



Original article

Physiological responses and exercise preference between the Trikke and the bicycle ergometer

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Received 28 August 2015; revised 17 December 2015; accepted 11 January 2016

Available online 23 April 2016

Abstract

Background/Objective: The positive relationship between health benefits or the wellbeing of individuals and their engagement in physical activity is well-documented. Nevertheless, many Americans show no interest or perceive that “exercise is boring” as one of the reasons for not exercising. For these reasons, it is important to promote fun and enjoyment aspects of the activity to motivate people to participate in physical activity. The purpose of this study was to examine the physiological responses and the perception of enjoyment between the Trikke and the bicycle ergometer. **Methods:** Thirty college students (15 males and 15 females) aged 18–45 years old voluntarily participated in the study and showed up on three occasions. The first session involved a 5-minute instructional video and practice on the Trikke. Participants were then randomized into sessions which involved either riding the Trikke or the bicycle ergometer. Participants of each group performed a 20-minute ride at 75–80% of maximal predicted heart rate. **Results:** Results of mixed design analysis of variance (ANOVAs) indicated that VO_2 , energy expenditure, and rate of perceived exertion (RPE) of the participants were significantly ($p < 0.001$) higher when using the bicycle ergometer than the Trikke, and female participants were able to manipulate the Trikke more efficiently than their male counterparts. **Conclusion:** Participants were more efficient in using the Trikke than the bicycle ergometer. The Trikke may be an enjoyable alternative for those individuals, particularly women, who have lost interest in traditional forms of exercise. Copyright © 2016, The Society of Chinese Scholars on Exercise Physiology and Fitness. Published by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Energy expenditure; Oxygen consumption; Physical inactivity; Rate of perceived exertion

Introduction

The benefits of physical activity are well-documented. There is tremendous evidence supporting the positive relationship between health benefits or the wellbeing of individuals and their engagement in physical activity. For example, it has been demonstrated that physical activity can reduce the risk of coronary heart disease, hypertension, diabetes, and

osteoporosis as well as some forms of cancer.^{1–4} The American College of Sports Medicine and the Centers for Disease Control and Prevention recognize that considerable health benefits can be achieved by engaging in physical activity for at least 30 minutes 3–5 days a week, if not all days a week, performed at a metabolic equivalent of task (MET) level of 3–6.⁵ In fact, a considerable reduction of most causes of mortality has been found with an energy expenditure of 1050 Kcal/wk.⁶ Additional benefits of physical activity include the improvement of cardiorespiratory and muscular fitness, strength, and flexibility⁷ and the reduction of depression and anxiety symptoms.⁸

In spite of the known benefits of participating in physical activity, it is estimated that 31% of the world's population is

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physically inactive, and over 80% of adolescents (13–15 years old) do < 60 minutes of moderate to vigorous physical activity each day.⁹ Even for those who participate in exercise programs, the dropout rate is 45%.¹⁰ Conventional exercise training programs emphasize the nature of the exercise protocol itself such as the time, duration, intensity, and type of exercise.¹¹ Most recent researchers, however, support the notion that other factors such as pleasure and affective responses should be included in exercise prescription.^{12,13} For example, Salmon et al,¹⁴ showed that there was a strong positive relationship between preference or enjoyment and the degree of activity among 1332 adults. After studying a group of male police officers, Soremsen¹⁵ concluded that enjoyment was the most significant determinant of physical activity and fitness. Merrill et al¹⁶ surveyed 675 participants in the World Senior Games and found that what motivated physically active individuals to do physical activity was recreational enjoyment or fun, whereas sedentary individuals were mostly motivated by improving their quality of life.

With the recognition of the importance of exercise at any age, Trikke Tech Inc. (Buellton, CA, USA) has developed a human powered transportation (the “Trikke”) that requires no pedaling.¹⁷ According to the company, the three-wheel Trikke can engage the rider's muscles of the upper legs, buttocks, upper arms, and shoulders by standing and carving back and forth. It is a full body workout that combines both strength training and cross training for maximal cardiovascular benefits without impact.¹⁸ Many Americans claim loss of interest or perceive that “exercise is boring” are stated as reasons for not exercising. In order to increase the participation in physical activity, it is important to intrigue interest and enjoyment with the activity. To the best of our knowledge, no study has been done to compare both the physiological and psychological benefits of exercise equipment. The purpose of this study was to assess the physiological responses and the perception of enjoyment between the Trikke (a nontraditional exercise equipment) and the bicycle ergometer (a traditional exercise equipment). Specifically, the following physiological variables of the participants were measured: exercise heart rate, rate of perceived exertion (RPE), VO_2 , and energy expenditure. Meanwhile, we also compared the outcomes of the males with those females. The purpose to establish those sex differences would be useful for personal trainers and personnel in the health-fitness industry when planning physical activity programs and exercise descriptions.

Materials and methods

Participants

Thirty young college students (15 males and 15 females) aged 18–45 years old voluntarily participated in the study. Prior to participation, each individual completed a consent form approved by the Institutional Review Board, Cleveland State University (Cleveland, Ohio) after they were informed of the procedures and possible risks involved in the study. In addition, the participants were asked to complete the

American Heart Association/American College of Sports Medicine Preparticipation Questionnaire to make sure only individuals with a low risk status participated in the study. None of the participants had prior experience in using the Trikke. Demographic characteristics (age, height, and body weight) of the participants are presented in Table 1.

Protocol

Participants were required to show up on three different occasions. In the first meeting, a 5-minute instructional video on the Trikke was shown to the participants. After the video, the participants were provided with the opportunity of practicing on the Trikke T8 (Trikke Tech Inc.) with protective gear (e.g., a helmet as well as elbow and knee pads). They could practice as long as they liked until they felt comfortable and were familiar with the maneuver of the Trikke. Upon completion of the practice session, participants were randomly scheduled to the next two sessions, which involved either riding the Trikke T8 (Trikke Tech Inc., see Figure 1) or the Monark Ergonomic 828 E bicycle ergometer (Monark Exercise AB, Vansbro, Sweden, see Figure 2). There was a minimum of 24 hours rest for the participants between these two sessions.

In both sessions, participants were equipped with a Polar heart rate monitor (Polar Electro Inc., Lake Success, NY, USA) and a COSMED K4 oxygen/carbon dioxide portable analyzer (COSMED, Rome, Italy, see Figures 1 and 2). They then performed a 20-minute ride on each of the machines at 75–80% of maximal predicted heart rate, which was expressed as $220 - \text{age}$.¹⁹ The Trikke session was performed in an indoor gymnasium whereas the ergometer session was conducted in the Human Performance Laboratory at the researchers' University. A research assistant showed the Borg Scale 6–20 chart²⁰ to each participant every 5 minutes throughout each exercise protocol, and their RPE was recorded.

Questionnaire

Upon completion of both exercise protocols, the participants were asked to complete the Exercise Preference Questionnaire (EPQ), which was developed by the researchers for the purpose of this study. The EPQ had nine items (see Table 2), and item responses were based on a 5-point Likert scale (e.g., 1 = “very strongly disagree”, 3 = “neutral”, and 5 = “very strongly agree”). In an effort to reduce response bias,²¹ the EPQ included two negatively worded items: “The Trikke is boring.” and “The Trikke is not for me.”

Table 1
Demographic characteristics of the participants.

Variable	Total (N = 30)	Male (n = 15)	Female (n = 15)
	Mean ± SD	Mean ± SD	Mean ± SD
Age (y)	25.1 ± 5.1	24.0 ± 3.3	26.3 ± 6.3
Height (cm)	171.7 ± 9.5	177.8 ± 5.8	165.7 ± 8.6
Body weight (kg)	73.4 ± 13.6	81.7 ± 11.9	65.1 ± 9.7

SD = standard deviation.

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