

The Effects of Running With a Partner on Cardiovascular Performance and Motivation

by:

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The Effects of Running With a Partner on Cardiovascular Performance and Motivation

by

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Abstract

The objective of this study was to determine the effects of running with a partner on cardiovascular performance and motivation. The study focused on three variables: run time, caloric output, and motivation. In order to determine the effects, healthy volunteers were placed into two groups: the control group or the experimental group. The control group ran 1680 meters twice, both times by themselves. The experimental group ran once by themselves and a second time with a partner who ran at a faster pace. Using Statistical Package for the Social Sciences, version 26, we were able to determine that running with a partner had no statistical significance on run time and caloric output. However, we determined that running with a partner made a statistically significant difference by increasing motivation.

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Introduction

Cardiovascular activity and exercise are needed to live a healthy life. However, most states report high levels of physical inactivity (Ruopeng, Xiaoling, Yang, & Yan, 2016). Unfortunately, these inactive individuals are missing out on a plethora of health benefits. There is evidence that aerobic exercise capacity demonstrates a strong inverse correlation with the risk of death in older adults (see Appendix B). Cardiovascular exercise can also help improve mental health (Goldstein, Topitzes, Brown, & Barrett, 2018). Not only are the health benefits of cardiovascular exercise great, but there are financial implications, too. There is a decrease in health care cost for those who are more aerobically conditioned when compared to others who are not (Martinson, Crain, Pronk, O'Conner, & Maciosek, 2003).

While people need to put an emphasis on their cardiovascular health, it can still be challenging to initiate a program and be motivated to continue. An option to assist in motivation to engage in aerobic exercise is to perform cardiovascular training sessions with a partner. There is limited scientific evidence on the benefits of aerobic training with a partner. Evidence that is available is primarily personal accounts and opinions as to why they feel it is preferred. Many people think it makes time feel like it is going by faster, therefore distracting them from the training (Kislevitz, n.d.). Others are motivated by their partner to run faster, in turn increasing their performance (Bahadur, 2015). However, there is no scientific data to support these claims.

Health Benefits

One of the health benefits to aerobic exercise is decreasing the risk of all-cause mortality through increasing exercise capacity (Meyers et al., 2001). The only way that

individuals can increase their aerobic exercise capacity is to include cardiovascular exercise in their training program. The more you train the higher your capacity will become, up to a point. This does not mean that if you exercise enough you will become immortal, but it will help keep your quality of life higher for longer than someone who does not regularly engage in cardiovascular exercise (Rejeski & Mihalko, 2001).

Cardiovascular exercise has this effect because it affects the body in many different ways. One of the effects that will happen as you exercise is a decrease in blood pressure (Magal, 2016). Decreased blood pressure is beneficial for an individual both acutely and chronically, and is attributed to a decrease in all-cause mortality. Not only does cardiovascular training prevent all-cause mortality, but it also prevents diseases, such as: cardiovascular disease, coronary artery disease, stroke, type 2 diabetes, etc. (Magal, 2016). These diseases can lead to decreases in quality of life or even death. This is not saying that by exercising an individual will have no chance of developing any of these diseases, but it will substantially lower the risk.

While many people only stress the physical benefits of cardiovascular exercise, the enhancement effect it has on mental health should be noted. When performing cardiovascular activities regularly, there is evidence that depression is minimized due to increased self-efficacy (Goldstein et al., 2018). There is also evidence that general anxiety is lowered in individuals in an exercise program. The reduced anxiety comes from the feeling of mastery and the reduction of muscle tension and heart rate (Goldstein et al., 2018).

Other Benefits

Rising healthcare costs are becoming an issue for many families across the United States (Bush, 2018). Any way for people to decrease healthcare cost would be beneficial for the average person. One way to do so is to engage in physical activity (Martinson et al., 2005). The reason behind this relates to many of the health benefits that come along with becoming more physically fit. When individuals become fitter, they also become healthier, and they do not have to rely on the healthcare system as much, which will start to lower their cost for healthcare.

Thesis Statement

Evidence suggests that increasing aerobic capacity has physical, psychological, and economic benefits, yet most people do not achieve the minimum standard for physical activity set by Surgeon General (Physical Activity Council, 2014). One way to increase the amount of physical activity to gain the greatest benefits of the workout may be to complete aerobic training sessions with a partner who is more aerobically fit. The goal of this study was to determine if running with a partner who demonstrates a faster one-mile run time will increase motivation to jog and will increase caloric output and improve one mile run time. It was hypothesized that running with a faster partner would increase motivation, caloric output, and performance during a one-mile run, compared to running alone.

Literature Review

When looking into the question of whether or not running with a partner is beneficial to performance, there is no scientific research. All of the information regarding the question comes from the opinions of different runners. Some say it is better to run

alone (Brooks, 2019), while others say running socially is the best way to run (Pritchard, 2016). The lack of scientific research should allow this study to set a foundation for the topic of running with a partner.

Knowing that there is little information on this topic it is important to insure that the equipment used in this study (Fitbit Surge) is accurate in measuring the different variables that are being tested. The Fitbit Surge is a consumer grade activity tracker that is able to track distance, heart rate, and caloric expenditure. The Surge has been found to be valid when tracking distance and heart rate (Xie et al., 2018). These two measurements will be important to help determine whether or not participant's performance has changed. In the same study, they concluded that the Surge is not as accurate when tracking caloric expenditure (Xie et al., 2018). However, there is evidence to show that the Fitbit Surge is reliable when tracking caloric expenditure (Evenson, Goto, & Furberg, 2015). This indicates that while the caloric expenditure might not be the exact amount of calories used during the workout, the Surge is able to reliably calculate similar counts of caloric output, which will be beneficial for the study.

Method

This study attempted to determine if there was any effect on cardiovascular performance or motivation when running with a partner. In order to do so, the study used nineteen human volunteers (ten male and nine female) who attended MTSU. They were asked to run 1680 meters as fast as they could around the Murphy Center indoor track. During all runs, the participants wore a Fitbit Surge, which captured and recorded data that was converted into a variety of objective activity and sleep measures, including energy expenditure. Time for each run was recorded using a stopwatch. The volunteers

were then split randomly into two groups. The first group was the control group, which was made up of eleven of the participants. They repeated the process of running 1680 meters to see if there was a difference between their first and second run time, caloric output and their motivation to complete the run. The second group acted as the experimental group, which was made up of eight participants. They ran their second 1680 meters with a partner who was not participating in the study. The partner was told to run faster than the participant, but to stay just ahead and encourage the participant.

The participant and the partner ran 1680 meters together and the participants' time, caloric output, and motivation to complete the run was measured and compared to their first run. In order to test motivation, the participants completed a written survey that asked them to rate how motivated they were to finish the run (see Appendix A). Both groups rated their motivation during both runs, to compare difference when running with a partner.

Statistics

Changes between runs were calculated for both groups and compared to determine mean differences. Three repeated measures ANOVAs with one between factor was conducted to evaluate statistical differences between groups for all three variables (run time, caloric output, and motivation). An alpha value of .05 was used for analyses. Statistical Package for the Social Sciences, version 26, was used to complete all data analysis.

Implications

The results of this study indicate whether or not running with a partner has any effect on performance or motivation. If the experimental group demonstrated greater

change than the control group, this may indicate that it is beneficial for individuals looking to increase their aerobic performance and motivation to exercise, to run with a partner who runs faster.

Results

Analyses were conducted to quantify changes in performance variables and motivation between groups and running trials. Results from each analysis are described below.

Running Time

A repeated measures ANOVA was conducted to evaluate differences in running times between the control and experimental groups for the two running trials. Results from this analysis indicate that there were no significant differences when comparing the changes in running times between the two groups ($F(1,17) = 4.03; p = .06$), indicating that running with a faster partner did not improve running time (See *Figure 1*).

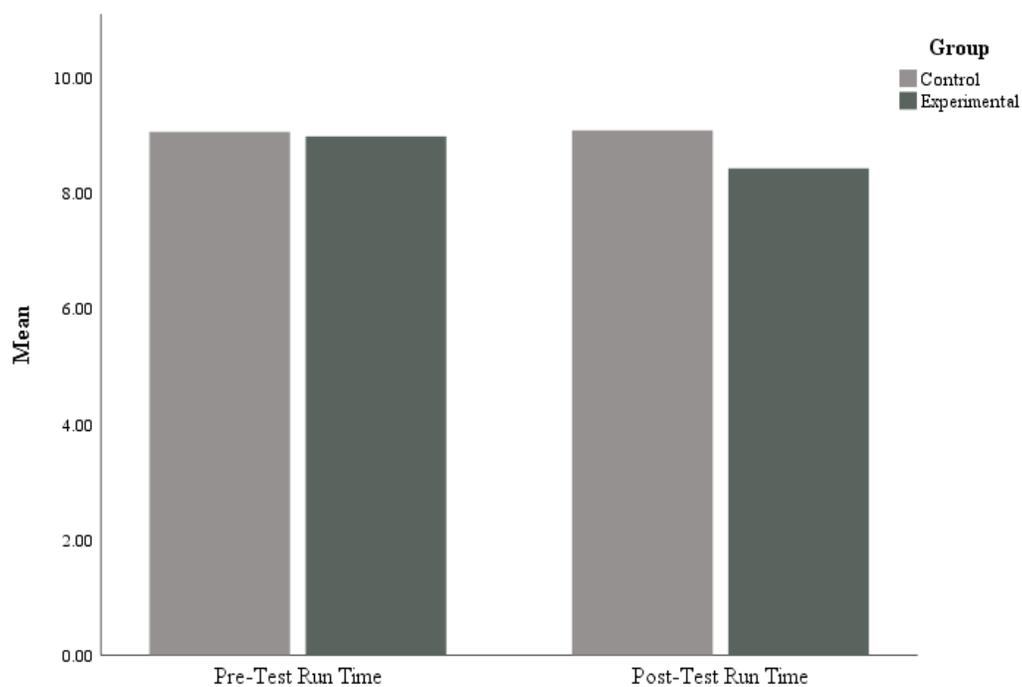


Figure 1. Average run time in minutes

Caloric Expenditure

A repeated measures ANOVA was conducted to evaluate differences in caloric expenditure between the control and experimental groups for the two running trials. Results from this analysis indicate that there were no significant differences when comparing the changes in the number of calories consumed between the two groups ($F(1,17) = .28; p = .61$), indicating that running with a faster partner did not expend more calories than running alone (See *Figure 2*).

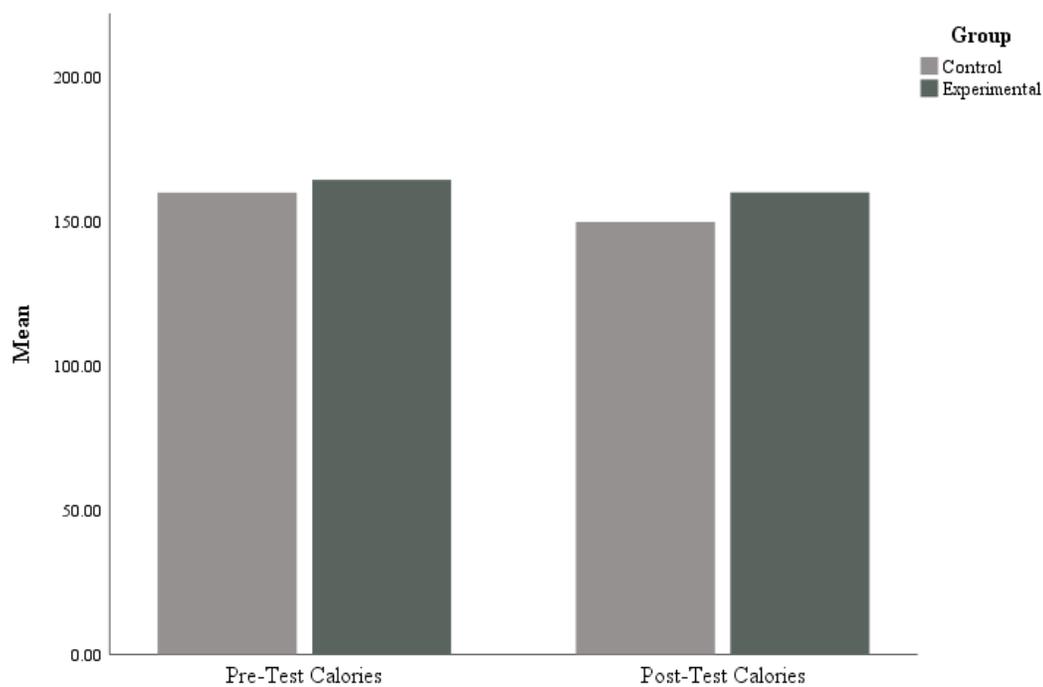


Figure 2. Average calories burned throughout run

Motivation

A repeated measures ANOVA was conducted to evaluate differences in motivation between the control and experimental groups for the two running trials. Results from this analysis indicate that there was a significant differences when comparing the level of motivation between the two groups ($F(1,17) = 5.7 ; p = .03$), indicating that running with a faster partner improved motivation to run more than running alone (See *Figure 3*).

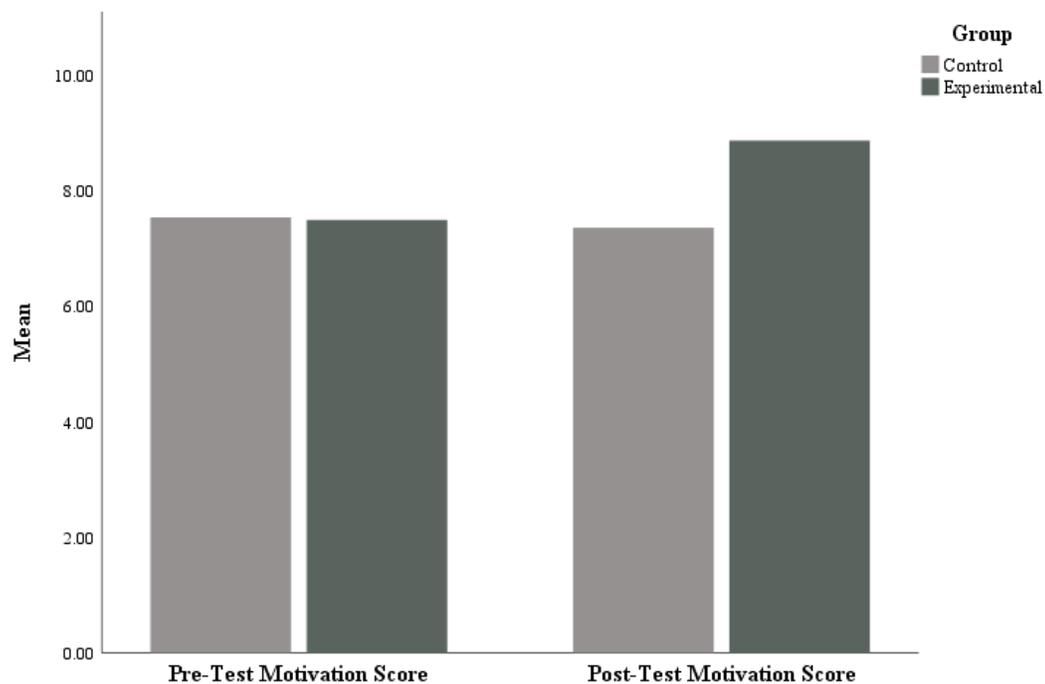


Figure 3. Average motivation to finish the run

Discussion

The goal of this study was to determine the effects of running with a faster partner on cardiovascular performance and motivation. In order to gauge cardiovascular performance, we tracked run time and caloric output during the 1680-meter run. Results from these analyses supported the null hypothesis for both of these variables; we failed to reject the null hypothesis.

There was no statistically significant difference between someone's run time when running with a faster partner compared to someone running alone. As shown in *Figure 1*, there seems to be a trend where the participants in the experimental group times improved slightly more than the times of the control group, but statistically there is no difference. When looking at caloric output, there is almost no noticeable trends shown on *Figure 2*. While both of these measures would indicate whether or not cardiac performance was increasing, the lack of a statistically significant difference should not stop an individual from running with a partner. On the contrary, we can now say that it is up to individuals to decide what they feel is best for them. Either way, it will not positively or negatively impact the cardiovascular performance.

Moving on from performance, the last variable in the study was motivation. In a sense, this is the most important variable in the study. If someone is unmotivated to run, they will never be able to affect their cardiovascular performance, whether or not they are with a partner. We determined that we could reject the null hypothesis, because we found a statistically significant difference between individual's motivation when running alone versus running with a partner. As *Figure 3* shows, participants that ran with a partner reported being more motivated to finish the run than those that were running solo. This

result is arguably the most impactful finding. While run time and caloric output did not increase, participants felt more motivated to finish their run. Even if they were able to run faster and burn more calories with or without a partner, if they were not motivated to finish they would not gain the benefits of their physical activity.

Limitations

One limitation to this study was the number of participants. Due to the time constraints of the honors thesis, more participants were not able to be recruited. With more participants, there could have been more data, which could have supported or rejected the hypothesis. Another limitation is the outside life of the participants. Participants have many different activities going on throughout their daily lives, which may interfere with their performance when running. There was no way to ensure that participants complete both portions of the running with the same exact circumstances beforehand happening earlier in the day/week. The greatest limitation to this study is time. Perhaps changes in both running speed and caloric expenditure would have changed more over time. If the participants had completed four testing runs over several months, training effects could be evaluated. With more time, many of the aspects listed previously could be avoided.

Conclusions

Motivation is the driving force of progress; without it, nothing could be accomplished. Running with a partner will increase your motivation and, by doing so, all of the benefits of physical activity can be attained. More research into motivation from a partner could show possible implication for exercise during physical rehabilitation as well as for recreation. More than likely, we could see where any sort of partnership in the

realm of physical activity could directly benefit both parties involved. All in all without proper motivation, physical activity levels would not be high enough for people to experience the benefits of being physically active. We determined that running with a partner increases motivation, so by doing this, individuals can attain a healthier lifestyle and reap the benefits associated with physical activity.

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Appendix B

Tables

Table 1.1

Evidence for Dose-Response Relationship between Physical Activity and Health Outcome

Variable	Evidence for Inverse Dose-Response Relationship	Strength of Evidence ^a
All-cause mortality	Yes	Strong
Cardiorespiratory health	Yes	Strong
Metabolic health	Yes	Moderate
Energy balance:		
Weight maintenance	Insufficient data	Weak
Weight loss	Yes	Strong
Weight maintenance following weight loss	Yes	Moderate
Abdominal obesity	Yes	Moderate
Musculoskeletal health:		
Bone	Yes	Moderate
Joint	Yes	Strong
Muscular	Yes	Strong
Functional health	Yes	Moderate
Colon and breast cancers	Yes	Moderate
Mental health:		
Depression and distress	Yes	Moderate
Well-being:		
Anxiety, cognitive health, and sleep	Insufficient data	Weak

^aStrength of the evidence was classified as follows:

“Strong” – Strong, consistent across studies and populations

“Moderate” – Moderate or reasonable, reasonably consistent

“Weak” – Weak or limited, inconsistent across studies and populations

Appendix C

IRB Approval

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Monday, September 16, 2019

Principal Investigator **Jon Thomas Neely (Student)**
 Faculty Advisor **Sandra Stevens**
 Co-Investigators **Vaughn Barry**
 Investigator Email(s) *jsn2t@mtmail.mtsu.edu; sandra.stevens@mtsu.edu; vaughn.barry@mtsu.edu*
 Department **Health and Human Performance**
 Protocol Title ***The effects of running with a partner on cardiovascular performance and motivation***
 Protocol ID **19-2247**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the EXPEDITED mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category (4) *Collection of data through noninvasive procedures*. A summary of the IRB action and other particulars in regard to this protocol application is tabulated below:

IRB Action	APPROVED for ONE YEAR	
Date of Expiration	7/31/2020	Date of Approval 8/7/19
Sample Size	50 (FIFTY)	
Participant Pool	Target Population 1: Primary Classification: Healthy Adults (18 years or older) Specific Classification: Health condition verified by PAR-Q Target Population 2: Primary Classification: N/A Specific Classification: N/A	
Exceptions	1. Contact information allowed. 2. Verbal participant recruitment permitted.	
Restrictions	1. Mandatory signed adult informed consent. 2. All identifiable data/artifacts that include audio/video data, photographs, handwriting samples, and etc., must be used only for research purpose and they must be destroyed after data processing. .	
Approved Templates	MTSU templates: Adult Informed Consent Non-MTSU Templates: Verbal recruitment script	
Comments	NONE	

Post-approval Actions

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions (<https://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php>) imposed with this approval. Any unanticipated harms to participants, adverse events or compliance breach must be

reported to the Office of Compliance by calling 615-494-8918 within 48 hours of the incident. All amendments to this protocol, including adding/removing researchers, must be approved by the IRB before they can be implemented.

Continuing Review (Follow the Schedule Below)

This protocol can be continued for up to THREE years (7/31/2022) by obtaining a continuation approval prior to 7/31/2020. Refer to the following schedule to plan your annual project reports and be aware that separate **REMINDERS WILL NOT BE SENT**. Failure in obtaining an approval for continuation will result in cancellation of this protocol. Moreover, the completion of this study MUST be notified by filing a final report in order to close-

Reporting Period	Requisition Deadline	IRB Comments
First year report	7/31/2020	NOT COMPLETED
Second year report	7/31/2021	NOT COMPLETED
Final report	7/31/2022	NOT COMPLETED

Post-approval Protocol Amendments:

Only two procedural amendment requests will be entertained per year. In addition, the researchers can request amendments during continuing review. This amendment restriction does not apply to minor changes such as language usage and addition/removal of research personnel.

Date	Amendment(s)	IRB Comments
09/16/2019	The distance to be run by the participants is increased from 1 mile (Ref Appendix K.1) to 1.04 miles. No additional changes in informed consent and other documents is necessary.	IRBA2020-051

Other Post-approval Actions:

Date	IRB Action(s)	IRB Comments
NONE	NONE.	NONE

Mandatory Data Storage Requirement: All research-related records (signed consent forms, investigator training and etc.) must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data must be stored for at least three (3) years after the study is closed. Subsequently, the data may be destroyed in a manner that maintains confidentiality and anonymity of the research subjects.

The MTSU IRB reserves the right to modify/update the approval criteria or change/cancel the terms listed in this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

- Post-approval Responsibilities: <http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php>
- Expedited Procedures: <http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php>

Appendix D

Informed consent

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBF016: INFORMED CONSENT
A. INFORMATION AND DISCLOSURE SECTION
 (Participant Copy)

Primary Investigator(s)	Jon-Thomas Neely	Student <input checked="" type="checkbox"/>
Contact information	Phone: (615) 692-2293 Email: jsn2t@mtmail.mtsu.edu	
Department/Institution	Health and Human Performance	
Faculty Advisor	Dr. Sandra Stevens	Department Health and Human Performance
Study Title	The Effects of Running With a Partner on Cardiovascular Performance and Motivation	
IRB ID	19-2247	Expiration: 07/31/2022
		Approval 08/02/2019

The following information is provided to inform you about the research project and your participation in it. Please read this disclosure carefully and feel free to ask any questions you may have about this study and the information given below. You must be given an opportunity to ask questions, and your questions must be answered. Also, you must receive a signed copy of this disclosure.

Your participation in this research study is voluntary. You are also free to withdraw from this study at any time. In the event new information becomes available that may affect the risks or benefits associated with this research study or your willingness to participate in it, you will be notified so that you can make an informed decision whether or not to continue your participation in this study.

For additional information about giving consent or your rights as a participant in this study, please feel free to contact the Middle Tennessee State University (MTSU) Office of Compliance (Tel 615-494-8918 or send your emails to irb_information@mtsu.edu). Please visit www.mtsu.edu/irb for general information on MTSU's research participant protection policies.

Please read this section and sign Section B if you wish to enroll in this study. The researcher will provide you with a copy of this disclosure form for you to keep for your future reference.

- Purpose of the study:** You are being asked to participate in this research study because we want to determine if running with a partner who demonstrates a faster one-mile run time will increase motivation to jog and will increase caloric output and improve one mile run time.

- Classification of procedures to be followed and approximate duration of the study:**

- | | |
|--|---|
| <input type="checkbox"/> 2.1 Educational Tests | <input type="checkbox"/> 2.2 Behavioral Evaluation |
| The following classifications indicate that the participant will be asked to perform or part-take in physical activities or procedures. Examples of such studies simple physical exercises, medical or clinical intervention, pharmaceutical testing and etc. Due to the nature of these studies, you may be exposed risky situations that may exceed normal day-to-day scenarios. | |
| <input type="checkbox"/> 2.3 Psychological intervention or procedures | <input checked="" type="checkbox"/> 2.4 Physical Evaluation or Procedures |
| <input type="checkbox"/> 2.5 Medical Evaluation or Clinical Research | <input type="checkbox"/> 2.6 OTHER |

- What are procedures we intend on doing in this study?**

You will complete a PAR-Q, health screening. If no health concerns are identified, you will run one mile as fast as you are comfortable. During your runs you will wear an Fitbit Surge, which captures and records data that is converted into a variety of objective activity measures, including energy expenditure. You will also be timed. You will be randomly into one of two groups. The first group will be a control group. They will repeat the process of running a mile to see if there is a difference between their first and second run time, caloric output and their

motivation to run again. The second group will act as the experimental group. They will run their second mile with a partner who is not participating in the study. The partner's mile run time will be faster than the participants'. The participant and the partner will run a mile together and the participants' time, caloric output, and motivation to run again will be measured and compared to their first run. In order to test motivation, you will be asked to rate (on a scale of 1-10) how motivated they were to finish the mile run and how motivated you are to run again. Both groups will rate their motivation during both runs, to compare difference when running with a partner.

4. **What will you be asked to do in this study?**
You will be asked to run one mile at your fastest comfortable pace. After a one week break period, you will be asked to run another mile at your fastest comfortable pace. Half of the participants will run the second mile with a preselected partner. You will also be asked to complete a two question survey regarding your motivation.
5. **What are we planning to do with the data collected using your participation?**
The data collected which will be the time it took the participants to run both miles, caloric expenditure and motivation. The data from the first mile run will be compared to the second mile run data. We are looking to see if there is a difference between both sets of data.
6. **What are your expected costs to you, your effort and your time commitment?**
You will be committing the time it takes you to run one mile on two separate occasions. You get to decide the intensity at which you run.
7. **What are the potential discomforts, inconveniences, and/or possible risks that can be reasonably expected as a result of participation in this study?**
There is minimal risk in this study. You may feel fatigued after running the mile, but as a healthy individual this study should not pose any more physical demand than what you participate in your daily life.
8. **How will you be compensated for your participation?**
You will not be given monetary compensation, but you will gain insights into yourself in regards to your cardiovascular performance.
9. **What are the anticipated benefits from this study?**
You will be able to use the knowledge gained from the study to benefit your future cardiovascular activity.
10. **Are there any alternatives to this study such that you could receive the same benefits?**
You could seek similar benefits to this study, but you would have to purchase the same equipment in order to try and track the information we are seeking.
11. **Will you be compensated for any study-related injuries?**
You will not be compensated for any study-related injury.
12. **Circumstances under which the researcher may withdraw you from this study:**
If your PAR-Q does not clear you for medical clearance you will not be enrolled in this study.
13. **What happens if you choose to withdraw your participation?**
If you choose to withdraw from the study, we will insure that all of your data is not used in the study.
14. **Can you stop the participation any time after initially agreeing to give consent/assent?**
You are free to stop participating in the study whenever you feel best for you.

Institutional Review Board

Office of Compliance

Middle Tennessee State University

15. **Contact Information.** If you should have any questions about this research study or possibly injury, please feel free to contact Jon-Thomas Neely by telephone (615)692-2293 or by email jsn2t@mtmail.mtsu.edu OR my faculty advisor, Dr. Sandra Stevens, at sandra.stevens@mtsu.edu or (615)494-7905.

16. **Confidentiality.** All efforts, within reason, will be made to keep the personal information in your child's research record private but total privacy cannot be promised. Your information may be shared with MTSU or the government, such as the Middle Tennessee State University Institutional Review Board, Federal Government Office for Human Research Protections, if you or someone else is in danger or if we are required to do so by law.

You do not have to do anything if you decide not to participate. If you wish to enroll, then follow the direction next to the checked box below:

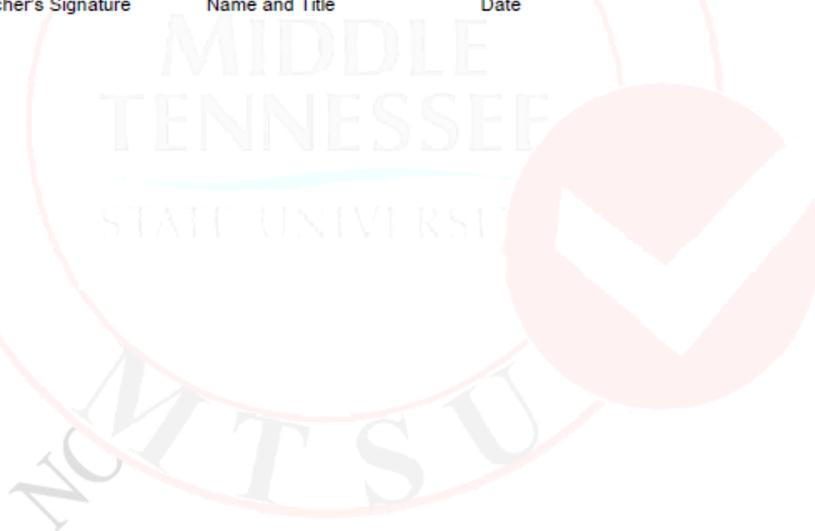
- Enter your name and age in the attached Section B document and sign in the space provided.
- Anonymous: Just your age and give consent by signing in the bottom of the space provided.
- Verbal Consent: Give consent verbally; this is done to protect your identity.

Consent obtained by:

Researcher's Signature

Name and Title

Date



IRB
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 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



**B. Signature Section
 (Researchers' Copy)**

Primary Investigator(s) Jon-Thomas Neely Student
 Contact information Phone: (615) 692-2293 Email: jsn2t@mtmail.mtsu.edu
 Department Institution Health and Human Performance
 Faculty Advisor Dr. Sandra Stevens Department Health and Human Performance
 Study Title The Effects of Running With a Partner on Cardiovascular Performance and
 Motivation
 IRB ID 19-2247 Expiration: 07/31/2022 Approval 08/02/2019

PARTICIPANT SECTION

(To be filled by the participant and return to the researcher)

Participant Name or ID	(print)	Age:
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- No Yes I have read this informed consent document pertaining to the above identified research
 No Yes The research procedures to be conducted have been explained to me verbally
 No Yes I understand each part of the interventions and all my questions have been answered
 No Yes I am aware of the potential risks of the study

By signing below, I affirm that I freely and voluntarily choose to participate in this study. I understand I can withdraw from this study at any time without facing any consequences.

Follow the signage instruction next to the box checked below:

- Enter your name and age above and sign below to enroll in the study
 Anonymous: Just enter your age above and sign below; DO NOT ENTER YOUR NAME
 Verbal Consent: The participant will give consent verbally to protect the participant's identity.

 Date Signature of the Participant

**RESEARCHER SECTION
 (To be filled by the researchers)**

Informed Consent obtained by:

 Date Signature Print Name & Title

Faculty Verification if the PI is a student:

 Date Faculty Signature Print Name & Title

IRBF016

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