# Does it Promote Physical Activity? College Students' Perceptions of Pokémon Go

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ABSTRACT The present study examined whether physical activity participation between Pokémon GO users was different from that of non-users. Participants' perceptions of the game in terms of promoting physical activity were also evaluated. A total of 393 college students (Female=175, age M=19.03, SD=2.04) took an online survey that measured user activity, perceptions on the game, and recalled physical activity participation. The participants were classified as non-users (n=227, 79.1%), non-active users (i.e., playing less than 30 min a day, n=24, 8.4%), and active-users (i.e., playing more than 30 min a day, n=36, 12.5%). Most users agreed that playing the game had a positive impact on their physical activity level. However, the non-active users and the active-users walked significantly less than the non-users did, and the non-users also had higher overall physical activity participation levels. Most Pokémon GO players perceived that the app made them more physically active, although they still walked less than non-players did. There may be pre-existing differences in the physical activity patterns between the users and the non-users. Health promotion professionals may encourage sedentary individuals to use this game to promote physical activity.

KEY WORDS college student, exergaming, physical activity, Pokémon GO

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## Introduction

Physical inactivity has been identified as a leading factor causing chronic diseases, including heart disease, diabetes, and some forms of cancer (Dietz, Douglas, & Brownson, 2016). Nevertheless, almost half of American adults do not meet physical activity recommendations (Center for Diseases Control and Prevention, 2015). As one of the leading reason for being physically inactive is a lack of enjoyment and fun (Lewis et al., 2016; Yan, Berger, Tobar, & Cardinal, 2014), the video game industry provides an alternative approach to this problem. Exergames, namely active video games, have gained popularity as a leisure pastime as well as a creative physical activity tool.

Exergames (e.g., Wii, Xbox Kinect) require whole-body movements, and thereby generate moderate levels of energy expenditure and elevated heart rate, which could potentially contribute to weight loss and cardiovascular health benefits (Staiano & Calvert, 2011). In a systematic review study, Sween and colleagues reported that, based on results from 27 studies, a strong correlation exists between exergaming and increased energy expenditure (Sween et al., 2014).

One of the latest advancements in the exergames industry is the location-based, augmented reality mobile games. Different from other exergames, the location-based augmented reality games utilize Global Positioning System (GPS) and camera-compatible devices to create a fantasy setting in which the games take place. The users need to physically walk in the real world to participate in the game. Pokémon GO, developed by Niantic Inc. for iOS and Android devices (Anderson et al., 2017), is one of the most popular location-based augmented reality games. When playing Pokémon GO, users need to download the app on their smartphones, and then walk in the real world to "catch" and collect the virtual creatures called "Pokémon" using their phones. Besides walking to catch Pokémon, the game also highlights other features to encourage users to walk (e.g., walking or jogging to hatch "eggs" or collect "candies", etc.). Since Pokémon GO was launched in the U.S. in July 2016, there have been 500 million downloads (Wong et al., 2017). It has achieved popular appeal in more than 100 countries.

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Pokémon GO is also marketed as a game that encourages outdoor physical activity and, therefore, can improve players' health. According to Wong et al. (2017), Pokémon Go promotes physical activity by encouraging goal setting for exercise (e.g., hatch "egg" feature), mobilization to different locations, and encouraging evening and after-hours activities. A recent study has shown that Pokémon Go users increased their physical activity by 1437 steps/day on average, representing a 25% increase compared with prior activity (Althoff, White, & Horvitz, 2016). It was also estimated that a total of 144 billion steps could be gained in the US alone if the game was played by the whole population (Althoff et al., 2016).

Since the location-based augmented reality game is relatively new, there is limited research on it, especially on how it changes users' physical activity participation levels. There is also a limited understanding of the users' perceptions of how the game changes their physical activity patterns, particularly walking and jogging behaviours. Hence, the primary goal of this study was to assess the walking and overall physical activity behaviours among the Pokémon GO users and compare them to the non-users. The secondary goal of the study was to determine the users' perceptions of how the game impacted their physical activity participation, enjoyment, and confidence. To our knowledge, this is the first study that compares active and non-active Pokémon GO users to non-users' physical activity levels and perceptions of the game. We hypothesized that the Pokémon GO players would walk more than the non-players would and the active users would have a more positive perception of the game on physical activity compared to the non-active users.

## Methods

### *Participants*

The study was approved by the Institutional Review Board at the college where the study was conducted (Protocol Number 2016-0906). Three hundred and ninety-three college students from a medium-sized college in the north-eastern United States participated in the study through an online survey. They were recruited via campus flyers, class visits, and word of mouth. Based on the responses, 105 athletes were excluded from the study as they accumulated a significant amount of physical activity time daily, which would influence the study results. The remaining participants (n=288) included eighty-eight males (33.5%), average age M=19.03, SD=2.04. See Table 1 for details of the participant characteristics.

### *Measures*

An online survey was developed by the research team to measure participants' Pokémon Go related behaviour and perceptions, as well as their physical activity level. Specifically, eight questions measured whether they had ever played, how much time they spent on playing it in the previous seven days, and where they usually played. Fourteen questions were developed to measure participants' perceptions on how playing Pokémon Go influenced their physical activity participation, motivation, enjoyment, and confidence on a Liker scale between 1 (strongly disagree) to 5 (strongly agree). An exemplar question was "Since I start to play Pokémon Go, I get outdoors more often than before". The analysis showed good reliability of this perception scale, with Cronbach alpha value=.95.

Finally, seven questions asked participants to recall how much time they spent on different types of physical activities in the previous seven days, including walking, jogging, weightlifting, dancing, yoga, team sports, and other types of exercise. The purpose of those questions was to compare walking, jogging, as well as the overall physical activity participation level between users and non-users. An example question was "During last week, how much total time did you spend on walking." If they checked "other type", they were asked to specify what type of physical activity it was and how many minutes they spent performing it. The total time of physical activity was calculated by adding up time spent on each physical activity that the participants indicated.

### *Statistical analysis*

All data were entered into and analysed using SPSS 21.0. One-way ANOVA and post hoc analyses were performed to examine differences in physical activity behaviour among active users, non-active users, and non-users. A T-test was also implemented to compare the differences in perception of Pokémon Go between active users and non-active users.

## Results

Based on the responses, an active-user was defined as one who had played in the previous days and on average spent more than 30 mins/day on playing; A non-active user was defined as one who had played in the previous seven days but for less than 30 mins/day; Non-users were defined as those who have not played Pokémon Go in the previous seven days. Based on the responses, there were 227 non-users (79.1%), 24 non-active users (8.4%), and 36 active-users (12.5%).

The average time (minutes) spent on walking, jogging, and total physical activity were M (walking)=384 min, SD=280 min, M (jogging)=179 min, (SD=199), M (total)=921 min, SD=673 min, respectively. Females walked and jogged significantly more than males did: male (walking) M=285 min, SD=243 min, female (walking) M=430 min, SD=184min, t (240)=-4.86, p<.001; Male (jogging)=138 min, SD=112 min, female (jogging)=198 min, SD=223 min, t(250)=-2.81, p<.01. There were no gender differences in total physical activity participation time: male (total)=836 min, SD=653 min, female (total)=960 min, SD=680 min.


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TABLE 1. Basic characteristics of the study participants

| Users, n, (%) | Active Users (n=36) | Non-Active Users (n=24) | Non-Users (n=227) |
|---|---|---|---|
| Age, y, mean (SD) | 20.3(2.1) | 18.5(1.2) | 18.9(2.0) |
| Male, n, (%) | 19(57.6) | 12(60.0) | 57(27.1) |
| Year in college, n (%) | | | |
| Freshmen | 9(27.3) | 17(85.0) | 132(62.9) |
| Sophomore | 6(18.2) | 0(0) | 28(13.3) |
| Junior | 4(12.1) | 2(10) | 33(15.7) |
| Senior | 12(36.4) | 1(5) | 11(5.2) |
| Graduate Students | 2(6.1) | 0(0) | 6(2.9) |
| Last 7d walking Time, hr, mean(SD) | 4.7(3.8) | 4.7(3.6) | 7.0(4.7)*** |
| Last 7d jogging Time, hr, mean(SD) | 1.2(1.4) | 1.4(1.2) | 2.5(2.5) |
| Last 7d total physical activity Time, hr, mean(SD) | 9.1(6.7) | 9.3(4.9) | 13.1(9.9)* |

Note.* indicates significant level at .05; *** indicates significant level at .001.

Different from the hypothesis, ANOVA and Post hoc analyses showed that non-active users and active-users walked significantly less than non-users did: M=4.7hr/w SD=3.6, M=4.7hr/w SD=3.8, and M=7.0hr/w SD=4.7, respectively, F (2,247) =4.78, p=.001. In terms of total jogging time in the previous seven days, M=1.4 SD=1.2, M=1.2 SD=1.4, and M=2.5 SD=2.5, for non-active users, active users, and non-users, respectively. No group differences were observed (Ps>.05).

In terms of the total physical activity time in the previous seven days, the average of the non-active users was

TABLE 2. Perception of Pokémon Go's Influence on leisure activities

| Since I start to play Pokémon GO: | % Strongly Agree or Agree | |
|---|---|---|
| | Active Users | Non-Active Users |
| I walk more | 75.8** | 28.6 |
| I bike more | 11.2 | 14.3 |
| I jog more | 30.3 | 19.1 |
| I get outdoors more often than before | 69.7*** | 33.3 |
| I park my car further to walk more | 36.4** | 9.5 |
| I take the stairs instead of the elevator | 30.3 | 28.6 |
| I walk to a destination to play | 60.6** | 33.4 |
| I drive to a destination to play | 63.6** | 23.8 |
| I am more likely to walk instead of drive to the nearby locations | 45.5 | 28.6 |
| I walk/bike with my friends more than before | 57.6** | 19.1 |
| I walk/bike with my family more than before | 27.3** | 4.8 |
| I enjoy walking/biking more than before | 57.6* | 28.6 |
| I am more confident to walk/bike long distance than before | 39.4** | 14.3 |
| I want to continue using this APP to increase my physical activity level | 45.5** | 9.5 |

Note.* indicates significant level at .05; ** indicates significant level at .01; *** indicates significant level at .001.

M=9.3hr/w, SD=4.9hr/w, active users M=9.1hr/w, SD=6.7hr/w, non-users M=13.1hr/w, SD=9.9hr/w. One-way ANOVA analysis showed there were significant differences between the groups, F (2,250)=3.39, P=.04. The post hoc test showed that the non-users had significantly higher physical activity participation than the active users did (P=.02), but not the non-active users (P=.15).

We also examined how playing Pokémon Go influenced participants' physical activity participation, motivation, enjoyment, and confidence. Table 2 showed the percentages of the users who responded "strongly agree" or "agree" to the statements. According to the data, playing Pokémon Go had a positive influence on physical activity behaviour, for both active-users and non-active users. Specifically, more than half of the active Pokémon GO users agreed that playing the game had increased their walking behaviour (75.8%), motivated them to go outdoors more often (69.7%), motivated them walk to a destination to play (60.6%), walked/biked more with friends and family members (57.6%), and made them enjoy walking/biking more (57.6%). When comparing the active-users and non-active users, the positive responses among active users were higher than non-active users on all statements. Table 2 showed the results of the group differences examined by the independent T-tests.

## Discussion

The purpose of the present study was to compare the walking, jogging, and overall physical activity participation between Pokémon GO active, non-active users, and non-users. In addition, it assessed the users' perception of how playing the game changed their physical activity participation and perceptions. The results showed that the Pokémon GO active-users had less walking behaviour, as well as overall physical activity participation level, compared to the non-users.

Interestingly, the perception questions showed that the active Pokémon GO users agreed that, in general, playing the game had increased their walking behaviour, motivated them to walk more, and also made them enjoy walking more. The results of the perception questions were consistent with the recent research that also reported positive impacts of Pokémon GO on physical activity (Liu & Ligmann-Zielinska, 2017; Serino et al., 2016; Xian et al., 2017). Specifically, Xian and colleagues reported that playing Pokémon GO was associated with an average increase in 2000 steps per day (Xian et al., 2017). Liu and colleagues reported that playing the game was associated with 3 additional hours and 5.6 extra miles of physical activity in total per week. Consistent with our hypothesis, the active-users also reported more positive changes in physical activity than the non-active users, which indicated that the more users play, the more positive influences the game had on their physical activity participation and perceptions.

Although the users perceived that playing Pokémon GO increased their walking behaviour, they still walked less than the non-users. One possible explanation is that the individuals who are playing Pokémon GO and other video games are in general more sedentary than the non-user population, which is supported by the current results that the players had lower overall physical activity levels compared to the non-players. In addition, numerous studies report positive relationships between screen-time, including playing video games, and physical inactivity, indicating that video game players are more sedentary than non-players in general (Bickham, et al., 2013; Lepp et al., 2013). Finally, given the fact that the non-players in this study were so active (i.e., average 13 hours of physical activity time per week), it is not surprising that the Pokémon players accumulated less total physical activity participation time compared to them.

Another significant finding of this study was that the Pokémon Go users had a positive perception of the game on promoting their walking behaviour, motivating them to walk more, and making walking more enjoyable. Not surprisingly, the active-users had a significantly more positive evaluation of the game on their physical activity than the non-active users did. However, it is not clear whether it is because the active users play more, and hence obtain more physical activity-related benefits; Or, because they benefit more, and therefore they tend to play more. This question could be answered by studies in the future.

We determined that the active-users were significantly more likely to drive and play than non-active users. When people are highly motivated to play, they tend to use all possible means, including unsafe ways such as driving and playing, to advance themselves in the game. While the game developing company should work on detecting and prohibiting those unsafe playing behaviours, health educators at schools and communities should also reach out and provide safety education to the players.

Although recent studies have shown the positive impact of Pokémon Go on the users' physical activity levels, it is unclear how sustainable those changes are. Sustained behavioural change has proven challenging as consumers discontinue use and/or lapse back into previous behaviours (Foster et al., 2013). Recent data showed that the daily users of Pokémon Go dropped from 28.5 million in June 2016 to 5 million at the end of 2016 (Comscore, Inc.). This warns us to avoid being overly optimistic about using this type of video game as a long-term tool to promote physical activity. It also indicates that there should be more longitudinal studies, as well as qualitative studies, to understand the sustainability of this type of video game on physical activity promotion.

There are several limitations to this study. First, the cross-sectional study design does not provide direct evidence of the changes in physical activity levels before and after users playing Pokémon Go. In addition, the


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measure of physical activity was not objective, which resulted in more measurement error (e.g., recall bias). Third, participants may over-report their physical activity participation level as being more socially acceptable, causing a response bias. Finally, although the overall sample size was satisfactory, the number of active users and non-active users were significantly lower than the non-users, which lowered the overall power of the study to detect potential differences. Given those limitations, future studies could use a randomized experimental study design to examine the actual impact of Pokémon Go on players compared to the non-players. In addition, qualitative studies should be implemented to explore how the game impacts individual behaviours and psychological characteristics.

Although the current study only focused on the college population, the results may offer implications on physical activity promotion strategies to a larger population as well. Specifically, health practitioners may use this game to promote youth and young adults walking and/or jogging behaviours, with setting specific goals (e.g., walking/jogging a certain distance a day to hatch eggs). Schools and community organizations may use this game to design physical activity promotion programmes through individual participation, peer interaction (Yan & Cardinal, 2013), or group competition (e.g., competitions on the number of Pokémon collected, distances walked/jogged). In addition, organizations and worksites should also provide walking/jogging maps to participants, along with safety tips (e.g., do not play along late at night, drive and play, or bypass private areas while playing).

In conclusion, this study supported the positive impact of Pokémon Go on promoting physical activity, motivating participants to be more physically active, and making physical activity more enjoyable. Although this game has the same struggles of user sustainability as other video games, we believe it is a useful strategy for individuals who do not enjoy conventional exercise. More innovative exergames should be created to encourage the public to engage in physical activity while having fun during a game.

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