**Pokémon GO May Increase Physical Activity and Decrease Sedentary Behaviors**

Regular physical activity contributes to the prevention of obesity and chronic diseases; however, fewer than half of US adults are regularly active. Video games, computers, television, mobile devices, and sedentary occupations have all contributed to the growth in sedentary behavior and obesity. More recently, technology-based interventions have focused on mobile devices to promote physical activity. About 90% of American adults have a mobile phone, with 64% owning a smartphone. Advantages of technology-based interventions include continual self-monitoring and access, decreasing barriers of transportation and time, and portability (e.g., smartphone interventions), and they may be more cost-effective, accessible, and convenient.

Gaming technology has attempted to promote physical activity but with limited success regarding uptake or effectiveness. On July 6, 2016, Pokémon GO was released. It is a mobile application that uses a global positioning system to allow users to walk around or travel to catch nearby “Pokémon,” which are creatures that the player captures and trains to fight other such creatures. The augmented reality feature places the Pokémon in the real-world setting by using the mobile device’s camera, which makes players feel like real-life Pokémon Trainers. The map in the application is based on real-world streets and pathways, featuring Poké Stops (where one can collect items, such as the Pokéballs used to capture the Pokémon, and Pokémon eggs) and Gyms (where battles against other Pokémon Trainers and their Pokémon occur). The three types of Pokémon eggs, 2 kilometers, 5 kilometers, and 10 kilometers, are hatched by walking the corresponding distances, and rarer Pokémon tend to emerge from 10-kilometer eggs. Furthermore, nostalgia is incorporated by featuring first-generation Pokémon and a Pokédex to track Pokémon captured.

**A PILOT STUDY**

In the absence of a formal research evaluation of Pokémon GO, the University of Hawaii institutional review board exempted a retrospective pre–post design study to investigate if playing Pokémon GO increased physical activity and decreased sedentary behaviors. We distributed the SurveyMonkey link through social media, e-mail, e-mail lists, and Web sites requesting recipients to further post the link on their social networking sites. Participants provided consent, and surveys (open from July 28, 2016, to August 31, 2016) took about 5 to 10 minutes to complete.

We excluded 4 of 633 surveys that only had one demographic variable and that of one individual who noted 0 days of playing Pokémon GO. Of the remaining 628, 82 (13.1%) completed only demographics and 60 (9.6%) individuals completed only the pre–Pokémon GO survey portion. These individuals were not significantly different from survey completers on demographics and the prebehavior variables (all P > .05) and we also excluded these from the analyses. Thus, we analyzed 486 of 633 surveys (76.8% completion rate; 57.8% female; 59.9% White, 28.5% Asian; mean age = 28.6 [SD = 8.5] years; mean body mass index [BMI] = 26.4 [SD = 6.8] kg/m²; playing Pokémon GO an average of 23.3 [SD = 10.0] days).

A revised Godin Leisure-Time Exercise Questionnaire assessed days per week (0–7) and minutes per day (10-minute intervals from 0 to ≥60) spent in strenuous, moderate, and mild physical activity before and after beginning to play Pokémon GO. We defined strenuous physical activity as an activity causing a rapid heart rate and sweating (e.g., soccer, vigorous swimming). We defined moderate physical activity as not exhausting with light sweating (e.g., fast walking, volleyball). Mild physical activity included minimal effort without sweating (e.g., easy walking, fishing). The Godin Leisure-Time Exercise Questionnaire demonstrated adequate test–retest reliability and validity.

Three questions assessing hours of daily sedentary behavior (0 to ≥10 hours) before and after beginning to play Pokémon GO addressed television, video, or DVD watching; video game playing; and Internet surfing and playing online games. This measure displayed adequate test–retest reliability.

**PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR**

Playing Pokémon GO increased moderate to vigorous physical activity by about 50 minutes per week and reduced sedentary behavior by about 30 minutes per day. Figure 1 presents the pre–post physical activity and sedentary behavior results. We saw significant increases for all three physical activity indicators with the largest change in the mild-intensity physical activity (approximately +47 minutes per week; P < .008), followed by moderate physical activity (approximately +38 minutes per week; P < .008) and strenuous physical activity (approximately +14 minutes per week; P < .008). For sedentary behavior indicators, TV, video, or DVD watching (approximately –30 minutes per day; P < .008) and Internet surfing (approximately –12 minutes per day; P < .008) decreased significantly, whereas video game playing did not change (P > .05). Note that missing data (0%–1.5%) appeared at random and we deleted it.
pairwise and applied a Bonferroni correction for multiple comparisons ($P<.05/6 = .008$).

We found no sex or race/ethnicity interaction for any behavioral indicator (all interaction $P>.008$), but there was some indication that the game may benefit the more-overweight participants. The BMI was positively related to strenuous, moderate, and mild physical activity (all $r=0.2; P<.01$). The number of days playing Pokémon GO was positively related to moderate and mild physical activity (both $r=0.1; P<.05$).

CAVEATS

The weak but significant physical activity dose–response effect is likely attributable to the short time frame of data collection. It is unclear why there was no BMI or dose–response effect for sedentary behavior; however, the Pokémon GO sedentary behavior effect seems to appear early when starting to play and applies across the BMI range.

The retrospective self-report design is associated with potential social desirability and recall bias. The lack of a control group also limits the ability to make causal inferences. Long-term, rigorously designed studies should look at mechanisms of effective Internet-based interventions such as cooperation, competition, nostalgia, intermittent reinforcement, sense of control, and augmented reality. Furthermore, future research should also document possible negative consequences such as game or Internet addiction or accidents.

PRECISION PUBLIC HEALTH

This study supports the potential of Internet games being able to promote health behaviors, which has implications for mostly sedentary people, especially when, such as with Pokémon GO, they can potentially reach large populations. Pokémon GO individually tailors its character (avatar) and augmented reality of the game both motivationally and geographically, maximizing uniqueness for each player, and may be providing a way to individualize interventions.

REFERENCES


CONTRIBUTORS

C. R. Nigg was the principal investigator, conceptualized the study, oversaw the data collection, ran the analyses, and wrote the “Physical Activity and Sedentary Behavior,” “Caveats,” and “Precision Public Health” sections. D. J. Mateo wrote the first draft of the introduction and pilot description and conducted the data collection. J. An provided input on the study design, measures, procedures, and discussion. All authors revised drafts and approved the final version.

ACKNOWLEDGMENTS

The authors would like to acknowledge the Health Behavior Change Research Workgroup members who assisted with recruitment: Nikki Cablay, Maddison Chai, Anna Lena Eckert, Codie Garza, Robin Mehl, Zoe Nigg, Brandon Sakka, and Jula Schneider.
Copyright of American Journal of Public Health is the property of American Public Health Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.