



Effect of exposure to greater active videogame variety on time spent in moderate- to vigorous-intensity physical activity



Hollie A. Raynor^{a,*}, Chelsi Cardoso^a, Dale S. Bond^b

^a Department of Nutrition, University of Tennessee, 1215 W. Cumberland Avenue, JHB 341, Knoxville, TN 37996-1920, USA

^b Department of Psychiatry and Human Behavior, Warren Alpert Medical School of Brown University, The Miriam Hospital/Weight Control and Diabetes Research Center, 196 Richmond St., Providence, RI 02903, USA

HIGHLIGHTS

- Exposure to greater variety may prolong behavioral responding via delayed habituation.
- Participants were exposed to 1 or 4 different active videogames in a 60-min session.
- Exposure to only 1 active videogame produced a decrease in session activity.
- Exposure to 4 active videogames did not produce a decrease in session activity.
- Exposure to a variety of physical activity stimuli may increase physical activity.

ARTICLE INFO

Article history:

Received 15 December 2015

Received in revised form 7 April 2016

Accepted 8 April 2016

Available online 14 April 2016

Keywords:

Variety

Habituation

Physical activity

Active videogames

ABSTRACT

Background: This investigation examined whether exposure to greater active videogame variety increases moderate- to vigorous-intensity physical activity (MVPA).

Methods: Twenty-three participants (age = 22.7 ± 4.2 yrs; body mass index = 23.5 ± 3.0 kg/m²; self-reported MVPA = 298.7 ± 116.7 min/wk; 62.2% female; 73.9% Caucasian) participated in VARIETY (4 different active videogames during 4, 15-min bouts) and NON-VARIETY (only 1 active videogame during 4, 15-min bouts) counterbalanced sessions. VARIETY provided a different active videogame in each bout. NON-VARIETY provided participants their most highly liked active videogame in each bout. The Sensewear Mini Armband objectively assessed MVPA.

Results: For MVPA minutes, a session \times bout ($p < 0.05$) interaction occurred. In NON-VARIETY, bouts 2, 3, and 4 had significantly ($p < 0.05$) fewer minutes than bout 1, with no decrease occurring in VARIETY. In bout 4, VARIETY had significantly ($p < 0.05$) more minutes than NON-VARIETY. A main effect of session ($p < 0.05$) occurred for MVPA minutes and energy expenditure, with VARIETY achieving greater amounts (31.8 ± 14.3 min vs. 27.6 ± 16.9 min; 186.1 ± 96.8 kcal vs. 171.2 ± 102.8 kcal).

Conclusions: Exposure to greater activity variety within a session increased MVPA. Future research should examine exposure to a variety of activities over a longer time frame with participants of differing lifestyles in free-living environments.

© 2016 Published by Elsevier Inc.

1. Introduction

Engaging in regular and sustained amounts of physical activity (PA), defined as activity engaged in at an intensity level of ≥ 3.0 metabolic equivalents (METs), is associated with reduced risk of the development and progression of cardiometabolic disease [1]. Thus, increasing knowledge about factors that influence PA can assist in understanding what strategies or recommendations may be provided to individuals to assist

with increasing and/or sustaining high levels of PA to improve and optimize health.

PA variety is one novel factor that might influence PA [2]. Research investigating the effect of variety on behavior has found that exposure to a greater variety of stimuli that prompt the same behavior prolongs engagement in the behavior [3]. It is believed that this response is due to a decreased rate of habituation. Habituation, a form of learning, is demonstrated when there is a decreased response to exposure to the same stimulus, with the reduced response being unrelated to other non-psychological factors, such as fatigue [4]. With more varied stimuli, habituation slows, prolonging the response [4]. Interestingly, when observational studies in children and adults have examined the

* Corresponding author.

E-mail addresses: hlaynor@utk.edu (H.A. Raynor), ccardoso@utk.edu (C. Cardoso), dbond@lifespan.org (D.S. Bond).

relationship between PA variety (i.e. number of different activities performed) and level of engagement in PA, most [2,5–9], but not all studies [10], have reported a positive relationship between the number of activities performed and PA. This suggests that engaging in a variety of activities may assist with increasing PA.

Only two experimental studies with children and one experimental study with adults have examined the effect of exposing participants to a greater variety of PA options on time spent in PA, with all studies finding that conditions with greater variety produced more time spent in PA [11–13]. Unfortunately, the adult study did not collect objective measures of PA [13]. Additionally, all three studies presented exposure to the greater variety of PA options all at once, which is believed to also enhance feelings of choice. As enhanced choice is known to positively motivate behavior [12], it is not clear if the increased PA found in the variety conditions was a function of exposure to a greater variety of PA options that prolonged habituation or due to feelings of greater choice.

“Exergaming” is a form of entertainment that combines videogaming with PA. Active videogames (videogames that rely on technology that tracks body movement or responses so that the game may progress) [14] increases energy expenditure above that which occurs with passive video games (electronic games played seated using a conventional gamepad controller) [14], and many active videogames have shown the ability to assist players with engaging in moderate-intensity PA [15]. This indicates that active videogames may be a viable strategy to assist with increasing PA [15].

One aspect of active videogames that may enhance engagement in PA more so than traditional forms of PA is that active videogames enhance exposure to variety, both across (i.e., dance, fitness, sports) and within (sports: soccer, tennis, track and field) games, with little need for new equipment or facilities. Thus, active videogames provide both an ideal opportunity to increase exposure to variety and a model to test the effects of variety on PA.

Thus the purpose of this study was to examine the effect of exposure to a greater variety of active videogames on objectively measured minutes of moderate- to vigorous-intensity PA (MVPA) and MVPA-related energy expenditure during a 60-minute laboratory session in non-obese, regularly active adults. Each 60-minute session was split into 4, 15-minute bouts in which participants were exposed to the same active videogame (NON-VARIETY) or a different active videogame for each bout (VARIETY). Providing only one activity choice in each bout reduced the potential confound of increased choice found in other studies that have manipulated variety. Thus, while each bout had only one activity choice, in VARIETY each bout provided exposure to a new active videogame, which did not occur in NON-VARIETY. It was hypothesized that exposure to a greater variety of active videogames would increase the amount of time spent in MVPA and MVPA-related energy expenditure. Additionally, it was anticipated that the amount of MVPA and MVPA-related energy expenditure would decrease across the four bouts in NON-VARIETY, indicating more rapid habituation.

2. Methods

2.1. Study design and participants

This study used a $2 \times 2 \times 4$ mixed factorial design, with the between-subject factor of order (VARIETY and NON-VARIETY sessions were counterbalanced), and the within-subject factors of session (VARIETY and NON-VARIETY) and bouts (1, 2, 3, & 4). Primary dependent variables were minutes of MVPA and MVPA-related energy expenditure as measured by the Sensewear® Mini Armband (SWA). This study was approved by the Institutional Review Board at the University of Tennessee and was registered with ClinicalTrials.gov (Identifier: NCT01441544).

Participants were recruited from October 2011 to September 2015 from flyers hung around the university campus. Interested individuals were phone screened and told the purpose of the study

was to investigate the effects of engaging in active videogames on liking of videogames. Eligibility criteria included: aged 18 to 35 years, body mass index (BMI) between 18.5 and 29.9 kg/m², physically able to play and had previously played an active videogame, liked (scoring ≥ 50 on a 100 mm visual analogue scale [VAS]) playing the active videogames used in the investigation, and regularly active (engage in ≥ 150 min/week of MVPA). The eligibility criteria related to the active videogames and engaging in regular activity were used to identify participants that may choose to spend some time during each session playing an active videogame, allowing for the manipulation of access to variety to be examined and not be confounded with other factors that may influence active videogame playing, such as being unfamiliar with active videogames, inability to engage in PA, or inability to engage in PA for 4, 15-minute bouts (60 min of PA). Eighty-three potential participants were phone screened and 23 participants were eligible and completed the protocol. Sixty potential participants were ineligible: 23 were not interested, 11 did not like the active videogames, 10 were not regularly active, 7 had a BMI outside of eligibility range, 5 could not complete sessions within required time frame, 2 did not show for the screening session, 1 had an age outside of eligibility criteria, and 1 had a malfunction in the Sensewear Mini Armband (SWA) during one session and PA data were not collected.

2.2. Procedures

Participants who appeared to be eligible following the phone screen were invited to an in-person screening session. At the screening session, informed consent was obtained, participants' height and weight were measured, and a Seven-day Physical Activity Recall [16] was conducted. Participants engaged in 3 min of playing each of the 4 active videogames and rated their liking of each game on a 100 mm VAS [17]. Eligible participants were scheduled for 2 individual, 80-minute experimental sessions, between the times of 10 am and 7 pm, with the two sessions scheduled at the same time of day and no more than 7 days apart. Participants were asked to refrain from engaging in MVPA during the day prior to their scheduled session.

At the start of the next session, participants rated their liking of the 4 active videogames and their feelings of energy and tiredness using a 100 mm VAS. The SWA was placed on the upper right arm of the participant to measure MVPA. In both sessions participants completed 4 individual, 15-minute bouts during which they played active videogames or sat quietly and read popular magazines (each week the same magazines were available, but the current weekly versions were provided), providing participants with a choice of engaging in physical activity or not throughout each bout. Participants commenced each 15-minute bout by starting the videogame (playing for approximately 10 s) to ensure that they remembered how to play the videogame. However, after starting the game, participants could choose to play the active videogame or read and alternate between both activities during each 15-minute bout. In the NON-VARIETY session, participants were exposed only to their most highly liked active videogame for each of the 4 individual, 15-minute bouts, while in the VARIETY session participants were exposed to all 4 active videogames, with 1 different game accessible for each of the 4 individual, 15-minute bouts. In the VARIETY session the order of the presentation of the active videogames was randomly determined. A two-minute break occurred between bouts to allow for the videogame to be reset. Bottled water was freely available to participants during the sessions, and the sessions were conducted in a temperature controlled room (70 °F). At completion of the two experimental sessions, participants were compensated with a \$25 gift card.

2.3. Active videogames

This investigation used the Xbox 360 Kinect®, which is a controller-free gaming system where participants are required to engage in

Download English Version:

<https://daneshyari.com/en/article/2843879>

Download Persian Version:

<https://daneshyari.com/article/2843879>

[Daneshyari.com](https://daneshyari.com)