AUGMENTED POKEMON GO IN TIMES OF COVID-19: DOES IT HAVE ANY EFFECT ON PROMOTING TEENAGERS’ PHYSICAL ACTIVITY?

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Authors’ Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Abstract

Study purpose. One of the main problems during the COVID-19 pandemic that needs to be considered is the decline in physical activity carried out by teenagers. The overall objective of this mixed method is to investigate the effects of the Pokemon Go intervention program to promote physical activity in teenagers during the COVID-19 crisis.

Materials and methods. This study was conducted through a mixed method approach. 94 teenagers in grades 10-12 from three high schools agreed to participate in this study. The subjects were divided into 2 groups, namely in the Pokemon Go intervention program group (N = 47) and a control group that did not get any physical activity (N = 47). The Pokemon Go intervention program was carried out for 7 weeks with an intensity of 3 times a week in physical education classes. After carrying out the Pokemon Go intervention program, the forty-seven subjects were interviewed. The quantitative instrument used to measure the physical activity level was IPAQ, while the qualitative instrument used in-depth interviews.

Results. The quantitative and qualitative (mixed) research confirms that the Pokemon Go intervention program showed to positively promote PA levels in teenagers to higher levels in the current COVID-19 crisis. The results of this study are in line with the previous studies which explained that Pokemon Go is an augmented reality game that requires players to travel to various locations in the real world where distances are relatively far.

Conclusions. Teenagers with the status of players, ex-players and non-players experienced a significant increase in physical activity level after participating the Pokemon Go intervention program for 7 weeks, and the majority of subjects considered that Pokemon Go had a positive effect to promote physical activity during the COVID-19 pandemic. After implementing the Pokemon Go intervention program for 7 weeks, the results of our study confirm that the physical activity levels of teenagers have gradually increased during the COVID-19.

Keywords: Pokemon Go, physical activity, COVID-19, mixed method.

Introduction

In this COVID-19 era, physical activity (PA) among teenagers until adults are drastically decline (Yan et al., 2020). Previous studies reported that physical activity has an important contribution in maintaining healthy body, fit and avoid chronic diseases, such as heart disease, obesity, cancer, diabetes (Dietz et al., 2016) and hypertension (Lee et al., 2021). Another study reported that, globally, more than a quarter of adults were physically inactive, caused 5 million deaths per year (Ni et al., 2019). According to the study results by Xian et al. (2017), notwithstanding that exercise has been carried out and well documented, PA levels were still low in some countries. Based on this fact, innovative strategies to increase PA need to be promoted in current COVID-19 era.

Previous studies recommended Pokemon Go as a strategy to promote the low PA levels (Madrigal-Pana et al., 2019; Khamzina et al., 2020). Pokemon Go is an augmented reality game, a player has to find and get cartoon characters in real world or in the surrounding environment (e.g., house, yard, park, school) (Howe et al., 2016). According to Ma et al., (2018), this game created a condition as if players can catch and fight monsters (Pokemon) in the real world. Pokemon Go
has an advantage by utilizing the Global Positioning System (GPS) and compatible devices with cameras, so that players feel as if they are experiencing fantasy in the real world (Yan et al., 2020). Previous studies have reported that Pokemon Go had a positive effect on increasing PA levels (Ayers et al., 2016), because this game encourages people to walk or run to catch monsters (Pokemon), collect candy or hatch eggs (Wong, 2017; Wattanapisit et al., 2018). Although the benefits of Pokemon Go had been reported and documented, this was claimed could cause traumatic injuries, for example the players were possible to fall, hit trees or walls, and even cause traffic injuries due to playing while walking, cycling or driving a vehicle. There were some data reported that the negative impact of playing Pokemon Go was serious injuries to players by 10.7% of all events and the most common side effect was musculoskeletal or skin injuries (68.0%) (Li et al., 2021). In addition, a study found that the long-term effects of Pokemon Go on increasing PA and health were not yet untested (An & Nigg, 2017). Based on the fact that there was found some gaps in previous studies, it was suggested that further research on Pokemon Go needs to be conducted and should be a major concern.

Previous studies on Pokemon Go have been reported internationally (Clark & Clark, 2016; Licoppe, 2016; Keogh, 2017). However, research on Pokemon Go as a strategy to increase PA levels through mixed methods has not been reported internationally. According to our knowledge, this is the first study that use a mixed method to investigate the effects of Pokemon Go during the COVID-19 crisis, because most of the previous research was conducted through Longitudinal, Cross-sectional, Experimental, Retrospective Cohort studies (Lee et al., 2021) and qualitative (Lindqvist et al., 2018). This study has the potential to explain the effectiveness of Pokemon Go in terms of quantitative and qualitative (mixed), so that it can provide accurate information to lecturers, students, athletes, public regarding the importance of the game Pokemon Go for increasing the PA level of teenagers during the current dangerous pandemic crisis. Thus, this study aims to investigate the effect of playing Pokemon Go on increasing PA levels during COVID-19.

**Materials and Methods**

**Subject**

The mixed method was used as an approach in this study. Mixed method is a research that combines quantitative and qualitative research. Thus, this study aims to obtain data in the form of numbers and descriptions of interviews results with subjects. The subjects in this study were teenagers who are currently undergoing education at the high school level in Cianjur City (Indonesia). Subjects were selected using Cluster Random, namely by sending messages via WhatsApp to all students from grades 10 to 12 from three schools regarding the purpose of this study and only 94 students responded and were willing to be subjects in this study. The characteristics of the subjects are presented in Table 1.

**Measuring Instrument**

Quantitative Instruments. International Physical Activity Questionnaire was used to measure a PA level. This instrument has been validated and has a validity value of 0.087 while the reliability was 0.77 and has been translated into Indonesian. IPAQ was used to measure three types of activities, namely high intensity PA, moderate PA and low PA (walking). These three PAs have different METs values, for example high PA = 8.0 METs, medium PA = 4.0 METs and low PA (running) = 3.3 METs. The total PA scores of the three activities between high, medium and low were combined and expressed in MET-min/week (Wong, 2017).

Qualitative Instruments. In qualitative research, researchers used in-depth interviews towards subjects about their experiences during the Pokemon Go program. Interviews were carried out by using Indonesian language with a duration of 10-15 minutes per day via online through Whatsapps platform. The interviews were recorded and noted in books, then analyzed by 3 experts who have Ph.D. degrees in physical education and sports.

**Procedure**

This research was conducted from November to December 2021 at Suryakancana University. This research has obtained permission from the Research Committee (No:270.75/SP2H/UN64.10/LL/2021) Suryakancana University (Indonesia). In addition, this research has followed

### Table 1. Socio-demographic of Subjects

<table>
<thead>
<tr>
<th>Variables</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50(53.19%)</td>
</tr>
<tr>
<td>Female</td>
<td>44(46.81%)</td>
</tr>
<tr>
<td>Age (y)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>24(25.53%)</td>
</tr>
<tr>
<td>16</td>
<td>32(34.04%)</td>
</tr>
<tr>
<td>17</td>
<td>21(22.34%)</td>
</tr>
<tr>
<td>18</td>
<td>17(18.09%)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>19(20.21%)</td>
</tr>
<tr>
<td>55</td>
<td>25(26.60%)</td>
</tr>
<tr>
<td>60</td>
<td>36(38.30%)</td>
</tr>
<tr>
<td>65</td>
<td>14(14.89%)</td>
</tr>
<tr>
<td>High (cm)</td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>24(25.53%)</td>
</tr>
<tr>
<td>160</td>
<td>39(41.49%)</td>
</tr>
<tr>
<td>165</td>
<td>19(20.21%)</td>
</tr>
<tr>
<td>170</td>
<td>12(12.77%)</td>
</tr>
<tr>
<td>School</td>
<td></td>
</tr>
<tr>
<td>Senior High School 1 Cipanas</td>
<td>29 (30.85%)</td>
</tr>
<tr>
<td>Senior High School 2 Cianjur</td>
<td>41 (43.62%)</td>
</tr>
<tr>
<td>Senior High School 1Ciranjang</td>
<td>24 (25.53%)</td>
</tr>
<tr>
<td>Class</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>59(62.77%)</td>
</tr>
<tr>
<td>11</td>
<td>21(22.34%)</td>
</tr>
<tr>
<td>12</td>
<td>14(14.89%)</td>
</tr>
<tr>
<td>Play Status</td>
<td></td>
</tr>
<tr>
<td>Players</td>
<td>30(%)</td>
</tr>
<tr>
<td>Ex-Players</td>
<td>24(%)</td>
</tr>
<tr>
<td>Non-Players</td>
<td>40(%)</td>
</tr>
</tbody>
</table>
the ethical guidelines of the World Medical Association (Helsinki Declaration) for human objects. In quantitative research, 94 subjects were divided into two groups, namely the experimental group (N=47) who received the Pokemon Go program and the control group (N=47) who only did daily activities at school or did not receive any physical activity program. The pre-test and post-test activities were carried out by sending IPAQ via WhatsApp to all subjects, so that they could fill out the questionnaire individually under the supervision of the research team. While the Pokemon Go program started from 08.00-09.00 AM during education classes and was carried out for 7 weeks with an intensity of 3 meetings a week. In addition, this study applied the COVID-19 health protocol, namely checking body temperature, providing hand sanitizer and vaccines to subjects.

As for qualitative research, all subjects were interviewed online by researchers regarding their experiences after participating in the Pokemon Go program for 7 weeks. The questions are as following: (a) The experience of intervention (Pokemon Go program), (b) the advantages of the Pokemon Go program and (c) the disadvantages of the Pokemon Go program.

**Statistical analysis**

Quantitative analysis. Quantitative data were processed to analyze descriptive statistics presented as mean, standard deviation (SD) and percentage. In addition, all data were checked for normal distribution using the Kolmogorov-Smirnov test. Meanwhile, the independent t-test was used to analyze descriptive statistics presented as mean, standard deviation (SD) and percentage. In addition, all data were checked for normal distribution using the Kolmogorov-Smirnov test. Meanwhile, the independent t-test was used for comparison between the experimental and control groups. Then the effect size (ES) was used to estimate the significance of the group mean differences. All quantitative data were processed using IBM SPSS software (v25.0, SPSS Inc., Chicago, IL, USA) with a significance level of 0.05.

Qualitative analysis. Meanwhile, qualitative data were processed through thematic analysis. There were several steps in the thematic analysis that need to be taken, including: (a) Interviews were transcribed word for word. (b) The transcribed interview was read repeatedly by the researcher/expert to gain a broad understanding. (c) The data was sorted by categorization, coding, and highlighting based on their similarity (Rasmitadila et al., 2020). (d) Similar phrases were grouped and organized into themes (Ekström et al., 2017).

**Results**

The normality test in this study was normally distributed (p = 0.246 > 0.05). While the results of the quantitative study shows that there was a significant increase in total PA in teenagers with player status due to the impact of the Pokemon Go program (Table 2). The similar results also occurred in teenagers with ex-players status (Table 3) and non-players status (Table 4). Meanwhile, there was no increase in PA levels in the control group in all statuses.

The results of qualitative research through interviews with subjects are presented in three themes:

**Theme 1: Experience of Intervention**

The results of qualitative research through interviews with subjects are presented in three themes:

This first theme discusses the subjects’ experience when participating in the Pokemon Go program for 7 weeks. Intervention experience is an important factor that needs to be considered in planning future programs.

### Table 2: Differences in Pokemon Go group and Control group values in Walking PA, Moderate PA, Vigorous PA of Players

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Pokemon Go Group (N = 15)</th>
<th>Control Group (N = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
</tr>
<tr>
<td>Walking PA (METmin/week)</td>
<td>598.4(356.0)</td>
<td>558.8(342.1)</td>
</tr>
<tr>
<td>Moderate PA (METmin/week)</td>
<td>653.3(383.5)</td>
<td>664.8(362.7)</td>
</tr>
<tr>
<td>Vigorous PA (METmin/week)</td>
<td>629.3(367.2)</td>
<td>1024.0(433.1)</td>
</tr>
<tr>
<td>Total PA (METmin/week)</td>
<td>1881.1(456.1)</td>
<td>2246.8(742.4)</td>
</tr>
</tbody>
</table>

### Table 3: Differences in Pokemon Go and Control group values in Walking PA, Moderate PA, Vigorous PA of Ex-Players

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Pokemon Go Group (N=12)</th>
<th>Control Group (N=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
</tr>
<tr>
<td>Walking PA (METmin/week)</td>
<td>533.5(369.3)</td>
<td>561.5(218.9)</td>
</tr>
<tr>
<td>Moderate PA (METmin/week)</td>
<td>733.3(331.3)</td>
<td>1063.3(288.1)</td>
</tr>
<tr>
<td>Vigorous PA (METmin/week)</td>
<td>466.6(278.8)</td>
<td>893.3(492.9)</td>
</tr>
<tr>
<td>Total PA (METmin/week)</td>
<td>1733.5(423.2)</td>
<td>2517.6(650.7)</td>
</tr>
</tbody>
</table>
known, in order to provide an overview of the effectiveness of the Pokemon Go program. The subjects give their opinion as following:

“I’m excited to be able to join the Pokemon Go program, because this game is very interesting and motivate me to walk.”

“At the beginning of the intervention, I felt that this game was boring but after getting a lot of Pokemon monsters I liked the game.”

“I’ve played this game previously, but I thought Pokemon Go can hurt me. But my opinion was changed because the location of the intervention in this study was carried out in an area on university that was far from the city center and there were no vehicles.”

“Before taking part in this research, I have often played this Pokemon Go game and I confirm that this game is safe if it is done in a place far from vehicles, such as parks or hills. And I like this game, because it triggers me want to walk or run to find Pokemon monsters.”

**Theme 2: Pokemon Go Program Advantages**

The second theme is about the advantages of the Pokemon Go game which is indeed an important factor and must be informed to everyone. The subjects argued that:

“I presume that the advantage of playing Pokemon Go is it can gradually increase our PA level. For example, before participating in the Pokemon Go intervention, I rarely did PA outside the house, especially during hot weather or the current pandemic situation. But, Pokemon Go has help me to have a much better PA level.”

“In my opinion, Pokemon Go is one of the games that promotes PA in a positive way to teenagers in the current COVID-19 pandemic crisis. The advantage of this game can be played at any time, we just need to provide a smartphone with a mobile data.”

“This game is incredibly fun, because it allows me to walk for an hour without feeling bored or tired. I will continue to play this game, even after the research has been completed.”

“I believe that Pokemon Go can be one of the right strategies to increase PA levels during the current COVID-19 pandemic, because this game can be played individually and doesn’t require many friends.”

“I can’t believe it!!, This Pokemon Go game trigger me to walk 1.2 km every day. This game is a great method for teenagers to increase their PA level even during a pandemic.”

**Theme 3: The disadvantages of Pokemon go program**

This third theme discusses the shortcomings of the Pokemon Go game that must be investigated accurately, in order to minimize the weakness. The subjects revealed their opinion that:

“Pokemon Go is indeed a game that can promote improvement in PA levels, but if the game is not played in a safe place, it can result in injury (e.g., falling, crashing into a tree or wall, being hit by a vehicle).”

“In my opinion, Pokemon Go has several weakness, such as: it requires a fairly large mobile data plan, we should have a smart phone with good quality in order to play this game.

“If the internet network is bad, then Pokemon Go cannot be used to increase our PA level. In addition, if the weather is raining, then we cannot walking outside the house. And the GPS signal sometimes gets interrupted, so players can’t walk to search Pokemon monsters.”

**Discussion**

In overall, the objective of this study was to evaluate the effects of the Pokemon Go game from a mixed method point of view on increasing PA levels during the COVID-19 period. In quantitative and qualitative (mixed) research confirm that the Pokemon Go program showed to positively promote PA levels in teenagers to higher levels in the current COVID-19 crisis. The results of this study are in line with previous studies which explained that Pokemon Go is an augmented game that requires players to travel to various locations in the real world which the distances was relatively far. Thus, after carried out this game, players can increase their PA level to be better than before (Althoff et al., 2016; Chaput & Leblanc, 2017; Ewell et al., 2020; Kosa & Uysal, 2022).

Teenagers with the status of players, ex-players and non-players who have participated in the Pokemon Go intervention program reported that they were able to walk 60 minutes in a day (Ni et al., 2019) and experiencing an increase in walking distance with an average of 1.5 km. Similarly, a study conducted in the US reported that the effects of Pokemon Go can lead to an average increase of 1473 runs in a day. While the research of Howe et al., (2016) noted that players experienced an increase of 955 steps per day (Wattanapisit et al., 2018).

In addition, this study refutes previous research that reported Pokemon Go was not effective if used in the long term to increase PA levels (An & Nigg, 2017). The fact is the Pokemon Go intervention program which was implemented for 7 weeks was effective for increasing PA levels in teenagers despite the current pandemic crisis. The main issue that is often found in previous studies is the safety or of players.
(Wong, 2017; Marquet et al., 2017; Wattanapisit et al., 2018), but our research confirms that none of the teenagers got injured while playing Pokemon Go. This is because we had prepared a wide and safe environment for them to play.

Conclusions

This study becomes evidence that the Pokemon Go program is one of the strategies that have a positive effect in promoting PA among teenagers at high school level during the COVID-19 crisis. The scope of this study was limited in terms of the subject which was comes from one area in Indonesia. Thus, future studies need to be carried out by targeting subjects from different ages including children, adolescents and adults in several regions in Indonesia or other countries.

Acknowledgement

Our gratitude goes to those who supported the implementation of this research, especially Halu Oleo University.

Conflict of interest

All researchers declare that there is no conflict of interest in this research.

References


Augmented Pokemon Go in Times of Covid-19: Does it Have any Effect on Promoting Teenagers’ Physical Activity?

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Abstract

One of the main problems during the COVID-19 pandemic is the decrease in physical activity among adolescents. The aim of this mixed-method study is to investigate the effect of an intervention program "Pokemon Go" on promoting physical activity among adolescents during the COVID-19 crisis.

Methods

The study was conducted using a mixed-method approach. The participants were 94 adolescents, 10-12th grade students from three secondary schools. They were divided into two groups, an experimental group (N=47) that participated in the "Pokemon Go" intervention program for 7 weeks, and a control group (N=47) that did not engage in physical activity. The "Pokemon Go" program was implemented during physical education classes, 3 times a week. After the completion of the "Pokemon Go" intervention program, a survey of the 47 participants was conducted. The quantitative assessment tool used to measure physical activity levels was the International Physical Activity Questionnaire (IPAQ), and the qualitative assessment tool used was detailed interviews.

Results

Quantitative and qualitative (mixed) analysis confirmed that the "Pokemon Go" intervention program had a positive effect on increasing physical activity levels among adolescents during the COVID-19 crisis. The results of this study are consistent with previous studies, which have shown that "Pokemon Go" is a game of augmented reality that requires players to walk greater distances in the real world.

Conclusions

Adolescents’ status as gamers, former gamers, and non-gamers experienced a significant increase in physical activity after participating in the "Pokemon Go" intervention program for 7 weeks. Most participants considered "Pokemon Go" to be a positive influence on promoting physical activity during the COVID-19 pandemic. After the implementation of the "Pokemon Go" intervention program for 7 weeks, the results of our study confirmed that the physical activity levels of adolescents during the COVID-19 epidemic were gradually increasing.

Keywords: Pokemon Go, physical activity, COVID-19, mixed method.

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