently participated in, how often and how long they exercise physically. The purpose was to see whether there were any trends among students.

The control group only had three respondents record that they regularly lift weights. The rest listed sports they casually participate in like basketball, ultimate Frisbee, and volleyball. Only one person listed participating in group exercise classes. Every person said they run except one. The frequency of workouts per week ranged from two days to six days. The average was four days a week. Respondents noted workouts lasting from five minutes to two hours at the most. A majority listed that they worked out for around one hour at moderate to high intensity. As far as mental exercises, most people listed none but a few listed activities like Sudoku puzzles, “puzzle games,” and lateral thinking puzzles.

The aerobic exercise group listed more cardio activities like walking, biking, running, swimming, and hiking. One person said they participated in IM sports and two others indicated lifting weights. The range for how often this group worked out was much smaller than the control group. The average for this group was only two days per week. This group listed workouts lasting from 30 minutes to one hour at mostly a moderate intensity. The mental exercises remained similar to the first group: Sudoku, crossword puzzles, brain games and riddles.

Finally, the mental exercise group listed a plethora of sports from soccer, basketball, football, and floor hockey. People recorded participating in group exercise classes and lifting weights. Only a few people in this group listed running. The average frequency of working out was four days per week. Almost everyone recorded moderate intensity, with a few listing moderate to high
intensity, and one listing low intensity. The only mental activities students in this group listed were word games and “puzzles in video games.” In every group, students listed reading as an activity for mental health, but to eliminate the variable of schoolbooks being included, reading was not included in the observations.

Division of Groups.

To eliminate outside factors, participants were randomly assigned to one of the three groups. In the order volunteers signed up, they were put on a list beginning with one and increasing to 30. Each independent variable was labeled: the control group was the first group, the second was the aerobic group and the third was the mental exercise group. Using randomlists.com, the list of participants was divided into three groups by entering the number of participants and the number of desired groups.

Explanation of Responsibilities.

The list of volunteers was emailed with dates and times for three preliminary informational sessions. At each session, students first answered a questionnaire about current mental and physical exercise they perform. Students then signed a contract (Appendix D) and had the option to receive a scanned copy via email if desired.
Finally, students filled out the PSQ. After everyone finished this, students were assigned groups and informed about the timeline for when the study would start, finish and the final PSQ would be administered.

_Aerobic Activity._

Participants were given a sheet with aerobic exercise opportunities at the Ashland University Recreation Center (Appendix E). This included hours the pool was open, a list of the cardio machines like elliptical, StairMaster®, bikes and rowers. A list of the fall 2015 group exercise cardio classes was provided including cycling, Zumba® and HIIT. Other suggestions included jump roping, using the punching bag, and following the local running route cards at the Customer Service desk.

Aerobic activity was measured using time and heart rate. Participants were asked to complete one extra hour of aerobic activity each week for six weeks. The time for this activity could be split up during the week but just had to add up to 60 minutes. Participants were expected to maintain a moderate heart rate between 50% and 75% of their age predicted maximal heart rates. This was determined by subtracting the participant’s age from 220 then multiplying the difference by 0.5 to find the lower number in the range and 0.75 to find the higher number in the range of acceptable heart rates. Each student received guidance at the explanation sessions to determine their personal range and there were instructions at the top of the opportunity page as a reminder. To monitor their heart rate, they were advised to use the silver grips on all cardio machines at the
Rec. They could also find their pulse at their wrist or neck and count how many beats they felt per minute.

*Mental Activity.*

Volunteers were given suggestions and general guidelines for their mental health exercises (Appendix F). This list included Android and iOS applications: Lumosity, Brain Trainer Special, and Fit Brains by Rosetta Stone®. Lumosity gets a baseline score after a user takes the Fit Test comprised of brain games then compares the results to others in the same age range. The Fit Test evaluates speed, attention and memory. From this baseline, Lumosity provides daily workouts to challenge five core cognitive abilities (speed, memory, attention, flexibility and problem solving) and adjusts the difficulty to the user’s developing skills. Brain Trainer contains 26 games relating to math, memory, concentration, speed, observation and more. Fit Brains is an application created by Rosetta Stone® that helps hone skills like memory, concentration, problem-solving, processing speed, language and visual-spatial recognition. The guideline sheet also specified when yoga was hosted at the Rec and other keywords students could type into YouTube to find stress-reducing videos. Mental activity was only measured by time. Students were required to complete an hour over the course of a week each week for six weeks. Participants could break up the sixty minutes amongst days throughout the week.
Descriptive Statistics

Statistical Package for the Social Sciences (SPSS) was used to analyze results and present descriptive statistics. 1.00 represents the control group. 2.00 represents the mental exercise group. 3.00 represents the aerobic exercise group. Table 1 displays the minimum and maximum results from the pre and post-test for each group. The lowest pre-test score for the entire sample was 6 and the highest was 30. The lowest for the post-test score was 7 and 29.

Table 1. Pre and Post Test Ranges

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The mean, standard deviation, median, and mode were determined for each group in the pre- and post-tests but also for the loss data. This information was gathered using SPSS and is listed in Table 2.
Table 2. Descriptive Statistics for Loss Data

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**RESULTS**

The tests run were based on data called loss. The losses were the difference from subtracting the post-test score from the pre-test score. A higher positive loss was an optimistic result because it meant that there was a larger gap between the pre-test and the post-test, signifying a reduction in stress.
A test of homogeneity of variances was run to determine if the variances were equal. The p-value was 0.207. Since it was above $\alpha=0.05$, the variances are most likely similar.

The results from a one-way ANOVA indicated that there were no significant differences found between the losses of any groups, $F = 2.844$, $p = 0.083$ as seen in Table 3. Table 4 displays the pre-test, post-test and loss data. Participant numbers 17, 24 and 25 did not complete the study and therefore only have a value for the pre-test column. The highest score available for the test is 40, which represents the highest level of stress and the lowest is 0, representing the least amount of stress.
Table 4. *Pre-Test, Post-Test and Loss Scores for PSQ*

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For the pre-test, students were categorized into the three different groups of stress they fell under. Eight percent of students scored below 13 meaning they had low stress. 48% of students scored between 13 and 20, meaning they were under moderate stress. Finally, 44% scored above 20, which meant they experienced high stress. The same action was taken for the post-test results. About 41% scored below 13, having low stress. 32% scored between 13 and 20 meaning they had moderate stress levels. 27% scored above 20, meaning they experienced high stress.

**DISCUSSION**

This study sought to determine whether aerobic and mental activity would cause a significant decrease in stress levels among college students. Results from the study indicated there were no statistically significant effects of aerobic or mental activity for students.

A few observations can be made about the numerical differences between the pre- and post-tests. The percentage of students in the lowest score range increased from eight for the pre-test to 41% for the post-test. This meant more students said they experienced less stress after the six weeks. The PSQ scores above 20 fell from 44% to 27%. This meant less people felt highly stressed after the six weeks.

In interpreting the results of this study, limitations must be acknowledged. Only 25 students participated meaning each of the three groups only averaged about eight people. The sample size was small. A larger sample size should be
used to provide stronger results. A larger will be more accurately representative of the whole population. Two separate studies could be held, one per semester, in order to provide more opportunities for students. The study could be held earlier in the semester to allow students longer to participate in the exercises. Increased exercise duration, and therefore more exposure to aerobic and mental exercise, may affect students’ stress levels differently.

When dividing the groups up, no attention was given to the number of males or females within a group although there were more men than women. One study claimed that women are more vulnerable to stress than men (Arazi, et al., 2012). This could have implications on the effects women experience versus those men experience. With a larger sample size, a researcher could also break down the groups to assess whether gender has a significant effect on reducing stress. One study claimed that the health benefits derived from aerobic activity may differ among men and women (Kravitz, 2011).

In addition, the duration of the study was brief. Semesters are around 16 weeks. About three to four weeks were needed to create, revise, and finalize the Human Subjects Review Board application. Two weeks were needed to recruit participants via email and word-of-mouth. Two weeks were used to schedule and host education sessions informing students of the requirements of the study. Six weeks was selected for the study because it was the longest amount of time before the study would have been strongly affected by holiday breaks or finals. One week was required at the end to have students fill out the final questionnaire.
Another limitation would be that adherence to the six-week program was based on self-report. Students met with the researcher once at the beginning of the six weeks and then were responsible for completing their assignments on the honor system. Participants did not need to record any activity with the researcher. In the future, it is recommended to require students to record weekly exercise with a Google Doc or email to the administrator of the study. Information gathered could include the specific activity completed, duration, date, and time. For the aerobic activity group, students could also be required to record heart rate during exercise to make sure participants are reaching the correct levels each time.

Furthermore, people in the cardio and mental exercise group could be performing different activities than those in the same group. For example, one person in the cardio group could have walked briskly while another one was performing High Intensity Interval Training. Each type of exercise benefits the heart but could have outside factors like time, intensity, the person’s physical ability and whether they enjoy the exercise or not. Requiring the same exercises could have eliminated this variable. Limiting or monitoring the types of aerobic and mental exercises participants partake in can eliminate any variability concerning different exercises.

Finally, the college culture’s propensity for a healthier lifestyle might not accurately represent the entire population. The AU Rec Center is a key department on campus in terms of employment and entertainment purposes. On Ashland’s campus and college campuses in general, it might be the norm for this
demographic to workout often and therefore these results might accurately represent the rest of society. To loss a truer result, citizens from around town could be recruited instead of just college students. A wider variety of participants may present truer data that is not affected by the propensity of college students to work out habitually.
REFERENCES


American Psychological Association. (2016a). *Stress: the different kinds of stress. Adapted from The Stress Solution by Miller L. H and Smith, A. D.*


Reed, J. (2014). *Suicide among college and university students in the United States.* Waltham, MA: Education Development Center, Inc.


APPENDIX A

TO: Ashley Lorah and Dr. Glen Fincher
FROM: Chris Chartier, HSRB Chair
DATE: September 30, 2015
SUBJECT: Human Subjects Review Board Approval
PROJECT TITLE: Examination of the Impacts of Aerobic and Mental Exercises
HSRB APPROVAL CODE: 09-22-15-#017

The Human Subjects Review Board has approved your research study. You may proceed with the study as you have outlined in your proposal. The approval is granted for one calendar year. Research participant interaction and/or data collection is to cease at this time, unless application for extension has been submitted and approval for continuance is obtained.

The primary role of the HSRB is to ensure the protection of human research participants. As a result of this mandate, we ask that you adhere to the ethical principles of autonomy, justice, and beneficence. We would also like to remind you of your responsibility to report any violation to participant protections immediately upon discovery. Likewise, we would like to remind you that any alteration to the research proposal as it was approved cannot move forward. Any amendment to the application must be submitted for approval before the project can resume.

We wish you success in your discoveries,

Doctor Chris Chartier
Ashland University
Chair Human Subjects Review Board
INSTRUCTIONS:

The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, please indicate your response by placing an “X” over the circle representing HOW OFTEN you felt or thought a certain way.

<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Almost</th>
<th>Sometimes</th>
<th>Fairly</th>
<th>Very</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In the last month, how often have you been upset because of something that happened unexpectedly?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. In the last month, how often have you felt that you were unable to control the important things in your life?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. In the last month, how often have you felt nervous and “stressed”?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. In the last month, how often have you felt confident about your ability to handle your personal problems?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. In the last month, how often have you felt that things were going your way?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. In the last month, how often have you found that you could not cope with all the things that you had to do?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. In the last month, how often have you been able to control irritations in your life?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8. In the last month, how often have you felt that you were on top of things?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. In the last month, how often have you been angered because of things that were outside your control?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
APPENDIX C

What activities, if anything, do you typically do to exercise your physical health?

How often do you workout per week?

How long do you usually work out at a time? Is it usually low, moderate or high intensity?

What activities, if anything, do you typically do to exercise your mental health besides schoolwork?
APPENDIX D

Ashley Lorah’s Honors Program Capstone Project Agreement

Please review the following terms carefully.

**Purpose of the project:** To successfully complete the Honors Program at Ashland University, students must complete a Capstone Project similar to a graduate thesis. This requirement serves to challenge students to apply the skills of inquiry, discovery, and critical thinking for a project within their discipline. Ashley’s project seeks to determine which of the chosen methods of stress relief will decrease stress the most over a six-week period as measured by Perceived Stress Scale.

**Rough Guidelines:** All participants will be required to take a written evaluation before and after the six-week period to determine their stress levels. During the six-week period, each of the three groups will have different requirements. The control group will not have any instructions but will just carry on with their lives. One group will perform one extra hour of cardio each week on top of what they normally do, choosing from a pre-determined list of exercises. The final group will perform one extra hour of mental exercises on top of their normal schedule, choosing from a pre-determined list of exercises. Further instruction will be given to each of the three groups after they sign the agreements.

**Time Required:** Only one extra hour each week

**Risks to Participants:** If a participant typically works out on a regular basis, they are at risk of overtraining.

**Benefits to Participants:** Participants will receive guidelines for mental and aerobic exercises and will hear the results of the project.

**Random Assignment:** To eliminate variables, participants will not be allowed to choose which of the three groups. Ashley will assign them randomly.

**Modification of Terms:** Ashley Lorah reserves the right to change or modify these Terms of any policy or guidelines of the experiment at any time or from time to time on a going-forward basis.

**Voluntary Participation:** Your participation in this study is completely voluntary. There will not be any penalty if you decide not to participate but should notify Ashley immediately if you choose to withdraw yourself.

**Agreement:** I agree to participate in the studies outlined above.

Your Name [printed] __________________________________________________________

Your Signature ___________________________ Date: ___________
Aerobic Exercise Opportunities at the Rec

*One hour per week for 6 weeks*
*Can be divided up between different days throughout the week*
*Stay between 50-75% of your maximum heart rate*
*Maximum heart rate = 220 - age*
*50% = (220-age) x 0.5*
*75% = (220-age) x 0.75*

Rec Hours
Monday-Friday 6am-10pm
Saturday 12-10pm
Sunday 1-10pm

Don’t forget to warm up. Slower pace of whatever you’re planning to do.

Swimming
Pool Hours
Monday-Thursday 11am-2pm/6-10pm
Friday 11am-2pm/6-9pm
Saturday 12-9pm
Sunday 2-9pm

Running/Jogging/Walking
Treadmill or track
1 mile is 9 laps

Elliptical/Stairmaster/Bikes/Rowers

Group X Cardio Classes
Cycling: Monday 4pm
Zumba: Monday 7:15pm
HIIT: Tuesday 5:15-5:45pm
Kickboxing: Tuesday 6:15pm
Cycling: Wednesday 5:15pm
HIIT: Wednesday 6:15pm

Jump Roping     Stairs     Punching bag

Front desk at the Rec has cards that give running routes around Ashland
**APPENDIX F**

**Mental Health Opportunities**

*one hour per week for 6 weeks*
*can be divided up between different days throughout the week*

**Lumosity**
- Free app or online lumosity.com
- 5 games in each daily workout
- 15 minutes per day

**Brain Trainer Special**
- Android app
- Free

**Fit Brains Trainer**
- Free for iOS

**Yoga**
- Rec Thursday 5:15pm

**Youtube keywords**
- meditation
- yoga
- stress relief
AUTHOR BIOGRAPHY

Ashley Lorah was born in Allentown, Pennsylvania on February 3, 1994. She grew up in Allentown, graduating from Parkland High School in 2012. At Ashland University, Ashley is majoring in exercise science with a minor in sport management. She's a member of Alpha Delta Pi sorority, Alpha Lambda Delta Honoray, Alpha Gamma Omega Nu Honoray, Omicron Delta Kappa Honoray, and Rho Lambda Honoray. She was also recognized with the Who's Who Among Students and earned Dean's List seven semesters.

Upon graduation, Ashley will be moving to Columbus, Ohio to study Sport Management at The Ohio State University while working with the Department of Recreational Sports as a Facility Operations and Special Events Graduate Administrative Assistant.