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# Abstract

# Introductaion

## Background

It is well known that sport is essential for individual’s physical health. With sport, we can train our muscles and respiratory, as well as enhancing immunity (Ornulf Seippel. 2006). Urbanizes, however, do lack of exercise due to various reasons. such as job character and long working period. In this way, the risk of obesity, depression, high blood pressures, as well as a series of cardiovascular diseases increased rapidly, being harmful to public health. For solving health issues, augmented reality (AR) videos games are in consideration. Augmented reality is an extended version of VR. It combines virtual elements with real world, through the assist of visual devices, including eyeglasses, monitor, as well as smart devices (Tim Fisher. 2021). Overlapping on and tracking in real world objects, AR objects seems occupying the same space. Besides visualization, AR system can also contain sound and tactile, for providing an new form of world. AR technology can be applied in various types of applications, such as map and games. In this study, we focus on Pokemon Go, a popular AR mobile games.

Pokemon Go is a famous mobile game developed by Niantic Inc, as well as released at 2016 on both Apple Store and Google Play (Luke Reilly. 2017). Pokemon Go players using GPS signals to locate, catch (also obtain ingredients for training Pokemon), hatch (players walk around 2 to 10 km to obtain a Pokemon) and train virtual creatures, Pokemon. Those Pokemon can be used for battling and Gym controlling (Andrew Webster. 2015). Pokemon Go use a map and camera to display the virtual spots, like Pokestop, Gym and activity location points. (Smith 2017) Pokemon Go is a celebrated application, with 632 millions times of downloading and 147 millions of monthly active players. Due to the popularity, Pokemon Go plausibly facilitating an obvious behavior change in public health (Dillet. 2016).

According to multiple researches, Pokemon Go obviously and positively affect the amount of physical activities. The amount of physical activities increased approximately 25%, comparing with previous activity level. Pokemon Go, additionally, rising the physical activity level across gender, ages, as well as weight status. The physical activityk level of player, inactive originally, increase sharply in general (Gunther Eysenbach. 2016). Some studies, however, suggested that Pokemon Go cannot directly advance the public physical health. Despite the best effects in first period, players’ physical activity level drop sharply, meaning that the positive effects mentioned is not sustainable (Allana LeBlanc et al., 2016). This effect can be related to the motivation of players. There are three kinds of motivation for players, including health, social and immersion. Although players with health motivation presented the significant increase of the amount of physical activities, the effects caused by social and immersion motivation is limited. Merely the time spending outdoor increased rapidly (Lukas Dominik et al., 2017). In this situation, an analysis based on several aspects was conducted.

## Research Objectives

It is commonly know that Pokemon Go was not designed for public health improvement. That is the reason of the confusion about the relation between Pokemon Go and physical activity. For truth discovering, the entire study was conducted based on four aspects. The relation between frequency of app usage and amount of app usage, firstly, is a main focus. Theoretically, the more the app usage, the higher the opportunity for players doing physical activity (e.g. catching Pokemon, or turning Pokestop). Following the application usage aspect, we also discuss the problem in players’ characteristic. Since some researches proved that Pokemon Go players tend to join game-related physical activity, instead of physical activity in general (Alessandro Gabbiadini, 2017). The aim is discovering the existence of relations between Pokemon Go players and amount of general physical activity. In fact, the level of physical activity can be affected by various factors, including motivation, education level, and gender. We, thus, want to locate variables associating with the amount of physical activities. Last but not least, we want to examine the effects of the attitude towards physical activity caused by gender or educational level?

# Methodology

## Data Description

The data was obtained from a study, carried out following the code of ethics of the world medical association (Declaration of Helsinki) for studies using human as data. Amazon Mechanical Turk (MTurk), an internet-based platform offering online participant pool, was applied for data collection (Buhrmester,Kwang,&Gosling, 2011; Paolacci&Chandler, 2014). The original data contains 999 records, described by 31 variables. According to the study, there is a variable “ATTENTION\_filter”, the question for checking concentration of participants. Participants failing to answer “Disagree” will be classified as “non-focus”. Thus, those records were filtered. The number of records, in this way, is 981. Both id, submitdate, ipaddr and ATTENTION\_filter are not in consideration due to irreverent of objectives. Age is discrete number and gender is nominal data. Both “Frequency of App Usage” and “How often sharing on social media” are ordinal data, anchored with the scale from 1 = “never” to 7 = “very often”. Former accessing the extent of players using Pokemon Go per month, while the latter demonstrate the frequency players sharing their achievements on social media. The remaining ordinal variables of data was discussed below.

There are six variables (attitude\_attitude1 to attitude\_attitude6) measuring participants’ attitude towards physical activities. Examples of question is “To promote better health conditions, people may take part in the sporting activities” (measuring scale of all questions were from 1 = “completely disagree” to 7 = “completely agree”). Six variables with “stepsattitude” measuring participants’ attitudes in different way, with the scales from 1 = “completely disagree” to 7 = “completely agree”. Players’ physically behavior was assessed in two aspects, recency and frequency. The first three items for measuring recency of participants’ physical activity were “When was the last time you had (1) a walk for more than 30 min/(2) had a run/(3) had a bike ride to get some exercise?”. (The scale for those questions is 1=“more than one month ago”, 2=“about four weeks ago”, 3=“about three weeks ago”, 4=“about two weeks ago”, 5=“about one week ago”, 6=“during the last week” and 7=“yesterday”.) For measuring frequency, the following three questions were adopted: “How many times have you had (1) a walk for more than 30 min/ (2) had a run/ (3) had a bike ride to get some exercise during the last month?, with the scale from 1=”never" to 7=“every day”. The remaining three variables, names containing “PokemonPastBehaviour”, were used for assessing participants’ physical behavior relating to Pokemon Go. Questions represented by these three variables were “How many times have you walked more than 30 min/ had a run/ had a bike ride with the intent of searching for Pokemon Go during the last month?” ( anchored with 1=“never”, 2=“two times”,3=“from three to five times”,4=“from six to eight times”, 5=“from nine to eleven times”, 6=“from twelve to fourteen times”and 7=“every day”). Before modelling, the data was processed as mentioned on the next sessions.

## Data Processing

Prior to processing data, we check the number of missing values (which is 0), as well as filtering out records in accordance with the variable “ATTENTION\_filter1”. “ATTENTION\_filter1” is a variable for filtering out non-focus participants as Mechanical Turk experiment was applied. In spite of the convenience as well as limitless of time and location, Mechanical Turk experiment cannot guarantee that participants are paying attention as the survey was completed online (Jennifer Jacquet, 2011). Ensuring only data from focusing-on-survey participants were collected, the item symboled by “ATTENTION\_filter1” was used. If failed choosing “Disagree” in this question, the records will be removed due to being classified as non-focus records. After primary data cleaning, we transform all columns into integer score, according to the scales above-listed. This subjective assigning method is plausible for applying interval scale and the concept of distance (Chaowei Yang, 2014).

## Model Selection

Modeling method Selection criteria

# Analysis Result

# Discussion and Conclusion

# Reference

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