

# Comparisons of College Students' Enjoyment in Physical Activity & Exergames

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## Abstract

The purpose of this study was to compare college students' enjoyment levels in three domains of activity (traditional physical activities, exergames, and non-exergames). Volunteers (n = 141) from a Midwestern university completed an online survey composed of a modified version of the Physical Activity Enjoyment Scale (PACES). Significant differences were detected across the three domains regarding level of enjoyment,  $F(2, 232) = 32.49$ ,  $p < .001$ , with the highest enjoyment levels reported in the traditional physical activity domain. Additional results revealed that Wii Sports (49%) and Just Dance (29%) had the highest percentage of use with exergamers, while non-exergame participants reported playing video games such as Pokémon, Zelda, Mario Kart, Madden (59%), and Clash of Clans (25%). These results suggest that traditional physical activities and exergaming activities are psychologically enjoyable pursuits for college-aged individuals that can help increase their physical health and quality of life.

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**Keywords:** Exergames, Physical Activity, Enjoyment

## Introduction

Several factors exist that may influence individuals to participate in being physically active. In general, a person's interests, their likes or dislikes, typically influence which activities they will enjoy, and one's motivation to participate is closely tied to their level of enjoyment. More specifically, perceived enjoyment is one major reason why people choose to participate in being physical active (Barr-Anderson, van den Berg, Neumark-Sztainer, & Story, 2008; Coulter & Woods, 2011; Dunton & Vaughan, 2008; Motl et al., 2001; Weinberg & Gould, 2014), which can include both traditional (e.g., running, weight training) and non-traditional activities using video gaming technology (e.g., exergaming). For instance, Yang and

colleagues (2014) found that college students who were monitored for moderate to vigorous activity levels during an exergame experience were able to achieve the recommended ACSM physical activity standards while also indicating that the participants enjoyed the exergaming experience. For the purpose of this study, exergaming is defined as playing a video game that requires people to be physically active during the game. This type of video game play is differentiated from non-exergaming, which could be considered more sedentary, and does not require one to be physically active during play (e.g., Madden or League of Legends).

Recent studies have investigated differences in enjoyment levels based on whether the event is more physically active in a traditional sense or whether the event is more grounded in exergaming. For instance, young female adults rated playing exergames (e.g., Just Dance) as more enjoyable than sedentary videogames and treadmill walking (Dunton & Vaughan, 2008). Likewise, children have reported higher enjoyment levels in interactive dance games than in traditional physical activities (Gao, Zhang, & Podlog, 2014). Some of these previous studies focused on players' perceived levels of enjoyment using the Physical Activity Enjoyment Scale (PACES, Kendzierski & DeCarlo, 1991). While it appears a few of these studies indicate that exergaming is more enjoyable than some activities, it could be that the use of predetermined traditional physical activities may have biased the participants' perceived levels of enjoyment and therefore skewed the results (Gao et al., 2014; Gao, Zhang, & Stodden, 2013).

Thus, understanding the different types of activities that are enjoyable to most individuals could be beneficial for health researchers and individuals interested in using interactive video games as a way of increasing physical activity levels. A recent meta-analysis suggests that playing exergames can provide light- to moderate-intensity physical activity (Peng, Lin, & Crouse, 2011). Therefore, activities perceived as enjoyable are likely to encourage sustained health-related activity involvement, and understanding or identifying enjoyment levels in various types of games or activities may provide researchers with information to help motivate individuals to increase their health and quality of life (e.g., Robinson, Dixon, Macsween, van Schaik, & Martin, 2015).

The purpose of this study was to compare college students' enjoyment levels across three domains of activity (traditional physical activities, exergames, and non-exergames) and to identify the most frequently played video games. The main research question for this study is to determine if differences in enjoyment levels exist between physical activity and playing video games. We further hypothesize that individuals will feel more enjoyment when playing exergames compared with playing non-exergames.

## Methods

### Participants

College students were recruited through university email lists, instructors' verbal announcements in classes, at a video game tournament, and through the Psychology Department's online research participant pool. A total of 141 college students from a Midwestern university completed an online survey in the spring semester of 2015. Only 122 volunteers provided demographic information such as sex, age, and ethnicity. Participants were 40 men and 82 women with an average age of  $21.24 \pm 1.37$ . The majority of the participants were Caucasian ( $n = 112$ ), with eight Asian Americans, one African American, and one Hispanic American.

Table 1. *Participant characteristics*

| Characteristic   |             |
|------------------|-------------|
| Age              |             |
| Range            | 18-25       |
| Average          | 21          |
| Sex              |             |
| Female           | 82 (58.2%)  |
| Male             | 40 (28.4%)  |
| No response      | 19 (13.4%)  |
| Ethnicity        |             |
| Caucasian        | 122 (86.5%) |
| African American | 1 (.76%)    |
| Asian            | 8 (5.6%)    |
| Hispanic         | 1 (.76%)    |
| Pacific islander | 1 (.76%)    |
| No response      | 8 (5.6%)    |

### Measures

Participation in traditional physical activities, exergames, and non-exergames were measured using the International Physical Activity Questionnaire (see O'Loughlin, Dugas, Sabiston, & O'Loughlin, 2012), which is a physical activity monitoring instrument for assessing types and frequency of involvement. To assess physical activity involvement, participants were asked, "What physical activity do you do the most (Running/Weight Training/Playing Sports /Other; if other, list name)?" To assess exergame involvement, participants were asked, "Do you play video games that require you to be physically active (e.g., Dance Dance Revolution, Wii Sports, Wii Fit, or Just Dance)?" Those who answered "yes" were asked "What exergames do you play the most (Dance Dance Revolution/Wii Sports/Wii Fit/Just Dance/Other; if other, then write the name)?" To assess non-exergames, participants were asked, "What non-physically active video game do you play the most (League of Legends/Clash of Clans/Minecraft/Other; if other, then write the name)?"

If participants indicated that they engaged in some type of traditional physical activity, exergames, and/or non-exergames, they were asked to report their perceived enjoyment levels in their reported activities using the PACES (Kendzierski & DeCarlo, 1991). Participants rated their enjoyment levels by responding to the 18 items with the statement “Please rate how you *typically feel* when you are playing this physical activity/exergame/non-exergame.” The scale uses a seven-point bipolar rating (e.g. “I enjoy it...I hate it,” “I feel bored...I feel interest,” “It’s very pleasant...It’s very unpleasant”). Scores can range from 18 to 126, with higher scores indicating more enjoyment. Kendzierski and DeCarlo reported Cronbach alpha coefficients of .93 and .96 in their previous investigations using the PACES, along with providing construct validity (1991). For this study, Cronbach alpha coefficients on the PACES showed high internal reliability for all three groups/domains (.93 traditional physical activity, .93 exergames, and .91 non-exergames). The PACES, therefore, was deemed reliable for measuring enjoyment levels.

## **Procedure**

A research participation invitation was emailed to college students with a cover letter and a link to an online survey. Students who were interested in participating in the study voluntarily responded to the secured online survey. All data were collected and recorded anonymously. The study was approved by the university Institutional Review Board (IRB), and participants provided consent to participate in the study by completing a consent form at the beginning of the online survey.

## **Data Analysis**

Data were first separated into the three domains. Participants were allowed to provide enjoyment ratings in one, two, or all three domains based on whether they participated in those activities. One hundred forty-one participants provided data resulting in 235 total enjoyment responses across all three domains (traditional physical activity [118 responses], exergames [56], and non-exergames [61]). Enjoyment levels based on the total score from the PACES instrument were analyzed to detect differences between the three activity domains using a one-way ANOVA.

## **Results**

### **Descriptive Analysis**

Initial analyses revealed the following frequency of participation in physical activities: running ( $n = 34$  or 27%), weight training ( $n = 44$  or 35%), playing sports (e.g., softball, basketball, and volleyball;  $n = 31$  or 25%), and other (e.g., swimming, biking, yoga, walking;  $n = 16$  or 13%). Exergame

participants reported the highest frequency of play in the following games: Dance Dance Revolution ( $n = 7$  or 11%), Wii Sports ( $n = 31$  or 49%), Wii Fit ( $n = 4$  or 6%), Just Dance ( $n = 18$  or 29%), and other (e.g., Kinect Sports, Dance Central;  $n = 3$  or 5%). Finally, non-exergame participants reported playing video games such as League of Legends ( $n = 6$  or 9%), Clash of Clans ( $n = 16$  or 25%), Minecraft ( $n = 4$  or 6%), and other (e.g., Pokémon, Zelda, Mario Kart, Madden;  $n = 38$  or 59%).

Table 2. *Frequencies of participation in physical activities and playing video games*

|  |           |
|--|-----------|
| <i>Physical activities</i>                               | $n = 125$ |
| Running  | 34 (27%)  |
| Weight training  | 44 (35%)  |
| Playing sports (e.g. softball, basketball, & volleyball) | 31 (25%)  |
| Other (e.g. swimming, biking, yoga, walking)             | 16 (13%)  |
| <i>Playing exergames</i>                                 | $n = 63$  |
| Dance Dance Revolution                                   | 7 (11%)   |
| Wii Sports   | 31 (49%)  |
| Wii Fit  | 4 (6%)    |
| Just Dance   | 18 (29%)  |
| Other (e.g. Kinect Sports, Dance Central)                | 3 (5%)    |
| <i>Playing non-exergames</i>                             | $n = 64$  |
| League of Legends  | 6 (9%)    |
| Clash of Clans   | 16 (25%)  |
| Minecraft  | 4 (6%)    |
| Other (e.g. Pokémon, Zelda, Mario Kart, Madden)          | 38 (60%)  |

### Inferential Analysis

Based on the one-way ANOVA analyzing the 235 total responses for level of enjoyment, significant differences were detected between the three activity domains,  $F(2, 232) = 32.49$ ,  $p < .001$ . A Tukey *post hoc* analysis indicated that physical activity enjoyment ( $M = 109.8$ ,  $SD = 14.0$ ) was rated significantly higher than both exergames ( $M = 100.1$ ,  $SD = 15.6$ ) and non-exergames ( $M = 91.8$ ,  $SD = 13.9$ ). In addition, exergames was rated significantly more enjoyable than non-exergames (all *post hoc* comparisons  $p < .05$ ).

### Discussion

The purpose of this study was to compare college students' enjoyment levels in three activity domains: traditional physical activities, exergames, and non-exergames. Results indicate that college students who participated in this study rated their perceived enjoyment levels as significantly higher in traditional physical activities as compared to playing both exergames and non-exergames. Specifically, traditional physical activities averaged approximately nine points higher than exergames and 17 points higher than non-exergames. Some previous research has indicated that

participants' enjoyment levels were higher for exergames than for traditional physical activity (Duncan & Dick, 2012; Gao et al., 2014; Gao et al., 2013). One explanation for this difference could be that in previous studies the participants were asked to rate predefined traditional physical activities, while our study asked participants to choose their favorite traditional physical activity.

According to the results of this study, participants rated their enjoyment levels significantly higher when playing exergames than non-exergames, thus supporting our hypothesis. This finding supports previous literature that participants find exergames more enjoyable (Dunton & Vaughan, 2008; Graves et al., 2010). For instance, Graves and associates found that participants Wii Fit sessions were significantly more enjoyable than non-exergaming sessions (2010). These results suggest a good potential to motivate people to be more physically activity while enjoying an exergaming activity.

One potential limitation of this study may be related to the data collection method. Specifically, the data were collected using a self-report online survey on how participants "typically feel" during their activity. Previous research using the PACES had the participants' rate how they feel "right now" after the activity. It is possible that participants may not have been entirely accurate in reporting their "typical" perceived enjoyment. This limitation could be addressed by investigating enjoyment levels across the three domains directly following an activity session and asking the respondents to report how they feel "right now."

Activities that individuals perceive as enjoyable are more likely to encourage fun, motivation, and prolonged engagement, be it in a traditional physical activity such as weight training or through physical participation as an exergamer in activities such as Wii Sports (e.g., Yang et al., 2014). In this study, traditional physical activities were perceived as being more enjoyable than playing exergames which in turn were perceived as being more enjoyable than non-exergames. These results do not agree with studies where exergaming was rated as more enjoyable than traditional physical activities (e.g., Gao et al., 2014). Regardless, exergaming can provide moderate to vigorous levels of physical activity, which can help individuals reach weekly health/activity guidelines as set forth by the ACSM (Peng, Lin, & Crouse, 2011; Yang et al., 2014). Based on the results of this study, traditional physical activities and exergaming activities are psychologically enjoyable pursuits for college-aged individuals that have the potential to provide physical health-related benefits.

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