

5-2021

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Keali Mari
kmari@unomaha.edu

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Recommended Citation

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The Study of High Intensity Interval Training's Effect on Enjoyment

IRB # 110-20-EX

Keali Mari

Honors Program

Abstract

This study assessed participant's level of enjoyment in high-intensity training over moderate intensity-training. High intensity interval training is defined as short bouts of exercise performed at a near-maximal effort with rest periods or light activity in between. High intensity interval training involves repeatedly exercising at a high intensity for 30 seconds to several minutes, separated by 1-5 minutes of recovery. This type of exercise has sparked the interest of many active people due to its decreased time commitment and the benefits it elicits. The results of this study show that high intensity interval training induces a higher enjoyment rate pre- and post-exercise and post-exercise self-benefit when compared to moderate intensity training.

Introduction

The aim of this study was to examine the level of recreationally active participants enjoyment in high intensity interval training (HITT) versus moderate intensity training. There have been extensive studies on the impact and health effects of participation in high intensity interval training however, there is limited research investigating the psychological aspects of this training. Within the last ten years, HIIT has flared in the interest of participants because of the various benefits that it elicits such as its time efficiency and augmenting health and wellness (Kilpatrick et al., 2015). The increased interest over the last decade in HITT has intrigued researchers regarding the health benefits (Thum et al., 2017). The posed question today is if high intensity exercise elicits a higher enjoyment and self-benefit feeling when compared to moderate intensity exercise.

This study examined, through a nine-item survey, fifty participant's enjoyment and adherence to exercise in HITT classes offered at the University of Nebraska Omaha's (UNO) Health and Kinesiology department. The researcher's hypothesis was that high intensity interval training would elicit a higher enjoyment and adherence rate when compared to moderate intensity training. The null hypothesis indicated that there was no difference between enjoyment and self-benefit of high intensity exercise and moderate intensity exercise. There are a few limitations when looking at previous research to compare to this topic. The first being a lack of previous studies done over high intensity interval training's effect on enjoyment. This causes abnormalities or to be overemphasized as there isn't enough average data collected. The second limitation is the small number of survey sample size in the study completed. There could easily be a skew in the data due to the limited sample size.

Background Information

Physical activity can be defined as a movement that produces a contraction of skeletal muscles (Wolters Kluwer, 2018). Exercise is defined as a type of physical activity that is planned and done with body movements that are repeated to improve or maintain physical fitness (Wolters Kluwer, 2018). Physical fitness is then defined as being able to carry out daily tasks with vigor, without fatigue, and ample energy (Wolters Kluwer, 2018). The American College of Sports Medicine (ACSM) guidelines state that healthy adults should be participating in 150+ minutes of moderate-intensity or 75+ minutes of vigorous-intensity aerobic physical activity each week (Heinrich et al., 2014; Wolters Kluwer, 2018). In addition to aerobic physical activity, adults should be performing resistance exercises at least 2 days a week to maintain or increase muscular strength and endurance (Heinrich et al., 2014; Wolters Kluwer, 2018). There can be different combinations of these recommendations to fit the needed weekly requirement to promote an individual's overall health. However, researchers have noted that few adults actually reach this recommendation even though there are numerous types of exercises other than the regular lifting or running to reach the recommended activity guidelines (Heinrich et al., 2014).

Metabolic equivalent (MET) is a standardized way to describe the intensity of many different physical activities (Wolters Kluwer, 2018). Metabolic equivalent is the amount of oxygen used by a person during rest or exercise. To have a reference, 1 MET would be described as the amount of oxygen and calories burned when a person is at rest. A light intensity workout would require 2.0-2.9 METS, moderate would require 3.0-5.9 METS, and vigorous would be ≥ 6.0 METS (Wolters Kluwer, 2018). For example, a type of exercise or activity that would be considered moderate exercise is walking at 3.0 miles per hour, golfing, or shooting a basketball around leisurely (Wolters Kluwer, 2018). Examples of exercises or activities that would be

considered vigorous exercise are walking, jogging, or running greater than 4.5 miles per hour, playing a basketball game, swimming or performing a high intensity interval workout (Wolters Kluwer, 2018). MET values and exercises can range from person to person depending on their physical fitness level, these are just standardized values for the average healthy individual.

High-intensity interval training (HIIT) is described as short bouts of exercise performed at a near-maximal effort with rest periods or light activity in between. HIIT is modeled after the Wingate anaerobic test, which is 30 seconds of “all-out” cycling against a high workload. During the original Wingate test, subjects pedaled against the high workload of 0.075 kilo-pounds (seventy-five pounds) per kilogram of body weight. High intensity interval training can be performed in many different ways. The most common approach is completed by performing 10-minute intervals of 60-second bouts of exercise at about 90% of the person’s peak aerobic work (Kilpatrick et al., 2015). These bouts are then intertwined with 60-seconds of rest or light activity to recover (Kilpatrick et al., 2015). Since this type of exercise is high intensity, typically the workout only lasts between 20-30 minutes total. There are many benefits of performing HIIT workouts and numerous studies have researched its various health benefits (i.e. increased aerobic capacity, increased fat metabolism, more calories burned in a short amount of time)

Literature Review

Research has noted that twenty percent of people in the United States meet the ACSM and the Center for Disease Control guidelines for activity per week (Wolters Kluwer, 2018). This statistic is of grave concern as sixty percent of the population in the United States has been categorized as overweight or obese (Wolters Kluwer, 2018). Many excuses are made for not working out (i.e., not having enough time, energy, limited enjoyment, etc.). Many people will go as far as creating a plan to workout, but often do not end up adhering to the plan.

Lack of Time

Researchers have determined that “lack of time” is the most common excuse for not participating in exercise daily (Frazão et al., 2016; Thum et al., 2017; Kilpatrick et al., 2015; Heinrich et al., 2014). It has been hypothesized that high intensity-interval training could show positive results in affective response when compared to moderate intensity exercise (Oliveira et al., 2018). Researchers have noted that participation in HITT workouts, due to shorter time commitment, elicit a post-exercise feeling of accomplishment. Although, some participants may see the side-effects like shortness of breath and fatigue that come along with a high-intensity workout to be a turnoff when considering what type of exercise session to choose (Thum et al., 2017). Research conducted by Frazão et al. (2016) has noted that there is a need to create a time-efficient exercise action soon to decrease sedentary people and convert them into active individuals.

Adherence

According to Thum et al. (2017), within the first six months of starting an exercise regimen, roughly fifty percent of individuals will drop out of the program. Adherence to an exercise routine is an area many people struggle with. Studies have shown that when people feel enjoyment from exercise, it mediates and gives them a stronger reason to continue to participate (Ekkekakis et al., 2011). This can be supported by the Hedonic theory that suggests people do things that will give them the most pleasure and avoid things that cause them pain or displeasure (Kilpatrick et al., 2015). Knowledge of exercise is another key to adherence of exercise because people have belief in its health benefits, but also the confidence to perform each movement correctly (Ekkekakis et al., 2011).

Enjoyment

Exercise enjoyment can be defined as a feeling of liking and amusement that stems from the exercise experience. In a study conducted by the Raedeke (2007) it was noted that “enjoyment may be key to maximizing the psychological benefits of exercise” (p. 106). In addition, Raedeke (2007) noted that just one workout of any type can be associated with an increase in positive affect and decrease in negative affect. Mood relating benefits play a huge role in a person participating in a workout or exercise. However, not all participants of exercise see the same psychological benefits from exercising at different levels and settings. When a person enjoys engaging in exercise, they are much more likely to integrate it into their daily lives

Results

Few studies have been conducted to understand the relationship between enjoyment and high intensity exercise. A research study conducted by Oliveira et al. (2018) evidenced that high intensity interval training is a great way for improving overall health and fitness. A critical question is if participants enjoy working out and will adhere to high intensity workouts. Multiple studies including Thum et al. (2017) and Oliveira et al. (2018) show that participants of high intensity workouts have a higher enjoyment rate and are more apt to adhere to a workout schedule. There are also conflicting results from research that suggests high intensity exercise could potentially prove opposite in enjoyment and adherence (Oliveira et al., 2018).

According to Heinrich et al. (2014), the only significant difference received was that moderate intensity participants showed a lower exercise enjoyment than participants of the high intensity functional training. The moderate intensity participants completed moderate level resistance training and high intensity participants selected to use CrossFit™ as their mode of exercise. These choices of workouts could have had an effect on the outcome of their enjoyment.

High intensity participants were also more motivated to exercise, create a habit out of it, improve health, and see results in weight loss. These results could be due to the time the participants spent working out daily. High intensity participants had a shorter workout time than the other participants. This is due to moderate intensity requiring more time to achieve the same goals as high intensity exercise. The researchers concluded that the high intensity workout participants were able to maintain exercise enjoyment, adhere to the workouts, and spend less time doing so while meeting all the current physical activity guidelines (Heinrich et al., 2014).

Thum et al. (2017) examined the enjoyment difference between high intensity interval training and moderate intensity training in cycling participants. This study used the Physical Activity Enjoyment Scale (PACES) to assess enjoyment in the participants before and after the workout. The PACES scale is an assessment that tests the enjoyment in adults across multiple exercise modalities. The subjects performing the high intensity workouts scored significantly higher in regard to enjoyment than the other participants. This could be explained due to the recovery bouts that are in between each exercise before moving on to the next. Secondly, the participants of the moderate intensity level found the workout to be one dimensional and didn't enjoy the continuous workload. Thum et al. (2017) concluded that this enjoyment response could be due to the feeling of accomplishment that is felt after participating at a high level. There is a limitation to this study due to its small sample size of 12 participants who generally active people (Thum et al., 2017).

Kilpatrick et al. (2015) revealed that high intensity workouts with intervals of rest periods provide favorable enjoyment responses. Continuous exercise at the moderate level showed a decrease in enjoyment in this study. High intensity exercise did show a higher enjoyment rate during the post-exercise period when compared to moderate intensity. Although, this study

suggested that high intensity interval training had positive enjoyment results, these outcomes were equal to the moderate intensity participant's results. Additional research is needed to fully understand why interval training is preferred over continuous training. Kilpatrick et al (2015) noted that not all interval training is equal but there is something about it that appeals to most participants.

Conflicting Evidence

The American College of Sports Medicine (ACSM) exercise guidelines stated that “exercise-induced feelings of fatigue and negative affect can act as a deterrent to continued participation” in an exercise routine. This statement from the ACSM supports conflicting evidence against high intensity training being the leading exercise regimen for people to participate in, due to its affective responses. Affective responses are the general psychological state of an individual including emotions or current mood. Multiple studies that Oliveira (2018) meta-analyzed have shown positive results in high intensity interval training. The studies evidenced that participation in HIIT induced a higher level of enjoyment when compared to moderate intensity exercise, but many others have shown adverse results. Other studies within the meta-analysis noted that this outcome could be related to some differences in the methods between studies (Oliveira et al., 2018). According to Oliveira et al. (2018), a study's results could be explained by the proportion of the stimulus and or exercise time to rest periods in contributing to swayed results. Even though there is conflicting evidence to support adverse results, the researcher of this study wanted to deeper understand why high intensity interval training is so popular.

Methods

Participants

The participants of this study consisted of 50 college students, faculty, and gym members of the University of Nebraska Omaha's (UNO) Health and Kinesiology enrolled in two sections of exercise classes. The participants ranged in age from 19-57 and were a mix of females and males.

The first section of participants participated in a Bootcamp group exercise class offered on the UNO campus. The Bootcamp classes offered included an intense mix of aerobic activity and strength training. The average number of participants per class ranged between 3-10 depending on the day the class was given. Section 1 participants were signed up for the Bootcamp class on Tuesday and Thursday afternoons from 4:30-5:15 p.m. on the UNO campus. The class was held from January 21st until March 17th, 2020 resulting in 8 ½ weeks of Bootcamp classes.

The second section of participants were college students enrolled in the cycling and walking/jogging class at UNO for college credit. Both groups of subjects were chosen because they were enrolled in classes that required them to be active (meaning that they were not considered sedentary people). All 50 participants voluntarily joined the study by verbally stating willingness to the researcher to participate and/or read an introductory paragraph prior to participation in the study. The cycling class participants voluntarily completed the survey but did receive extra credit by the instructor's discretion to do so in order to boost participation.

Figure 1 represents the number of participants within each age ratio. The majority of the participants were undergraduate and graduate students between the ages of 19-27. Figure 2 describes the gender ratio of participants. As noted in Figure 1 more females participated in class workouts than males. The ratio of females to male participants was sixty-six percent to thirty-four percent.

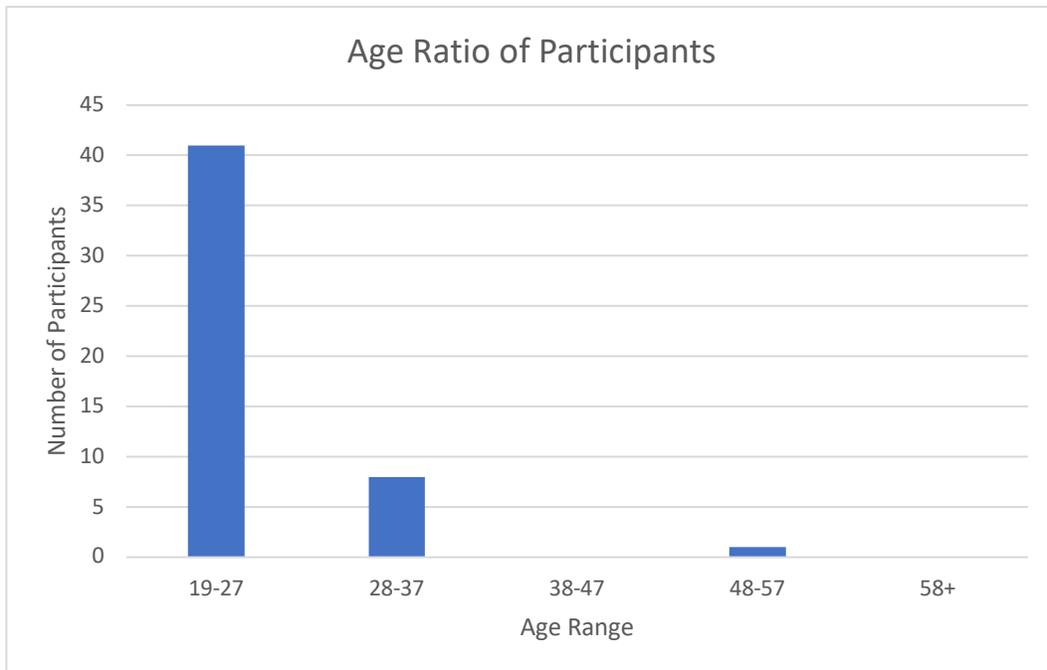


Figure 1 –Age ratio of participants from the Bootcamp, Cycling, and Walking/Jogging classes.

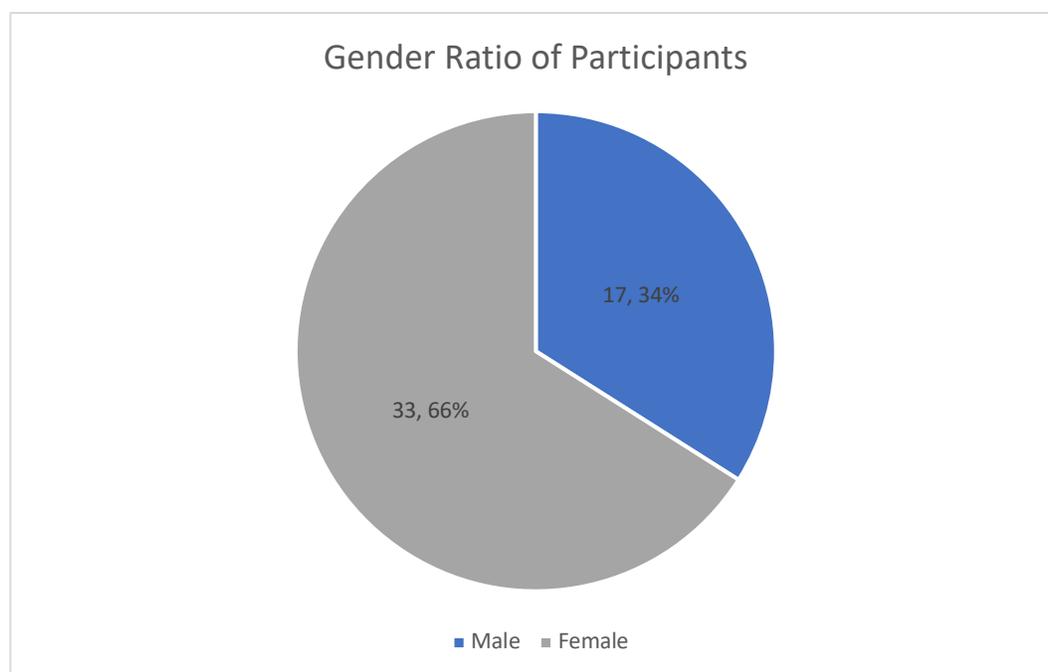


Figure 2 –Gender ratio of participants from the Bootcamp, Cycling, and Walking/Jogging classes.

Materials

Questions were created to assess participants' enjoyment in high-intensity training over moderate intensity-training, preference of working out alone or in a class-setting, and the benefit of high-intensity workouts versus moderate intensity workouts. Data was also collected on how many minutes/days each participant worked out in a given week.

Design

A nine-question survey was created to assess the feelings of participants' level of enjoyment and their perceived benefit from participation in high intensity workouts versus moderate intensity training/workouts. Questions were created to assess participants who worked out alone or in-comparison to working out in a class-setting. Questions were also created to assess if there was any effect on the participant not feeling enjoyment when doing a high-intensity workout. Data was also collected on how many minutes/days each participant worked out in a given week.

The researcher's plan was to administer the survey multiple times throughout the spring 2020 semester to Bootcamp class participants only. The survey was designed to assess if the participants showed a trend in enjoyment and adherence to high-intensity workouts in a class setting. The aim of the research was to collect data at intervals to assess change in perceptions over the course of the semester. The plan was interrupted due to COVID-19 closing down the University of Nebraska Omaha campus on March 13, 2020. The survey was then administered via Survey Monkey to students enrolled in the cycling and walking/jogging class on campus. The data received from both sections were blended and analyzed.

Procedure

The survey was created for the Bootcamp class participants. Each participant was verbally given information by the researcher about the study before survey participation. The participants were asked to read an introductory paragraph about the survey to give consent before participating in the survey. The survey was administered following Bootcamp class. Following completion of the survey participants were asked to place the survey face down to protect their anonymity. The data was entered into an Excel spreadsheet and the paper survey was shredded.

Following UNO's closure, the procedure of administering the survey was administered through SurveyMonkey. Following the advisement of the researcher's professors, the cycling and walking/jogging professor agreed to provide a link for the survey to enrolled students for extra credit. The introductory paragraph was given to the professor to post before the students participated in the survey via the link. Completion of the survey by the cycling and walking/jogging class was voluntary. The professor upheld the confidentiality of the participants by not providing identifying information of survey participants.

Results

After collecting all of the results were analyzed. Participants' enjoyment preference in regard to high intensity versus moderate intensity workouts was the key question of the survey. The survey's results revealed that high intensity exercise was the favored intensity level workout when compared to moderate intensity workouts. Observations were made based on the data collected regarding high intensity interval training's effects on enjoyment and self-benefit. Analyzed data was then collated into tables and figures for comparison purposes.

Three main areas were accessed through this survey: participants enjoyment in high intensity training over moderate intensity training, preference of working out alone or in a class-setting, and the benefit of high intensity workouts versus moderate intensity workouts. Participants were also to report their activity level per week. Table 3 shows that the mean of participants worked out 4 days each week with their sessions lasting 55-60 minutes. This is important to look at due to high intensity workouts being very exhausting and has a higher risk for injury. Sedentary people typically do not participate in high intensity exercise due to the side-effects post-workout (Frazão et al., 2016)

Participants Average Activity Time Per Week			
Days per Week	Number of Participants	Minutes per Session	Number of Participants
1	1	20-25	2
2	6	25-30	5
3	12	35-40	2
4	9	45-50	9
5	15	55-60	18
6	5	65-70	3
7	2	75-80	2
		85-90	2
		95-100	2
		105+	5

Table 1 – The values represent the average time per week the participants spend working out. These values were received from the participants of the Bootcamp, Cycling, and Walking/Jogging class at the University of Nebraska Omaha’s campus. The total number of participants of this study was 50.

Question five asked the participants if they prefer to workout in a class-setting or alone. The results noted that 50% of the participants preferred to be active in a class-setting, 40% of the participants preferred to workout alone, and the other 10% stated that they liked both or depended on what kind of workout they were performing. This question was limited as it only required participants to state what kind of class that they preferred to work-out in, therefore the results cannot be generalized.

Question three asked participants if they had participated in a Bootcamp or HIIT class before. Twenty-eight participants stated that they had participated in one of the classes before while the

other 22 stated that they have never participated in either a Bootcamp or HIIT class. This question was limited as it did not ask if the participants had engaged in a high intensity workout on their own.

Question seven from the survey asked if the participants would perform a high intensity workout or take another high intensity class again. The data showed that 76% of participants 'would' either perform alone or participate in high-intensity classes again and the other 24% reported that they would 'maybe' do so. This data could be correlated to participants who do not exercise as often as others, but a limitation in the data would be one section being completely comprised of students who workout for class purposes. This could cause a skewed result in this correlation.

Question nine asked if high-intensity interval training fit into their schedule better than moderate intensity workouts due to its decreased time requirement. Participants were given a written explanation to the weekly guidelines given by the ACSM and Centers for Disease Control and Prevention (CDC) for activity each week before answering this question, so they were aware of how to classify the classes that they take or the workouts they perform. 50% of participants stated that they believed that high intensity workouts fit into their weekly schedule better than moderate intensity workouts. On the other hand, 36% of the subjects reported that high intensity workouts could fit into their schedule better.

Figure 3 shows that high intensity workouts were the most preferred method of activity. Eighteen participants reported that they were neutral, or liked both intensity levels equally. There was a true significance between the high and moderate intensity enjoyment preference. Although, the significance is unclear between the neutral and high intensity enjoyment preference participants.

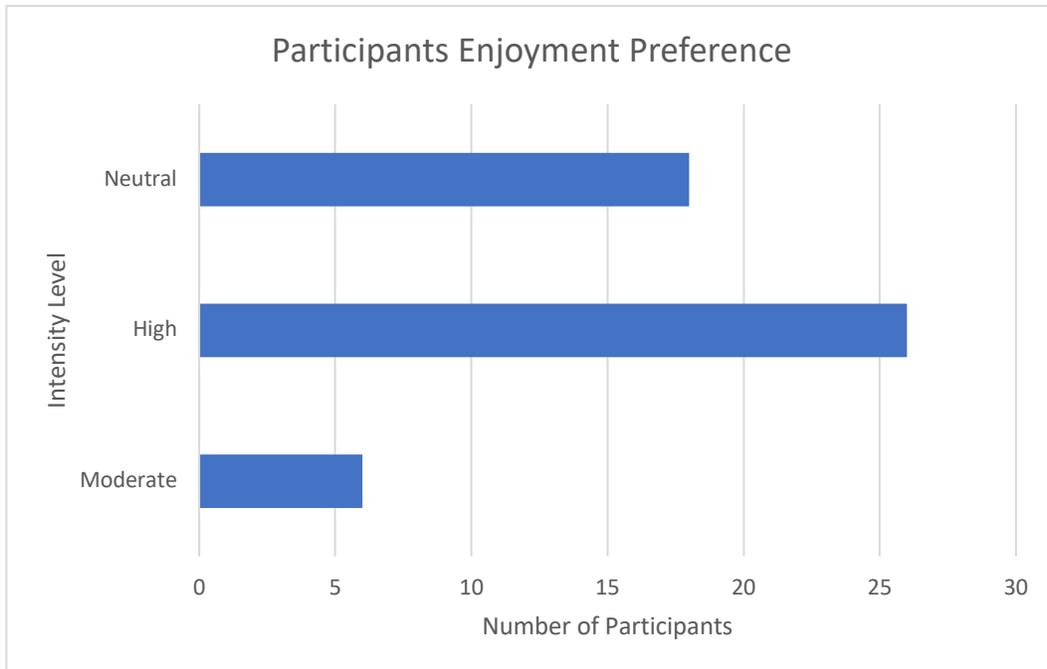


Figure 3 – The values represent the intensity level preference for enjoyment of the study’s participants. These values were received from the participants of the Bootcamp, Cycling, and Walking/Jogging class at the University of Nebraska Omaha’s campus. The total number of participants of this study was 50.

Question six asked participants to rate the feelings they had after completing either a moderate or high intensity workout. Sixty-four percent of the participants reported that they felt they had a higher benefit from participating in high intensity workouts (Figure 4). These workouts could have either been completed alone or in a class-setting. A limitation to the survey would be not asking the participants if they felt they got the most benefit in the class-setting or alone.

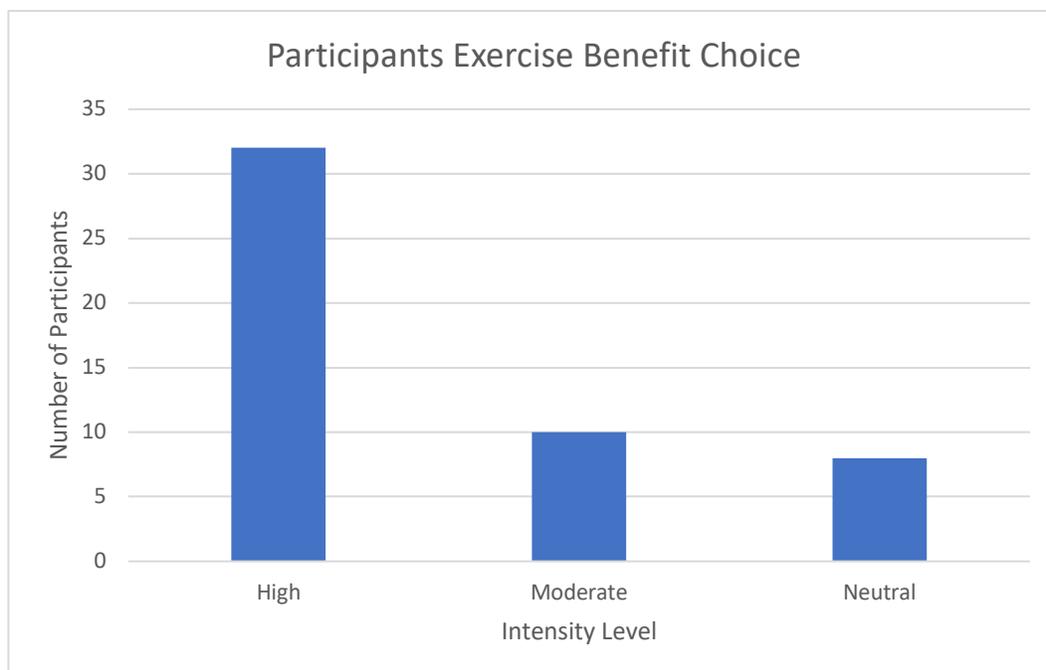


Figure 4 – The values represent the participants feeling of higher benefit from each intensity level. These values were received from the participants of the Bootcamp, Cycling, and Walking/Jogging class at the University of Nebraska Omaha’s campus. The total number of participants of this study was 50.

Discussion

Currently in the United States, less than a quarter of the population meet the ACSM’s activity guidelines (Wolters Kluwer, 2018). People not participating in physical activity may be due in part to many factors (i.e. no time, not physically being able to, and/or not enjoying exercise). This study was created to assess if high intensity interval training elicited a higher enjoyment and adherence rate when compared to moderate intensity training in healthy and able individuals.

When looking at the participants of this study’s weekly activity levels, it is noted that over eighty percent of the participants met their weekly activity guidelines, with twenty percent exceeding their weekly requirements (Table 1). The average participant worked out 4 days a week with each session lasting about 55-60 minutes. This translated that participants were active

220 minutes/week. Participant responses exceeded the weekly ACSM guideline of 170 minutes/week (Wolters Kluwer, 2018). The results could potentially have a correlation to why the data from this study leaned more towards a higher enjoyment and adherence rate to high intensity exercise.

When comparing the data between participants who prefer to exercise in-class and alone, there wasn't a significance between the two values. Thus, there was no correlation between enjoyment and adherence to high intensity activity and how the participants preferred to workout. In previous studies, there were no factors that included how each subject preferred to workout, in-class or alone, so there is no data to compare the results to.

Seventy-six percent of the participants of this study stated that they would perform another high intensity workout or take part in a high intensity class again. This is similar to the adherence to the intensity level because of the significant amount, 38 participants, who would perform this type of exercise again. The question was asked to determine if the participant would participate in the Bootcamp class again. The participants would then be asked the same questions multiple times throughout the semester. Then the data could be compared over time to see if there is a correlation between the Bootcamp class itself and wanting to participate again.

"Not having enough time" is the number one excuse for people to not workout. A benefit of high intensity workouts is the decreased time demand when compared to moderate intensity workouts. Participants were asked if they thought that high intensity exercise fit into their schedule better. The results of this question did not display significant data to prove that high intensity training does in fact fit into people's schedules better. This could be due to interpretation of the question incorrectly. Participants who take part in class workouts may think that the schedule of classes do not fit into their schedule as well as some of the moderate

intensity classes or working out alone. Many facilities hold high intensity classes multiple times per day to fit people's schedule. High intensity workouts last between 20 and 30 minutes due to the increased exertion level needed to complete the workout. This outcome could also be due to participants not regularly participating in high intensity workouts or have never participated in them before. This conclusion is based off the results of question three in the survey.

Enjoyment of exercise is the key to a person continuing to stay active. Figure 3 shows that the participants of this study enjoy high intensity interval training more than moderate intensity training. The participants were not specifically asked what aspect they liked more about this type of training. However, other studies have speculated that enjoyment is due to the short bouts of exercise followed by a rest period. In previous studies it has been noted that moderate intensity exercise could become monotonous, therefore participants lose interest fairly quickly.

The participants of this study were asked if they felt that they got better post-exercise benefits from high intensity training or moderate intensity training. Figure 4 shows that over 50% of the participants stated that they felt better benefits from high intensity training than moderate intensity training. Many studies including Thum et al. (2017) found that most of the participants displayed a higher enjoyment level due to how they felt post exercise. This post exercise feeling of accomplishment and seeing benefits later down the road may provoke many people to adhere to working out.

Conclusion

To conclude, three main areas were accessed through this survey: participants enjoyment in high intensity training over moderate intensity training, preference of working out alone or in a class setting, and the benefit of high intensity workouts versus moderate intensity workouts. The data noted that most participants enjoy high intensity interval training over moderate

intensity training. They also feel that they receive a higher benefit from high intensity training. The data collected does reject the null hypothesis that there is no difference in enjoyment and self-benefit of high intensity training and moderate intensity training. This study had fifty participants. To better represent the greater population, a larger study would need to be conducted. Exercising or staying active is the key to unlocking a healthier future. The biggest finding of the research presented is that high intensity training does elicit a higher enjoyment rate when compared to moderate intensity training.

The Study of High-Intensity Interval Training Enjoyment

This survey is anonymous and is completely voluntary. Please be aware that if you decide to participate in this survey, you do not need to complete future surveys and do not need to answer any specific question. The survey should take a maximum of 5 minutes to complete. The researcher will maintain confidentiality of this data. By completing this survey, you are indicating that you have read the terms described and are over the age of 19.

IRB # 110-20-EX

Thank you in advance for your participation!

-Keali Mari

1. Please choose the corresponding age range that relates to you...

19-27 28-37 38-47 48-57 58+ Prefer Not to Answer

2. Please choose your identifying sex...

Male Female Prefer Not To Answer

3. Have you ever participated in Bootcamp/High Intensity Interval Training class before?
4. Do you enjoy high-intensity training over moderate intensity-training?
5. Do you enjoy a class setting or working out alone?
6. Do you feel you get more benefit out of high intensity workouts or moderate intensity workouts?
7. Would you take a high-intensity class or perform a high-intensity workout again?
8. How many days a week do you participate in physical activity? How many minutes per workout?
9. Does high intensity training fit into your schedule better than moderate intensity training because of its decreased time requirement?

***High-intensity exercise is defined as 75% or higher of your maximum. Moderate-Intensity exercise is defined as 50-70% of your maximum.

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