Pulse Differences Among Exercising and Non-Exercising College Students

Kelli J. Wegner
Cassandra M. Jensen
Wisconsin Lutheran College
December 2, 2002
Abstract

The researcher studied college students with a quasi-experimental design to identify if those who exercise regularly will have a lower pulse rate than those who do not exercise due to endurance from regular exercise. The participants consisted of 24 females and 12 males at a small, private liberal arts college in the Midwest ranging in age from 18 to 31 years from Caucasian (95%), Asian (2%), and Hispanic (2%) ethnic backgrounds. The level of exercise was measured with a survey. The researcher found that 24% of the participants are considered to be exercisers and have a lower pulse than the 66% who do not exercise.
Pulse Differences Among Exercising and Non-Exercising College Students

It is essential that college students understand the importance of exercise and its benefits. Studying the pulse rate is one way to build awareness of the health benefits of exercising. Research on pulse rates shows there is a difference in pulse rates between exercisers and non-exercisers. Previous research studied the differences of health related characteristics among the sporting population and non-sporting population (Lamb, Brodie, Minten, & Roberts, 1991). The researchers found that the pulse rates of those who were involved in a regular sporting activity had a lower pulse rate than those who were not involved in a sporting activity. The findings of Lamb et al. (1991) show there is a difference in pulse between exercisers and non-exercisers, but this difference is not accounted for in this study. Hollandsworth and Jones (1979) studied the level of intensity of a workout program and found that high level intensity workout programs yield an average lower pulse rate as compared to low intensity workout programs that yield an average high pulse rate. This study supports that there is a difference in pulse rates when using different intensity levels, but this does not define the relationship between the exerciser and a lower pulse rate among those who exercise.

Travlos and Marisi (1996) conducted a study regarding pulse rate and workload intensity and found there is a significant relationship when measuring the pulse rate and workload intensity. This supports the importance of measuring the pulse rate between exercising and non-exercising individuals because there are differences in workload intensities of each group (Travlos & Marisi, 1996). Dubbert and Wilson (1984) researched the effects of a continuous exercise program over time on pulse rate and found that a person’s pulse rate will decrease over an extended period of time if he or she engages in a regular exercise program.
A research study that involved a survey measured public opinion of checking the pulse rate (Faigenbaum, Ciccolo, & Libonati, 1998) and concluded that people feel it is significant to measure the pulse rate. Chen et al. (2001) conducted a study and noted that a continuous exercise program is shown to be effective if an individual checks his or her pulse regularly when exercising. He or she should find that his or her pulse does get lower, supporting the fact that a continuous exercise program yields a lower pulse (Dubbert & Wilson, 1984).

Shephard and Bouchard (1994) studied the Canadian population and factors that might affect a person’s pulse rate. Shephard and Bouchard (1994) found that caffeine and smoking could affect many variables related to health, including resting pulse rate. Holmes and Roth (1985) found that stress could cause a person’s heart rate to increase. Caffeine, smoking, and stress are all factors that may affect the pulse rate and could be valuable in determining the results of the present study. Therefore, these factors will also be examined in this research study.

The purpose of this study is to test the pulse differences between those who exercise and non-exercisers. Studying pulse is a way to assess one variable of health, even though there are many more. The present research uses exercising and non-exercising college students to demonstrate the importance of exercise in one’s life as it is related to pulse. There are some factors like caffeine, smoking, and stress that may affect a person’s pulse. The hypothesis the researcher is studying is the following: if a person exercises on a regular basis, then his resting pulse rate should be lower than one who does not exercise due to endurance from the exercise program.

Method

Participants
The participants included 38 undergraduate college students (12 males, 24 females, 2 unspecified) ranging in age from 18-31 years \(M=20\) from 95% Caucasian, 2% Asian, and 2% Hispanic ethnic backgrounds. The exercisers consisted of 13 students (5 males and 7 females, 1 unspecified) ranging in age from 19-23 years \(M=20\) with a 100% Caucasian ethnic background. Four participants exercised the day of the study, 9 did not; 8 drank caffeine, 5 did not; and 5 were stressed and 8 were not. The non-exercisers consisted of 25 students (7 males and 17 females, 1 unspecified) ranging in age from 18-31 years \(M=21\) with a 92% Caucasian, 4% Asian, and 4% Hispanic ethnic backgrounds. Four participants exercised the day of the study and 21 did not; 6 drank caffeine, 19 did not; and 13 were stressed and 12 were not. The participants were convenience sampled from a small private liberal arts college in the Midwestern United States during research week on campus, which was a time reserved for collecting data for psychology studies. The participants volunteered in response to an email sent to all the students about the research week. The compensation the participants received upon completion of the study ranged from candy, extra credit, or a T-shirt to any combination of the three, depending on their level of participation. The sample is non-representative of the general college-age population; therefore, the results cannot be generalized to the population.

**Instruments**

The researcher utilized a revised exercise survey (Norris, Carroll, & Cochrane, 1992) was used to measure the exercisers and non-exercisers (see Appendix A). The survey was a paper and pencil self-report survey originally written by Kobasa, Maddi, and Puccetti (1982) that measured the amount of exercise a person does on a daily basis. The researcher measured the open-ended questions by a likert scale and others were forced choice with yes and no as the choices. For example: do you engage in organized sports regularly? A. Yes B. No or How many hours do you
spend on sports and non-sports exercise each week? The responses to the surveys were based on what kind and how much exercising activity a person is involved in on a daily basis. The answers to the survey required the participants to write yes or no, a number indicating the amount of time he or she exercises each week, and a 0, 1, or 2 representing mild, moderate, or strenuous for the level of exercise. Each response was given a number from 0-2 and the researcher added up the numbers at the end of the survey, which gave the participants a number. This number identified the participant as an exerciser or non-exerciser, which was scored on a likert scale with the numbers ranging from 0-6. A score between 0-3 defined a participant as a non-exerciser, and those who scored between 4-6 were exercisers. There were no reliability and validity scores for the survey.

The researcher measured the pulse by hand and assessed each participant’s pulse. The researcher did this by placing the second and third fingers on the palm side of the hand under the thumb and counting the pulse beats that were felt for 30 seconds. The researcher multiplied this number by two to get a resting pulse reading that represented one minute’s worth of a pulse rhythm. The researcher added the exercisers’ pulses together to get a total number. Then this number was divided by the total number of those measured as exercisers and that was the average pulse rate of the exercisers. The researcher utilized the same procedure to measure the non-exercisers’ average pulse rate as well as the average pulse rates of the male and female exercisers. The survey took about three minutes to complete and the recording of the resting pulse rate took about 1 minute, which was a total of 4-5 minutes altogether.

*Procedure*

Through convenience sampling the participants volunteered in response to the email about the multiple studies given during the research week held at the college. The rewards for
participating in the study were commensurate with the amount of studies completed. The participants arrived in the medium-sized classroom that was assigned for the study and were given directions to read, sign, and hand in the informed consent (see Appendix B). Then the participants were given the paper and pencil survey to fill out. When the participants completed the survey, his or her pulse was measured and written down in the survey. The demographic section accounted for certain factors that might affect a person’s resting pulse rate. These factors were amount of sleep, weight, caffeine, smoking, stress, and exercise the day of the study. The survey took about five minutes to complete. When each participant handed in the survey the researcher thanked him or her for participating and he or she was allowed to leave. The participants were given a debriefing statement (see Appendix C) through email about a week after the study had taken place, and the results were sent through email during finals week.

Results

Inferential statistics were used to analyze whether a regular exercise routine yielded a lower pulse rate. The researcher found that those who exercised had a mean pulse rate of 67.0 with a standard deviation of 15.0, and those who did not exercise had a mean pulse rate of 80.0 with a standard deviation of 11.8. Among the exercisers the mean pulse rate for the males was 58.8 with a standard deviation of 11.4, and for the females the mean pulse rate was 72.9 with a standard deviation of 15.1. The range of pulses was from 42 to 100, the mode was 80, and the median was 73. The t-test yielded a $p < .004$ for the pulse and the degrees of freedom was 36.

Discussion

The purpose of this study is to test the pulse differences between those who exercise and non-exercisers. Lamb et al. (1991) found that involvement in a regular exercise routine will yield a lower pulse rate as compared to no involvement in a regular exercise routine, which yields a
higher pulse rate. The mean pulse rate of the exercisers from this study is 67.0 with a standard deviation of 15.0, and the mean pulse rate of the non-exercisers was 80.0 with a standard deviation of 11.8. The difference in pulse rates among the exercisers and non-exercisers supports the hypothesis as well as the findings of Lamb et al. (1991).

Even though the results of this study supported previous research, there were threats to the internal validity of the study. First, the survey used to measure exercisers and non-exercisers only measured the aerobic portion of a workout. It would have been helpful to have a section for weight lifting. Second, the results can not be generalized to the population of college students because the participants were convenience sampled. Random sampling with matching or blocking should have been used for sampling procedures to assure that all the groups were equal to assure that the results were internally valid. There were not equal amounts of exercisers and non-exercisers. Through random matching or blocking the two groups could have been equal. Third, the best time of the day to take the resting pulse rate is in the morning right after a person wakes up. The pulse rate in the study was taken in the early evening, which is the time of the day when a person is engaged in a good amount of physical activity. This could have unintentionally raised a person’s heart rate. Fourth, the design of this study was quasi-experimental, which did not allow the researcher to use a control. Fifth, there were certain factors like exercising the day of the study, caffeine, and stress. These were accounted for in the demographics section and the results indicated that 21.1% of the participants exercised the day of the study, 36.8% drank caffeine, and 47.4% were stressed.

The following threats to external validity occurred during the study. First, the survey used to measure exercisers and non-exercisers was not reliable and valid. This means that it is hard to speculate if the results are statistically valid. Second, the pulse rate was only assessed once
throughout the whole study. It would have been better to assess the pulse many times to reduce any chance of assessing an incorrect pulse rate. Third, there were not enough participants in the sample, which means the sample was not representative of the population. More participants and random selection would have assured that the results were externally valid.

Previous research discovered that a person’s pulse rate will lower with a continuous exercise program, but it would be helpful to find out how long it takes a person to achieve a consistent pulse rate. To get results like this it would be beneficial to carry out a study in which each participant records his or her own pulse each morning after he or she wakes up while engaged in an exercise program. This would give needed information on how long it takes to lower a person’s pulse rate, and also how fast a person’s pulse rate does lower once he or she starts an exercising program. The results have indicated that male exercisers have a lower pulse rate than female exercisers. The reason for this difference could be researched to find out why this is. The fact that males tend to be more active overall than females could be a reason, but more research on this topic would help. In conclusion, the researcher found that exercisers do have a lower pulse rate than non-exercisers. Hopefully this information will be a start to build awareness of the benefits of exercise and inspire non-exercisers to start an exercise program.
References


Appendix A

Please circle or write the answer in the blank.

Gender: Male or Female

Class Status:  Freshman  Sophomore  Junior  Senior

Age:__________

Ethnic Background:   
A. White/Non-hispanic  
B. Black/Non-hispanic  
C. Hispanic  
D. Asian or Pacific Islander  
E. American Indian or Alaskan Native  
F. Other________________________

Weight__________

Did you exercise today?     Yes     No

Did you drink caffeine within the last 8 hours?     Yes     No

Do you smoke?     Yes     No

Do you feel stressed today?     Yes     No

1. Do you engage in organized sports regularly? (e.g. jogging, football, netball, tennis etc).
   A. Yes  
   B. No

2. Do you engage in non-sports exercise regularly? (e.g. gardening, doing a paper round, riding or walking to school).
   A. Yes  
   B. No

3. How many hours do you spend on sports and non-sports and non-sports exercise each week?
   Sports Exercise_______________
   Non-Sports Exercise_____________
4. On average, how vigorous are the sports or non-sports exercise you engage in?

A. Mild  
B. Moderate  
C. Strenuous

Pulse:_________