THE EFFECT OF PEER INFLUENCE ON RUNNING SPEED, ENJOYMENT, AND PERCEIVED EXERTION IN INTERCOLLEGIATE DISTANCE RUNNERS

A thesis submitted to the
Kent State University College and Graduate School
of Education, Health, and Human Services
in partial fulfillment of the requirements
for the degree of Master of Science

By
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August 2011
The purpose of this study was to determine if, relative to an alone condition, exercising with a training partner affects average running speed, perceived exertion, and liking of the exercise during a self paced 30-minute training run in highly trained collegiate distance runners. We predicted that the presence of another runner would increase average running speed and liking of the run. Fourteen healthy male competitive distance runners, age 18-24, completed two running sessions under two different conditions (alone, with a peer). Heart rate, perceived exertion, distance ran, and liking of the run were recorded in each trial. There were no significant effects ($p \geq .68$) of social condition for any of the dependent variables. Contrary to our hypothesis, the presence of another runner did not have a significant effect on exercise intensity, perceived exertion, or liking during a 30-minute treadmill run in this group of individuals.
ACKNOWLEDGEMENTS

The completion of this project was made possible through the contribution of several individuals. I would like to thank the participants of this study, who willingly and enthusiastically gave their time and effort to this project. Also, my thanks go to Mark Croghan, the head cross country coach at Kent State University, who allowed me to recruit members of the Kent State team for this study. The assistance given by other exercise physiology graduate students and undergraduate researchers was crucial to carrying out the experimental trials, and I am grateful for their help. In addition, I owe my gratitude to my thesis committee, Dr. Ellen Glickman, Dr. Angela Ridget, and Dr. Jacob Barkley for their unwavering support and guidance. Lastly, I wish to express my heartfelt thanks to my thesis advisor, Dr. Jacob Barkley. His constant direction, insight, and revisions were imperative to developing this thesis project.
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CHAPTER I

BACKGROUND

Emerging studies have indicated a potentially important link between peer influence and physical activity behavior. Multiple survey-based research studies have identified a positive relationship between time spent with interacting with peers and/or friends and physical activity behavior in children and adolescents (Craig, Goldberg, & Dietz, 1996; DiLorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998; Duncan, 1993; Salvy, Bowker, & Roemmich, 2008; Smith, 2003; Smith, 1999). However, there are only two experimental studies of which we are aware that have assessed the effect of the presence of a peer or friend on physical activity behavior. Rittenhouse, Salvy, and Barkley (2010) showed that overweight/obese boys were less sedentary in the presence of an unfamiliar peer than when alone. Salvy et al. (2009) showed that the presence of a friend increased non-overweight and overweight/obese adolescents’ motivation to be physically active versus sedentary, while the presence of an unfamiliar peer increased motivation to be physically active in overweight/obese, but not non-overweight adolescents. While the survey and limited experimental studies illustrate the potential importance of peer influence on physical activity behavior, the majority of this research focuses only on children and young adolescents. There is comparatively less research exploring the impact of peer influence on physical activity in adults.

Non-experimental research provides some evidence that social support may be
associated with exercise adherence in adults (Dishman, Sallis, & Orenstein, 1985; Jonas & Phillips, 2009; King, Blair, Bild, & Dishman, 1992; Sherwood & Jeffery, 2000; Trost, Owen, Bauman, Sallis, & Brown, 2002; Wankel, 1984). In a review of the correlates of adult physical activity, Trost et al. (2002) indicated that every study including a measure of social support found a significant positive association between social support and physical activity. Similarly, Carron, Hausenblaus, and Mack (1996) contended in a meta-analysis on social influence and exercise that social influence has a positive effect on exercise behavior, cognitions about exercise involvement, and attitudes associated with exercise involvement. However, these studies did not distinguish between exercise activities and mainly considered the effect of social factors on the maintenance of an exercise program without exploring their effect on the duration or intensity of a bout of exercise. Furthermore, research supporting the positive link between social support and exercise in adults rely exclusively on survey data instead of experimental testing.

While there is a need for more experimental research examining the effect of peer influence on physical activity behavior in general populations of children and adults, there is far less research available, experimental or survey-based, examining this effect in competitive athletes who regularly train with peers (Anshel, 2003; Kolata, 2009). Zajonc’s (1965) social facilitation theory suggests that the presence of others can enhance performance in well learned motor tasks (e.g. running). Bond (1982) framed this phenomenon in terms of self presentation, proposing that individuals are motivated to create a good impression with others and can benefit from enhanced performance in well learned task. Because athletes often train with peers and typically perform in front of
other athletes and spectators, they are often in an environment where social facilitation may affect exercise behavior (Carron & Burke, 2004). However, there are only two studies that we are aware of that evaluated the impact of peer influence on exercise behavior in athletes. In a study of collegiate swimmers, Williams, Nida, Baca, and Latane (1989) demonstrated that swimmers swam faster in relay events than individual events, but only when their times were reported to them and their teammates. In a separate study, the presence of peers increased training pain threshold versus an alone condition (Cohen, Ejsmond-Frey, Knight, & Dunbar, 2010). However, this study measured pain threshold instead of exercise performance, and training intensity was held constant, which does not allow for increased performance. Therefore, while the limited amount of available experimental research in this area supports the social facilitation and self presentation theories of Zajonc (1965) and Bond (1982), additional empirical research involving the effect of peer influence in competitive athletes’ training habits is needed. In such athletes, like non-athletes, exercising with a group of teammates or training partners may increase physical activity effort (duration, intensity) and liking (enjoyment) of that training session. If this is the case, training with a peer may also increase adherence to a training regimen, which may ultimately improve athletic performance. In light of the common practice of athletes training with fellow athletes (Anshel, 2003; Kolata, 2009), there is a need for experimental examination of the impact of peer influence on the intensity, liking and ratings of perceived exertion (RPE) of an exercise session in a group of competitive, highly-trained athletes.
CHAPTER II

PURPOSE

The purpose of the proposed study is to determine if, relative to an alone condition, exercising with a teammate or training partner affects average running speed, perceived exertion, and liking of the exercise during a self-paced 30-minute training run in highly trained collegiate distance runners. We predicted that the presence of another runner would increase average running speed and liking of the 30-minute training run. These hypotheses were based on previous research examining the impact of peer influence on physical activity participation in children and the social facilitation theory proposed by Bond (1965) and Zajonc (1982), that performance in simple motor tasks (like running) will be enhanced in the presence of others.

CHAPTER III

METHODOLOGY

The present study utilized a two social condition (alone, with a peer) repeated measures design with condition serving as the within-subjects variable. Participants \( (N = 14) \) consisted of healthy male competitive distance runners, age 18-24, who were recruited from area National Collegiate Athletic Association (NCAA) Division I cross country and track teams in Northeast Ohio. To be eligible, participants were required to specialize in distances ranging from 1,500 – 10,000 meters and have a regular training volume of \( \geq 60 \) miles run \( \cdot \) wk\(^{-1} \). Specific entry criteria were set in order to ensure that
subjects were matched for level of fitness, minimizing the possibility that fitness differences, instead of social condition, would influence the results. Each pair of participants from the peer condition indicated familiarity with each other and identified themselves as reciprocal friends. Each participant completed three separate laboratory sessions. During the first session participants completed informed consent, were measured for height and weight, and completed baseline fitness testing. The next two sessions consisted of running trials under two different conditions (alone, with a peer). During each session participants were instructed to refrain from strenuous exercise 48 hrs prior, consume their normal diet, and abstain from alcohol and caffeine. The day before the test could include light intensity running or exercise (≤ 75% maximum HR) with a duration ≤ 60 minutes. This study was approved by the Kent State University Institutional Review Board.

**Session 1 (Baseline)**

For the initial session, participants reported to the laboratory alone. Height and weight were measured wearing only running shorts. Participants then completed a 10 minute warm-up run on a treadmill (Quinton MedTrack CR60, Bothell, WA) at a self selected pace in a climate neutral environment. After warming up, participants maintained their speed and the grade of the treadmill was increased by 2.5% every two minutes until volitional exhaustion. This protocol was modeled after that of Costill and Fox (1969). Expired air was collected and analyzed to determine maximal oxygen consumption (VO₂ max) using indirect calorimetry.
Sessions 2 and 3

Following the initial session, participants returned to the laboratory to complete the two 30-minute running trials alone and with a peer, in a counterbalanced order.

**Alone Condition**

The participant reported to the laboratory alone. The following instructions were given: “Today you are going to complete a 30 minute training run on the treadmill (Quinton MedTrack CR60, Bothell, WA). This is not a test to see how fast or far you can go. You are free to run at any speed you choose and you can adjust the speed at any time to go faster or slower. You don’t have to stay at the same pace you originally choose.”

During the test, treadmill incline was held at 0% and the participant controlled the speed. Heart rate (beats·min\(^{-1}\)) was recorded throughout the 30-minute run and RPE was recorded every five minutes. At the conclusion of the 30-minute run, total distance ran, and liking of the run were also recorded. RPE was assessed using the Borg effort rating scale (Utter, Robertson, Green, Suminsk, McAnulty, & Nieman, 2004) and liking was assessed using a visual analog scale.

**Peer Condition**

Two participants completed the identical running trial described in the alone condition. Two treadmills of the same make and model (Quinton MedTrack CR60, Bothell, WA) were placed side by side, and the participants completed the same 30 minute running session next to each other. The same instructions were given as in the alone condition, but included a statement regarding the other runner: “You will both
complete the 30 minute run next to each other, and you may talk to one another if you wish. You may discuss your running speed but you do not have to run at the same speed.” During the test, incline was again held at 0% and each runner controlled the speed. Measures were identical to the alone condition.

**Measurements**

**Anthropometrics**

Weight was assessed to the nearest 0.2 kg and height to the nearest 1.0 mm using a balance beam scale (Health O Meter, Alsip, IL) and calibrated digital stadiometer (Charder Medical, Da Li City, Taiwan, China) respectively.

**Aerobic Fitness**

The rate of oxygen consumption was measured continuously throughout the progressive treadmill test, using indirect calorimetry (True one 2400, ParvoMedics, Salt Lake City, UT). VO\(_2\) max was recorded as the peak VO\(_2\) in ml·kg\(^{-1}\)·min\(^{-1}\) achieved during the progressive treadmill test.

**Heart Rate Monitoring**

Heart rate (beats·min\(^{-1}\)) was recorded using a downloadable telemetry monitor (RS800, Polar, Kempele, Finland) throughout each 30-minute run (alone, with-peer). Heart rate was reported as the average beats·min\(^{-1}\) over each 30-minute run. The same monitor was utilized to monitor heart rate during the progressive treadmill test.
Average Running Speed

Average running speed was calculated for each 30-minute run (alone, with-peer) using the following equation: total distance ran (kilometers·30 minutes⁻¹) * 2 = average kilometers·hour⁻¹.

Ratings of Perceived Exertion (RPE)

Undifferentiated, whole-body RPE was obtained every five minutes of each 30-minute run (alone, with-peer) using the validated Borg RPE scale (Utter et al., 2004). RPE scores were then averaged for each 30-minute run.

Liking

Participants rated their liking of each 30-minute run (alone, with-peer) using a 10-cm visual analog scale anchored by “do not like it at all” on the left and “like it very much” on the right. Liking scores were obtained immediately after completing each 30-minute run. Liking or hedonics is an affective rating of a behavior that, when assessed in this manner, directly correlates with physical activity participation (Craig et al., 1996; DiLorenzo et al., 1998; Motl et al., 2001; Roemmich et al, 2008).

Data Analysis

All statistical analyses were conducted using SPSS for Windows (version 17.0, SPSS Inc, Evenston, IL). Means and measures of variability (standard deviation, standard error) were calculated for all physical characteristics (height, weight age, VO₂ Max) and the primary dependent variables (liking, total distance ran and average heart rate, running speed, and RPE) from each social condition (alone, with peer). Because all individuals in the study were participants there was interdependence within each pair of
participants who completed the peer condition together. Therefore, mixed-effects regression models were utilized to examine all dependent variables over the two social conditions. Mixed models assume that the data within subjects are dependent among the observations and are therefore commonly utilized to analyze data such as these where interdependence must be accounted for (Gibbons & Hedeker, 1994; Hedeker & Gibbons, 1994).

The social conditions were dummy-coded as either 0 (alone) or 1 (with-peer). Separate models were performed for each of the following dependent variables: liking, total distance ran and average heart rate, running speed, and RPE. All regression analyses utilized the following model:

\[ \text{Dependent variable} = \alpha + \beta_1 \text{ (social condition)} \]

CHAPTER IV

RESULTS

Subject characteristics are listed in Table 1. Dependent variables: distance ran, average speed, heart rate, RPE, and liking across social condition (alone, with-peer) are represented in Table 2. There were no significant effects \( (p \geq .68) \) of social condition for any of the dependent variables.
Table 1. *Subject characteristics* (N = 14)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>20.2 ± 1.4</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>67.54 ± 4.96</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>178.73 ± 5.76</td>
</tr>
<tr>
<td>VO₂ Max (ml · kg⁻¹ · min⁻¹)</td>
<td>72.03 ± 5.91</td>
</tr>
</tbody>
</table>

Table 2. *Distance, HR, RPE, and enjoyment during alone and peer condition*. F-statistic and level of significance for each dependent variable are given.

<table>
<thead>
<tr>
<th></th>
<th>Alone</th>
<th>Peer</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (km)</td>
<td>6.023 ± 0.970</td>
<td>6.073 ± 0.925</td>
<td>0.015</td>
<td>0.902</td>
</tr>
<tr>
<td>Speed (km·hr⁻¹)</td>
<td>12.046 ± 1.904</td>
<td>12.146 ± 1.85</td>
<td>0.015</td>
<td>0.902</td>
</tr>
<tr>
<td>Heart Rate (beats·min⁻¹)</td>
<td>138.3 ± 17.2</td>
<td>136.86 ± 16.74</td>
<td>0.051</td>
<td>0.824</td>
</tr>
<tr>
<td>Perceived exertion</td>
<td>10.39 ± 1.30</td>
<td>10.62 ± 1.21</td>
<td>0.164</td>
<td>0.689</td>
</tr>
<tr>
<td>Enjoyment (cm)</td>
<td>82.78 ± 26.85</td>
<td>86.5 ± 20.32</td>
<td>0.170</td>
<td>0.683</td>
</tr>
</tbody>
</table>

Values are reported as means ± SD, N=14
CHAPTER V

DISCUSSION

Little research is available on the effect of peer influence on exercise behavior in competitive athletes. If training with a partner or group can encourage a greater training intensity or greater liking of that exercise, athletes who train together may benefit from a greater workload and stimulus for adaptation. This could potentially lead to enhanced performance, but may also lead to overtraining if an athlete trains too intensely on intended recovery days (Halson & Jeukendrup, 2004; Lehmann et al., 1997; Urhausen & Kindermann, 2002). Previous experimental research examining the effects of peer influence on exercise in athletes is limited to two studies (Cohen et al., 2010; Williams et al., 1989). Williams et al. (1989) demonstrated that swimming in relay races versus swimming alone increased speed in collegiate swimmers, but only when their times were made visible. Cohen et al. (2010) demonstrated that rowing at a fixed intensity in synchrony with teammates decreased perceived pain relative to the same rowing workout alone. In the study of swimmers, only swimming speed was measured and that was dependant not only on the social condition but also the availability of visible swim times. In the study of rowers, athletes exercised at a fixed intensity, not allowing for the assessment of the effect of peer influence on changes in exercise behavior. The current study examined the effect of the presence of a peer on multiple variables in athletes: intensity, perceived exertion, and liking. These analyses are more similar to experimental research examining the effect of the presence of peers/friends on physical activity.
behavior in children. In these previous studies of the effect of peer influence on physical activity in children, the presence of a peer increased the amount and intensity of physical activity children participated in, as well as their liking of that activity and their motivation to be active (Rittenhouse et al., 2010; Salvy et al., 2009). Contrary to our hypotheses, which were based on these previous experimental research projects on both children and adults, the presence of another runner in the present study did not have a significant effect on exercise intensity, perceived exertion, or liking during a 30-minute treadmill run in highly trained male collegiate distance runners.

The lack of an effect in the present study was unexpected; however, several aspects of the study design and subject characteristics may provide possible explanations for this lack of an effect. For the current study, athletes ran indoors on treadmills, during each running trial. This format was selected in order to increase internal validity and control for extraneous variables such as weather and traffic that may have affected subject behavior had they run on an outdoor trail, track, or roadway. However, treadmill running was not the typical form of training for these participants. All of the runners studied presently reported performing their training runs over ground on outdoor trails, tracks, and/or roads. When training in this fashion, if an athlete runs slower than a partner or group, he will fall behind and must increase his pace to “keep up,” or maintain the slower speed and become separated from the other runner(s). By contrast, while running in pairs on adjacent treadmills, different speeds will cause no change in relative position and thus not require either subject to change speed to “keep pace” with the other. This eliminates some of the potential competitive influence of peers on other runners.
Competition may be of importance as peer influence was shown to have had a significant effect on swimming speed in colligate swimmers during a simulated swim meet during which swimmers were competing with one another (Williams et al., 1989).

We also incorrectly hypothesized that running with a partner may increase liking of that run. While it is clear that athletes of this level possess motivation to train regularly, the rigors of heavy training, especially for a prolonged period as during a competitive season, can potentially be psychologically draining (Daniels, 2005; Halson & Jeukendrup, 2004; Lehman et al., 1997; Martin & Coe, 1999; Noakes, 2004; Urhausen & Kindermann, 2002). The enjoyment level of daily training could play a role in maintaining an athlete’s willingness to adhere to a demanding training regimen throughout a season. While we did not observe an increase in liking during the peer running condition, the laboratory setting of the running trials may have had an overriding influence of the subjects’ liking. Instead of performing their customary training runs outdoors, the participants ran for thirty minutes on treadmills facing a blank wall, and several commented about being “bored” during their runs. Overriding negative feelings about the dull setting may have restricted any change in enjoyment related to the peer condition.

Another possible explanation for the lack of an effect of social condition in the present study is that highly trained and competitive athletes may be different from the average noncompetitive exerciser, in that they do not require any type of social facilitation (Bond, 1982; Bond & Titus, 1983; Carron & Burke, 2004; Carron,
Hausenblas, & Mack, 1996; Cottrell, Wack, Sekerak, & Rittle, 1968; Frederick-Recascino & Schuster-Smith, 2003; Kolata, 2009; Strauss, 2002; Triplett, 1898; Zajonc, 1965) to push themselves in training. If this is the case, competitive athletes may not be as affected by the presence of training partners or teammates in their training behavior as non-athletes (e.g. the previously studied children) are in their physical activity behavior. Collegiate and elite level competitive distance runners, like those in the present study, follow a structured, periodized training plan (Daniels, 2005; Martin & Coe, 1999; Noakes, 2004) to maximize their race performance. This experiment took place during the athletes’ indoor track season, and laboratory visits were scheduled so as not to interfere with intense training sessions or competitions. As such, each runner likely had a specific training objective for each day, and it is possible that they may have focused on completing his intended run regardless of external stimuli. Furthermore, competitive endurance athletes are highly attuned to their training effort, and may be intent on maintaining a defined intensity during a specific training session. The subjects observed commonly used the running trials in place of aerobic conditioning runs, which are also referred to by runners and coaches as “easy” or “base building runs” (Daniels, 2005). Such runs typically fall between 55% and 75% of maximal VO$_2$ pace or approximately 65% to 80% of maximum heart rate (Martin & Coe, 1999), but collegiate distance runners more likely associate physiological training intensities with specific pace ranges. Anecdotally, we observed that several subjects asked what speed in miles·hour$^{-1}$ was equivalent to a certain minute·mile$^{-1}$ pace, and then maintained that speed throughout each trial. Such details raise the question whether collegiate and elite level athletes are so
self motivated in their training behavior that they are less likely to be affected by the presence of others.

Because of the differences between the exercise methodology employed in the present study (treadmill running) and the athletes’ stated preference (track or trail running) future research assessing the effects of peer influence on running performance in distance runners should test this effect using a track (outdoor or indoor). This would allow for the possibility that a runner would have to speed up or slow down to continue to run with their peer. Another limitation of the present study was the lack of female participants. King et al. (1992) suggest that there may be gender differences in the effect of social influence on physical activity. If this is so, female runners may respond differently to a running partner or group than males. Therefore, future studies should seek to assess female athletes as well. Finally, the inclusion of a separate group of non-athletes for comparison to athletes is warranted. Because athletes are often intrinsically motivated, it is possible that they are less affected by external factors believed to influence physical activity behavior (e.g. peer influence) than non-athletes. By comparing athletes to non-athletes a study could elucidate potential difference in the effect of peer influence on physical activity behavior.

CHAPTER VI

CONCLUSION

Based on initial experimental research on the effect of peer influence on physical activity behavior in children (Rittenhouse et al., 2010; Salvy et al., 2009) and athletes
(Cohen et al., 2010; Williams et al., 1989), as well as the social facilitation and self-presentation theories of Zajonc (1965) and Bond (1982), we hypothesized that the presence of a similar peer would increase running intensity and liking in fourteen highly trained, competitive male college distance runners. However, we did not observe a significant effect of peer presence on exercise amount, intensity, or enjoyment in this sample population. This lack of an effect of peer condition may be due to limitations in our study design, or it may suggest that highly competitive athletes are self-driven in their training habits and less affected by the presence of others than non-athletes. Our results highlight the need for continuing research on this topic to further explore the possible effect of peer influence on exercise and training behavior in competitive athletes and non-athletes.
APPENDICES
APPENDIX A

INFORMED CONSENT FORM
Appendix A

Informed Consent Form

Informed Consent

Title: Training behavior in collegiate distance runners

1) Introductory Statement.
It is a principle of medical ethics that the human subject participants of a research project be informed of the purpose and benefits of the project; the research methods to be used; the potential risks or hazards of participation and the right to ask for further information at any time during the research procedure. You have the right to know whether medical treatment or compensation is available for physical injuries incurred as a result of participation in the project. Your choice to participate is a voluntary one, and you are free to withdraw from the research project at any time. Your signature at the end of this consent form will indicate that the principal investigator, or his/her agent, has answered all your questions and that you voluntarily consent to participate in this investigation.

2) Purpose/Research Methods of the Study.
The purpose of this study is to assess how competitive distance runners behave when training. If you decide to participate in this study, you will be asked to report to the Kent State University Exercise Physiology Laboratory on three occasions. In the first session, your height and weight will be measured. You will then have your maximal aerobic capacity (VO\textsubscript{2} max) and ventilatory threshold tested by running on a treadmill and breathing into a machine that analyzes the air you exhale. This will require a brief but maximal effort from you. In the following two sessions, you will run on a treadmill for 30 minutes. This will not require a strenuous effort and should not interrupt your training program. These two thirty minute runs will be done at aerobic conditioning, “base building” or easy-moderate intensity. You should treat them like a normal distance run on a non-workout day. You will run one of these sessions alone and another alongside a training partner. You will be free to control the speed of the treadmill, but this is not a test of how fast you can run. While you run, we will track your heart rate and ask you how hard you are exerting yourself. At the end of each run, we will ask you how much you enjoyed the activity. Refreshments will be provided after each run.

The ultimate objective of this study will be to publish the findings in a scholarly journal, as well as present these findings at a scientific research conference. Your identity is confidential and the experimental results are anonymous. All collected data, including yours, will only be presented in aggregate.

3) Duration of the Project.
Each lab visit will take approximately 60 minutes. The final two visits are to be completed within a single week.
4) **Potential Benefits of Participation.**

$\text{VO}_{2}\max$ is one of the principal determinants of endurance running performance. The information we find in your test can help you gauge your fitness level, set goals for your competitive season, and more precisely determine individually appropriate training paces.

Your participation in the study will also expand the current knowledge of optimal training for competitive athletes and possibly determine new methods of increasing the effectiveness of training.

5) **Potential Risks of Participation.**

As with any type of physical activity, there are some risks to participation. These risks are minimal but may include fatigue, shortness of breath, muscle soreness, or dizziness. However, as a trained distance runner, nothing in this study should exceed routine practice for you. You are free to stop exercising at any point due to abnormal discomfort. Only trained and experienced staff will supervise each exercise session, minimizing any risks to you. Medical Assistance or emergency medical treatment by the University Health Center is provided only to currently registered students. In other cases of physical injuries “911” will be called. You or your medical insurance will be billed for this service. No other medical treatment or financial compensation for injury from participation in this project is available.

6) **Alternate Methods of Treatment.**

The alternative is not to participate.

7) **Cost to the Participant.**

There is no cost to you participating in this study.

8) **Compensation and Medical Care.**

You will receive a $15 gift certificate to a local store of your choosing for each lab visit that you complete ($45 total if you complete all three laboratory visits). This gift certificate will be given upon the completion of your participation in the study. Medical Assistance or emergency medical treatment by the University Health Center is provided only to currently registered students. Please be advised that for all others, “911” will be called for physical injuries occurring on the Kent State University main campus. You or your medical insurance will be billed for this service. No other medical treatment or financial compensation for injury from participation in this project is available.

9) **Right to Withdraw Any Time.**

Your participation in this study is voluntary and you may stop your participation at any time without prejudice.
10) **Contact Person.**
Jacob E. Barkley, Ph.D. Assistant Professor Exercise Science, School of Health Science, MAAC Annex, Room 163E, 350 Midway Dr., Kent, Ohio 44242, (330-672-0209).

11) **Institutional Review Board Approval**
This project has been approved by the Kent State University Institutional Review Board to use human research subjects. If you have any concerns involving the research methods or protocol that you do not wish to discuss with the principal investigator or faculty advisor, you may contact the Institutional Review Board Compliance Assistant: Laurie B. Kiehl, Office of Safety and Research Compliance, Research and Graduate Studies, 122 Cartwright Hall. (330-672-2704).

12) **Confidentiality.**
Information related to you will be treated in strict confidence to the extent provided by law. Your identity will be coded and will not be associated with any published results. Your code number and identity will be kept at the Kent State University in a locked file of the Principal Investigator.

13) **Statement of Voluntary Agreement to Participate.**
All of the above has been explained to me and all of my current questions have been answered. I understand that I am encouraged to ask questions about any aspects of this research study, and that future questions will be answered by the researchers listed below:

Jacob E. Barkley, Ph.D. Assistant Professor Exercise Science, School of Health Science, MAAC Annex, Room 163E, 350 Midway Dr., Kent, Ohio 44242, (330-672-0209).

By signing this form I understand that I do not waive any of my legal rights.

By signing this form, I agree to participate in this research study. A signed copy of this consent form will be given to me.

__________________________  ____________________________  ____________
Participant’s Name          Participant’s Signature         Date

__________________________  ____________________________
Witness’ Name               Witness’ Signature            Date

I certify that the nature and purpose, the potential benefits and possible risks associated with participation in this research study have been explained to the above individual and that any questions about this information have been answered.

__________________________  ____________________________  ____________
Principal Investigator’s Name  Principal Investigator’s Signature          Date
APPENDIX B

LIKING VISUAL ANALOG SCALE
Appendix B

Liking Visual Analog Scale

Liking Visual Analogue Scale

Name: _____________________

Date: ___/___/___

Do not like it at all.  

Like it very much.

Left side  

Right side
APPENDIX C

BORG RPE SCALE
Appendix C

Borg RPE Scale

6  No exertion at all
7  Extremely light
8  Very light
9  Light
10 Somewhat hard
11 Hard (heavy)
12 Very hard
13 Extremely hard
14 Maximal exertion
APPENDIX D

SUBJECT BASELINE DATA COLLECTION FORM
Appendix D

Subject baseline data collection form

Subject Baseline Data

Date: _____________________
Subject #: _____________________
Birth Date: _____________________
Age: _____________________
Height (cm): _____________________
Weight (kg): _____________________
VO2 Max (ml · kg⁻¹ · min⁻¹): _____________________
Ventilatory Threshold (VT): _____________________
APPENDIX E

RUNNING TRIAL DATA COLLECTION FORM
Appendix E

Running trial data collection form

Distance Running Research

Participant name and #:______________________

Date:______________

Condition 1:   Alone   Peer

If peer condition peer name and #:______________   Friend?______________

1:_____  2:_____  3:_____  4:_____  

Minute 5

Speed:_______  HR:_______  RPE:_______  Avg HR:_______

6:____  7:____  8:____  9:____  

Minute 10

Speed:_______  HR:_______  RPE:_______  Avg HR:_______

11:____  12:____  13:____  14:____  

Minute 15

Speed:_______  HR:_______  RPE:_______  Avg HR:_______

16:____  17:____  18:____  19:____  

Minute 20

Speed:_______  HR:_______  RPE:_______  Avg HR:_______

21:____  22:____  23:____  24:____  

Minute 25

Speed:_______  HR:_______  RPE:_______  Avg HR:_______
Minute 30

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

Finish

Distance: ________  Avg. Speed: ________  Avg. HR: ________  Avg RPE: ________
Liking: ________

Date: ________

Condition 2: Alone  Peer

If peer condition peer name and #: ________  Friend? ________

Minute 5

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

Minute 10

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

Minute 15

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

Minute 20

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

Minute 25
Speed: ________  HR: ________  RPE: ________  Avg HR: ________

26:____  27:____  28:____  29:____

**Minute 30**

Speed: ________  HR: ________  RPE: ________  Avg HR: ________

**Finish**

Distance: ________  Avg. Speed: ________  Avg. HR: ________  Avg RPE: ________

Liking: ________
APPENDIX F

RECRUITMENT FLYER
COMPETITIVE INTERCOLLEGIATE DISTANCE RUNNERS

Participate in a research study on competitive runners’ training habits

• 3 lab visits
• FREE VO₂ Max and Ventilatory Threshold Test
• $45 Compensation

For more information please contact
Andrew Carnes, B.S. Exercise Physiology
Email: acarnes1@kent.edu    Phone: 330-327-6385
APPENDIX G

PHONE RECRUITMENT SCRIPT
Appendix G

Phone recruitment script

Carnes Thesis Project Phone Script

Hello, this is _____________________ from the Exercise Science Lab at Kent State University.

If experimenter is calling a person from the data base:

- I am calling because you have previously expressed interest in a study in our laboratory and you indicated your willingness to be contacted for future studies. Would you like to hear about a new study that your child may qualify to participate in?

If experimenter is returning a call regarding the study:

- I am returning your call regarding the distance running study. Would you like to hear about the study?

If you get the answering machine follow this script:

Hello, this is _____________________ from the Applied Physiology Lab at Kent State University. I am returning your phone call about your interest in the distance running study in our laboratory. We have a new study that you may be eligible for. This study consists of three laboratory visits and you will receive a $45 gift certificate for your participation. Please call us at 330-672-0209 for more information regarding the “distance running” study. Please leave a voicemail with your name, phone number and a good time to call. Someone will return your phone call promptly. Thank you.

If experimenter is answering a call regarding the study:

- Yes I would be happy to explain the “distance running” study.

The purpose of this study is to assess how competitive distance runners behave when training. If you decide to participate in this study, you will be asked to report to the Kent State University Exercise Physiology Laboratory on three occasions. In the first session, your height and weight will be measured. You will then have your maximal aerobic capacity (VO₂ max) and ventilatory threshold tested by running on a treadmill and breathing into a machine that analyzes the air you exhale. This will require a brief but maximal effort from you. In the following two sessions, you will run on a treadmill for 30 minutes either alone or with a fellow runner running on a treadmill next to yours. This will not require a strenuous effort and should not interrupt your training program. These two thirty minute runs will be done at aerobic conditioning or “base building” intensity. You should treat them like a normal distance run on a non-workout day. You will be free
to control the speed of the treadmill, but this is not a test of how fast you can run. While you run, we will track your heart rate and ask you how hard you are exerting yourself. At the end of each run, we will ask you how much you enjoyed the activity. Refreshments will be provided after each run. After completing the laboratory visits, your portion of the study will complete and you will receive a $45 gift certificate for your participation.

Any information obtained from you, including this phone screen, will be treated in strict confidence. This phone screen is voluntary and you may stop at any time. Do you have any questions? Does this sound like something you are interested in?

If no. Thank you for your time.

If yes. Great, I have a few questions to ask you to determine if you are eligible to participate in this study. This will only take a couple of minutes and you can ask me questions at any time.

1. Answer questions on medical history

2. Are you a male between the ages of 18 and 2?  
   
   Y or N

3. What college do you run for?
   
   __________________________

4. What is your primary competition distance?
   
   __________________________

5. On average, how many miles per week do you run? This shouldn’t be your lowest or your peak mileage, but an estimate of your average weekly running.  
   
   ________________

6. Prior to your most recent competitive season, were you cleared by a physician to practice and compete?  
   
   Y or N

7. Are you able to visit the laboratory 3 times, Monday – Friday?  
   
   Y or N

*Screener: Participants must be male collegiate or post-collegiate distance runners age 18-25, competing at 1500-10,000m, running 60+ mi/wk average, and cleared by a physician.

Is the caller eligible?  

Y or N
APPENDIX H

MEDICAL HISTORY FORM
Appendix H

Medical history form

Medical History

Subject #___________ Date___/___/_____
Name__________________________________________
Address ____________________________________________________________________________

Phone Number____________________________________
Age_____ (must be 18) DOB___/___/______ Sex  m  f
Height _____ in  Wt _____ lbs
Height _____ cm (inches *2.54)  Wt _______kg (lbs/2.2)

Which ethnic group do you most identify with (circle response):
American Indian or Alaskan Native  Asian or Pacific Islander  Black, not of Hispanic Origin
Hispanic White, not of Hispanic Origin
Other________________________

Y/N

___ Has a doctor ever said that your blood pressure was too high or too low?
___ Have you ever had pain in their heart or chest?
___ Have you ever notice extra heart beats, skipped beats or a racing heart?

___ Has a doctor ever said that you have heart trouble, an abnormal electrocardiogram (ECG or EKG), heart attack, or coronary?

___ Do you often have trouble breathing?
___ Have you ever been diagnosed with asthma?
___ Have you ever been diagnosed with diabetes?
___ Do you have any orthopedic limitations to physical activity?
Do you have any other medical conditions that affect your ability to safely participate in physical activity? If yes, explain. ________________________________________________________
____________________________________________________________________________
________________________________________________

Are you willing to sample activities that involve running, jumping and throwing?  Y   N

Are you currently taking any medication(s)?   Y   N
If yes, please describe the medication(s)____________________________________________
_____________________________________________________________________

Are you involved in any club or school sport teams?   Y   N
If yes, what sport(s) and how frequently each week?
____________________________________________

Do you have any questions?

Does the subject seem eligible?  Y   N

Date of first appointment: _____________________
REFERENCES


