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Pokemon GO and Mental Health

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Nathaniel Ed, B.A.

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Clinical Psychology M.A.

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2019

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Pokémon GO and Mental Health

Nathaniel Ed, B.A.

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Abstract

Pokémon GO is a new type of game that emphasizes physical activity and social interaction. In the literature, both physical activity and social interactions have been shown to be positively correlated with mental health. Much research has been conducted on the effects of gaming on mental health, but to date no research has been done on the possible correlations of the game Pokémon GO and mental health. The present study was conducted to determine whether Pokémon GO players scored significantly lower than a control group of traditional gamers on scales of depression, anxiety, and pathological gaming, and if they reported more positive coping styles. Results indicated that Pokémon GO players did not score significantly lower on depression, anxiety, and pathological gaming inventories, but they did have trends toward better coping skills. Additionally, 39.6% of Pokémon GO players reported that they felt their mental health is either better or much better since playing the game, and 50.5% reported that they felt their physical health is either better or much better. While causation was not determined, the present study could open the door to discovering new coping interventions.

Acknowledgements

I would like to acknowledge those who made it possible to finish my thesis. Firstly, I would like to acknowledge Dr. Gruber, who stood with me throughout the entire process. I would also like to acknowledge my committee members and professors, Dr. Allan and Dr. Bernas.

Additionally, I would like to thank those in my life who pushed me into completing my thesis, even when progress was slow. I thank my father, Mark, my mother, Georgia, and my grandmother, Lois, for pushing me every step of the way. I would similarly like to thank my friends Chris and Mike, as well as my campus minister, Roy, for the continued encouragement.

Finally, I would like to thank God for His many blessings.

Video gaming is a relatively new innovation, but its impact on our culture is undeniable. Video games have been widespread since the time arcades were commonplace inside the malls of the United States. This technology has become increasingly advanced in recent years, with each new gaming system having better graphics and processing power.

This literature review examines video games with special focus on a recent game that involves real world interpersonal socialization, Pokémon GO. Pokémon GO is a new type of video game, combining screen time with real world movement and social interactions. The game uses the GPS function of the phone to show players the location of fictional creatures that spawn on a map. The players then travel to these physical locations to find and capture new Pokémon, often playing with friends. Pokémon GO is a unique type of game, combining traditional gaming elements with physical activity and social communication. These special factors lead to the present study. This literature review examines topics related to the idea that video gaming can be either helpful or harmful, including their effect on aggression, depression, and socialization. It also covers Pokémon GO and seeks to explore how the game may be adverse or beneficial to players.

Video Games

Current research on video games has been equivocal. Some studies show the positive effects of video games, while others demonstrate negative effects. There are general research trends, but even when it appears that the research on a topic is final, there is a paper published that shows the opposite. With this in mind, we will present the current research on the topic.

Pathological Gaming

It is important to first define the term “pathological gaming.” Pathological gaming has traditionally been defined using the *Diagnostic and Statistical Manual of Mental Disorders-5* (DSM-5) criteria for pathological gambling (known as gambling disorder in the current DSM-5), but modified for video gaming (Gentile, 2009). For instance, Gentile measured the time the participants thought about gaming while not gaming, whether gaming was used as an escape mechanism, and school performance. Like gambling disorder, they posit that pathological gaming occurs when “serious negative life consequences” arise. In this study, a gamer was marked as pathological if they endorsed at least six of the eleven criteria. These criteria included failed attempts to reduce time spent playing, skipping more important duties to play games, constantly thinking about playing games, stealing games, lying about game usage, and escapism. In a more recent study, Gentile, et al. found evidence that it may actually be an impulse control disorder because those who show more impulsivity, do not handle emotions properly, or are less socially adept are the most predisposed to it (Gentile, et al., 2011). This led the authors to believe that it would be better categorized as an impulse control disorder in the *DSM*. Regardless, there is a general consensus in the literature that pathological gaming is clinically significant.

Engagement vs. Addiction

A number of studies have drawn a distinction between video game “engagement” and video game “addiction.” It is important to understand this issue before moving on to specific correlates. Charlton and Danforth (2007) identify engaged gamers as those who spend a lot of time gaming but have few pathological symptoms. On the other hand, they identify addicted gamers as those who spend large amounts of time gaming and have

major consequences as a result of that playtime. Charlton and Danforth (2007) also hypothesized that there are seven criteria that can be used to measure whether someone is addicted to video games. They broke these into two different groups: core criteria, which are the most severe, and peripheral criteria, which are milder. The core criteria consist of “behavioral salience, withdrawal, relapse, and conflict,” while the peripheral criteria consist of “cognitive salience, euphoria, and tolerance” (Seok & DaCosta, 2014). Charlton and Danforth (2007) reported that the peripheral criteria are common in both engaged and addicted players, but the core criteria are only found in addicted gamers. With this in mind, it appears that frequently playing video games does not always create problems, although Charlton and Danforth warn that engagement can be a risk factor for becoming addicted (2007). Therefore, it is important to ask what some of the negative consequences of gaming might be.

Aggression

One of the most studied areas of research on gaming is how video games and aggression correlate. The research often reports correlations between playing violent video games and aggression in players. Additionally, studies tend to find that online gaming correlates more with aggression than offline gaming. For example, one recent study found that teenage boys in Iran who played video games for at least seven hours a week were more likely to engage in fighting and other bullying behaviors (Allahverdipour, Bazargan, Farhadinasab, & Moeini, 2010). Another study found that university students were significantly more aggressive when playing online violent games than when playing offline violent games, but both violent game groups were more aggressive than online nonviolent and offline nonviolent groups (Hollingdale &

Greitemeyer, 2014). It should be noted that aggressive behavior was measured by the amount of hot chili sauce they put in chili to give to an unseen person. A self-report study performed in South Korea found that violent video games were directly related to aggressive behaviors and were not mediated by emotion (You, Kim, & No, 2015). A study on cyberbullying in online gaming showed that bullying is a common occurrence in online gaming, and it often causes the victim to reciprocate by bullying other players (McInroy & Mishna, 2017).

Ivory, Ivory, and Lanier look at other facets of aggression in their own study. They found that gamers who played mostly sports games were more likely to commit sexual assault than other gamers, and that gaming overall was associated with a higher likelihood of being sexually assaulted (2017). Additionally, all gamers were more likely to engage in physical violence against another person or carry a weapon than their non-gamer counterparts. Regardless of these findings, it is difficult to tell whether playing video games causes aggression or if it is the opposite given the correlational nature of the studies.

In response to these findings, studies have attempted to find a directional relationship. According to a two-year longitudinal study on pathological gaming in children, players developed “normative beliefs about aggression” and other violent behaviors only after becoming pathological gamers (Gentile, et al., 2011). Although most gamers were still identified as “pathological” after two years, 16% of them fell below the criteria upon a follow-up. For those who fell below the cutoff, their symptoms abated. Specifically, they were found to have fewer aggressive “fantasies” and behaviors.

On the other hand, some research has shown the opposite. For example, researchers found that after playing the game *Hitman: Blood Money*, a game where the player controls an assassin, players had no change in their levels of aggression, and actually had less hostility after long-term playing (Ferguson & Rueda, 2010). Additionally, the authors found evidence that individuals who frequently play violent games were able to calm down more efficiently after stressful stimuli than their less-experienced counterparts. The authors found no differences among separate genders or ethnicities. The level of aggression was measured by creating a punishing noise for a nonexistent player when that player would lose a game trial. Higher decibel noises were coded as more aggressive. The researchers opine that the decrease in hostility is because the violence causes “mood-management” in certain people. Another study sought to find whether playing massive multiplayer online (MMO) games would make gamers more socially aggressive and how it impacted their views of violence (Williams & Skoric, 2005). The researchers found that MMO players were not more inclined to argue with others, and that they were no different than the control group in supporting the aggressive actions of people portrayed in a survey. They admit that older gamers were found to be slightly more argumentative, but for every other age group the difference between the control group and experimental group was negligible.

While most of the studies agree that violent games correlate with and perhaps even cause aggression, it is clear that there is not universal agreement; however, aggression is not the only correlate of gaming.

School Performance

Research on school performance and video game usage has been generally consistent with its findings. A study on college gamers found that GPA had a negative correlation with game usage, but the results were stronger in males (Burgess, Stermer, & Burgess, 2012). Another study found similar results, but it was SAT math scores that were more strongly correlated with video game usage in males (Anand, 2007). Similarly, a study on male college gamers found that students who self-reported symptoms of pathological gaming were found to have lower GPAs at the end of their first two semesters (Schmitt & Livingston, 2015). The researchers found that the same students actually had lower expectations of their own performance and participation in college activities as well. This factor could imply that the lower grades were due to reduced expectations of how well one would perform rather than game addiction itself. Additionally, there could be another factor involved, such as a personal trait (e.g. ADHD, lack of interest in education, motivation, etc.).

A paper by the Center for Internet Addiction Recovery corroborates the idea of a third factor. They report that when children receive poor grades, their self-esteem is negatively impacted, which may cause them to use video games as a coping mechanism (Young, 2009). With this in mind, it could be that video games are not the cause, but rather that self-esteem mediates game addiction and school performance.

There are a few aspects of video game usage that have actually been positively correlated with GPA. A study on middle and high school students found that students who used game guides, looked at game manuals when they needed help, and were willing to ask another person to assist them in completing a task in the game had better GPAs than those who did not (Hamlen, 2014). These correlations could imply that willingness

to ask for help on assignments is the cause of higher GPA rather than innate intelligence. Interestingly, they also found that individuals who tried to find out as much as they could about game strategies before trying it themselves had lower GPAs.

Looking at children and teenagers, the results are less clear. One study found that adolescents had little or no reduction in their grades in science, reading, or mathematics as a result of playing video games (Drummond & Sauer, 2014). In fact, some research has found that English scores are actually positively correlated with the amount of time spent gaming in primary school children, but only on school nights (Skoric, Teo, & Neo, 2009). This may be due to the reading skills required for some games. Another group of researchers showed that video games do have negative effects on academic performance (Gentile, Lynch, Linder, & Walsh, 2004). These researchers also found that the time spent playing video games was more related to grades than factors about the games themselves, such as violence. They did find violence to be slightly correlated with being verbally aggressive toward teachers, and that children whose parents are engaged with their gaming by policing content are less hostile toward teachers and peers, and have better grades.

A meta-analysis found that the overall research indicates that video gaming in children and adolescents generally did not affect academic performance; however, academic performance still had a slight negative relationship specifically with violent video games (Ferguson, 2015). It could be that parental monitoring is a preventative factor that keeps gaming from having an impact on academic performance. A study on children who were already addicted to gaming found that when students showed symptoms of addiction to video games, English, science, and mathematics scores were all

lower (Skoric, Teo, & Neo, 2009). With this in mind, gaming's effect on academic performance in children could depend on whether the individual shows symptoms of addiction.

Physical Health

Studies have reported that there are certain physical health risks in those who play video games, but the research is still equivocal. Studies on weight are among the most notable. For example, one study found that adult male gamers had higher BMIs than their non-gamer counterparts (Weaver, et al., 2009). Gamers were found to have an average of about 1.5 higher BMI points than non-gamers in the study. The research is less clear for minors. A study on high schoolers found higher BMI points for females, with an average BMI that was 0.41 points higher for gamers than for non-gamers, although they did not find a statistically significant difference for males (Desai, Krishnan-Sarin, Cavallo, & Potenza, 2010). Another study found that there was no relationship between BMI and playing sedentary games in teenagers (Scharrer & Zeller, 2014). There tends to be less research to support adolescent obesity based on video game usage, although this could be due to a number of factors. For instance, physical education at school in younger populations may help offset obesity. Similarly, there could be a causal problem as well, where adults with obesity may be more likely to play games than their lower-BMI counterparts, whereas there may be no difference in gaming habits based on weight for adolescents.

Although the study by Weaver, et al. did not find an increased BMI in adult females, they did find that females had a "lower health status," which is defined as the self-report of how healthy they consider themselves to be on average (2009). This result

was not found for males, regardless of the finding that they had higher BMIs. It has been shown in studies that obesity and lack of sleep are correlated in younger individuals (Nielsen, Danielsen, & Sørensen, 2011). Relating this to video game usage, one study found evidence that lack of sleep mediates obesity and gaming (Turel, Romashkin, & Morrison, 2016). While they did not definitively find a mechanism for this, they suspect that it may be due to the bright screen reducing the gamer's melatonin levels. They also report that the addiction itself may be implicated as well, meaning that individuals will opt to play rather than sleep.

In addition to weight, there are other correlates as well. For instance, one study found that adolescent males who were "problematic gamers" were more likely to smoke and to fight others, and adolescent females were more likely to use drugs (Desai, Krishnan-Sarin, Cavallo, & Potenza, 2010). On the other hand, a study on male college age students found that they were actually less likely to be caught using alcohol if they were gamers (Schmitt & Livingston, 2015). Some individuals may be too preoccupied with games to become involved with the social aspects of college like drinking, though they may miss out on positive experiences as well. Another study looked at substance use based on the genre of game played by college students. The researchers found that action gamers were less likely to use e-cigarettes or chewing tobacco, but more likely to use inhalants. They also found that sports and racing game players were more likely to drink, but used inhalants less (Ivory, Ivory, & Lanier, 2017). They also found that when considering all genres, gamers were more likely to engage in the use of illicit substances. Examining these findings, there appears to be a difference between gamers who play sports and racing games, and those who engage in other genres. It may be that the

individuals who play sports games comprise a different population than those who play other game genres, explaining the differences. Looking at all of these physical health studies, there is evidence to support numerous health problems with video gaming, although the specific problems can differ between studies.

Mental Health

There is evidence that playing games correlates with mental health problems. For example, one study found that fifth grade students who played violent video games for more than two hours per day had more depressive symptoms than those who played non-violent games (Tortolero, et al., 2014). This finding was only found to be significant for boys. A study on U.S. adults found that there was a direct effect of video game addiction on anxiety, depression, and stress (Loton, Borkoles, Lubman, & Polman, 2015). This was found even when controlling for coping, although they still found coping to be a partial mediator. Of the three, anxiety was found to have the strongest relationship to addiction (2015). In another study, Ivory, Ivory, and Lanier found that gamers in general were more likely to have suicidal ideation or make a suicide attempt, although sports game players were found to be less likely to engage in either (2017). Other researchers have found that ADHD is twice as common in pathological gamers than in other gamers (Gentile, 2009). A published dissertation found that the length of time a child with ADHD spent playing was correlated with inattention symptoms and “approach[ed] statistical significance” for hyperactive symptoms (Goodlad, 2014). On the other hand, they also found that the number of times a child sits down to play is unrelated to ADHD symptoms. A study of adults with ADHD found that neither time spent playing nor number of times playing were related to their symptomatology (Panagiotidi, 2017). The researcher found that

inattentive symptoms were still correlated with problematic gaming, which was identified as gaming that causes clinically significant impairment. A study on veterans with posttraumatic stress disorder (PTSD) found that veterans who played shooter games had more PTSD symptoms than non-shooter gamers and non-gamers (Etter, Kamen, Etter, & Gore-Felton, 2017). As a qualification, when controlling for outside variables, the researchers found evidence to suggest that shooter games and PTSD were not related.

One study showed that the caregivers of addicted gamers are negatively impacted too. Researchers in India found that the caregivers in a case study were negatively impacted both in their mental and physical health, and that the addicted gamer created problems in the ways that the family members interacted with one another (Sharma, 2016). Similarly, research has found that gamers' social interactions are impacted as well, which may affect interactions with caregivers. For instance, one study found that individuals who played violent video games had less empathy, fewer prosocial behaviors, and less self-control than the control group (You, Kim, & No, 2015).

A study in Korea found that more time spent playing video games in general had a negative correlation with symptoms of depression, but the researchers did not differentiate between violent and nonviolent games (Lee & Jeong, 2014). Regardless, the same study found that anxiety (measured by number of worries) and the time spent gaming were correlated, showing that there were still problems with gaming. Another study found that video game use in general did not correlate with conduct disorder or depression, but the researchers did find a small relationship between violent game use and conduct disorder (Etchells, Gage, Rutherford, & Munafò, 2016). Of course, it might be that individuals with a mental health disorder tend to use video games to cope, so there

may be a third factor involved. For non-violent puzzle games, research has actually shown benefits to mental health. For example, a study conducted at East Carolina University on casual puzzle games by the developer PopCap Games found that players had reduced depression, anxiety, and an improved mood after playing, both after thirty minutes and one month (2011). Additionally, Ivory, Ivory, and Lanier found that gamers were less likely to show symptoms of an eating disorder, although this finding was not analyzed by gender (2017).

Once again, it is difficult to determine the causation in the studies; however, a two-year longitudinal study found that symptoms of poor mental health dissipated after pathological video gaming ceased (Gentile, et al., 2011). The study also found that existing deficiencies in communication and impulsivity were both predisposing factors in gaming addiction, although gaming exacerbated those problems. Additionally, they found that the pathological gaming lasted longer than the two years of the study 84% of the time, giving credence to the idea that this is a long-term problem.

So why do people turn to video games? There have been case studies attempting to answer that question. For example, a study on internet usage found that the social aspect is a major factor. They found that minors tended to engage in internet activities (such as forums, but likely games as well) to get “affectionate social support” (Leung, 2007). In other words, gamers who visit these internet locales likely have similar interests, and therefore may support each other emotionally. Other reports seem to confirm this. The Center for Internet Addiction Recovery reports that addicted minors who have the games removed by a parent often feel grief as a result, as the other players may be their only source of friendship (Young, 2009). They go on to say that introversion

is a common personality trait among gamers, and those who have difficulties making friends in their offline lives may find their needs provided by friends inside the game.

Researchers have also found that games are sometimes used as a mechanism for escape. For instance, the Center for Internet Addiction Recovery says that, similar to substance use, some individuals use games to forget the outside world (Young, 2009). They report that gamers can become someone who they want to be rather than someone they already are. This “someone” can mean that online they are “socially confident, connected, and self-assured with others through the game” (Young, 2009). In other words, these gamers could potentially escape from bullying and social expectations through these online worlds, providing them with an incentive to continue playing, even to the point of it being pathological. Researchers have also found that disordered gaming may be more likely in individuals who are already known to engage in avoidance coping strategies (Schneider, King, & Delfabbro, 2017). As noted earlier, Loton, Borkoles, Lubman, and Polman found coping to be a partial mediator for video game addiction and stress, depression, and anxiety (2015). They also found that higher levels of video game addiction were correlated with higher usage of maladaptive coping styles, particularly avoidance, and that these same high-addiction individuals were less likely to use approach coping styles. Another study showed that video games can be effective in coping with physical pain as well. The researchers had children play a video game while dipping their hand in freezing water to test pain tolerance, and they found that playing the game during the trial helped them keep their hand in longer than their pretest baseline (Sil, et al., 2014).

Games as Therapy

There are clearly potential problems with video game use, which we may even be able to term as “abuse,” similar to a substance. Regardless, there is potential for them to be beneficial as well. Some therapists have gone as far as to incorporate gaming into their therapies. As previously mentioned, casual puzzle games by PopCap Games have been shown to be beneficial to those with symptoms of depression or anxiety (2011). Additionally, some games have been designed specifically for therapy. Called “computerized cognitive-behavioral therapy” (cCBT), a game entitled *SPARX* seeks to bridge the gap between technology and therapy (Fleming, 2012). During gameplay, users must perform tasks such as “shooting” their negative thoughts and helping to “restore balance” to a world plagued by depression by using cognitive behavioral skills. Between levels, the players hear from a guide who educates the player on cognitive behavioral techniques. A study performed on the game found that depressive symptoms were reduced in individuals who played the game, although they did not find a reduction in anxiety or other mental health symptoms (Fleming, 2012).

Another example is *Maya*, a psychotherapy adventure game that features a female protagonist who is designed to be relatable to female adolescent clients (Carrasco, 2016). The therapists who used the game as a part of their therapy reported value in it as a tool to help communication skills and guard against depression, and that it helped the clients “externalize” their emotions, allowing them to look at themselves objectively.

Considering these types of games, it is clear that games can be intentionally designed to help with mental health issues. With the rise of gaming, there is great potential to take advantage of this trend, even if gaming in general has detrimental

effects. Of course, there may be existing games that can help with mental health symptoms, which brings us to our study of Pokémon GO.

Pokémon GO

A recent phenomenon is the game Pokémon GO, released by the developer Niantic. Pokémon GO is a smartphone app where players can capture fantasy creatures, known as Pokémon, in a real-world environment that is tracked by their GPS. Players are required to travel around their city or town to find creatures that appear in specific locations, at which point they can capture them by throwing “Pokéballs” at them. As players capture more Pokémon, they gain experience points and level up, opening players up to capture even stronger creatures.

These games have a social aspect as well. Players are asked to join different teams (i.e. Mystic, Valor, and Instinct). Players on each team have the option to battle other teams at “gyms,” which are in-game strongholds on the virtual map that one team can hold until another team defeats them. Players on these teams often meet up in person to help capture the gym for their own team. Additionally, players often meet to walk around an area to capture new Pokémon or visit “Pokéstops,” which are real-world landmarks where players can restock their Pokéballs and other items. More recently, a mechanic called “raids” was introduced, where certain Pokémon, including some “legendary” Pokémon, could be caught. These also require a social aspect, as it is typically impossible to complete the raid by one’s self, and such groups often include between five and twenty people, who are potentially forming friendships.

Pokéconomy

Real world businesses have reported a positive impact on sales when their location is chosen to be a Pokéstop. Gaming magazine *PCMag* identifies what they call a “Pokéconomy,” where businesses are trying to capitalize on the craze (Marvin 2016). According to the article, businesses are investing in placing “lures” (which attract Pokémon to a location) on their businesses, which will boost their traffic. They report that one business had a 30% increase in business when they decided to spend the 99 cents each half hour for a lure. The author continues to list numerous examples of this in multiple cities across the United States.

Businesses are not the only locations seeing an influx in traffic. Various churches have been listed as either Pokéstops or gyms. According to Elizabeth Drescher of *America*, a Jesuit publication, some churches are looking to Pokémon GO as a way to evangelize to people who would not otherwise attend a church (2017). The article also notes that other churches see the players as “profane interlopers on sacred space,” though they note that this viewpoint is not the majority. The author continues to say that some churches have used lures in the same way businesses have, setting up lures during gatherings for youth to attempt to get them through the door for food, fellowship, and Pokémon.

Overall, we can see that there are benefits to businesses and churches that choose to use the app to increase traffic. But what is the benefit to the player?

Personal Benefits

Although the research is nascent, there are reports that the game may contribute to a more active lifestyle. Researchers at the University of Hawaii found that individuals who played Pokémon GO were on average active for an extra half hour every day and

received an extra fifty minutes of heavier exercise every week (Nigg, et al., 2017).

Another study found that only about a third of participants met recommended guidelines for physical activity before they started playing, but 75% did afterwards (Wagner-Greene, et al., 2017). Additionally, according to an article in *Parks & Recreation*, Pokémon are found in higher levels in public parks, making it more attractive for players to visit these locations (Amselle, 2016). This may further contribute to an active lifestyle. Regardless of the scarce research on physical activity and Pokémon GO, the research that exists shows that there are benefits to players.

Detriments

On the other hand, some research has shown a negative effect on players. For example, one study found that players were more likely to engage in risky behaviors when playing the game, such as playing while operating a vehicle and trespassing (Wagner-Greene, et al. 2017). The authors also found that players would often not pay attention to the world around them while playing, leading to potentially dangerous situations, and that they might get less sleep so they could play the game more.

Mental Health and Pokémon GO

To our knowledge, at the time of this study there are no academic studies examining whether Pokémon GO has any effect on the mental health of players. Regardless, various individuals have reported anecdotal effects. According to an article in the Huffington Post, many players have posted on the social media website Twitter to voice that the game has improved their depression or anxiety, although the author qualifies that it is not a substitute for actual therapy (Salfi, 2016). According to one user

on Twitter, @CptNaomi, “#PokemonGO is gunna[sic] cure my social anxiety. Everyone has been so nice. People are not as scary as originally perceived” (CptNaomi, 2016).

Furthermore, we already know that an increase in physical activity tends to boost mental health. For example, a study in the journal *Disability and Rehabilitation* found that exercise worked well alongside counseling for patients with severe depression, and in lesser severities it was even found to be about as effective as an antidepressant or counseling (Knapen, Vancampfort, Moriën, & Marchal, 2014). Studies have also been performed on the effects of “exergames,” which are games, such as Nintendo’s *Wii Fit*, that are played by exercising. A recent study found that patients in an assisted living facility were less likely to show symptoms of depression and had better balance after undergoing a weekly *Wii Fit* regiment (Chao, Scherer, Montgomery, Wu, & Lucke, 2015).

Based on the idea that Pokémon GO increases physical activity, and physical activity contributes to a better mental health, it might stand to reason that Pokémon GO can help contribute to mental health. To our knowledge, no study has been performed on the effect of Pokémon GO on depression. In Japan, researchers have opined that Pokémon GO may help individuals with social anxiety get out of their home, but no formal study has been conducted (Kato, et al., 2017; Tateno, Skokauskas, Kato, Teo, & Guerrero, 2016). This leads us to our present study. While research has been conducted on video games and mental health, Pokémon GO presents a unique experience that combines traditional gameplay with real world movement and social interactions. We suspect these differences may have different effects on user’s mental health as well. Firstly, we hypothesize that Pokémon GO players will endorse fewer symptoms of

depression when compared to a traditional gamer group. Secondly, we hypothesize that Pokémon GO players will endorse fewer symptoms of anxiety when compared to a traditional gamer group. Thirdly, we hypothesize that Pokémon GO players will endorse more positive coping skills and fewer negative coping skills when compared to a traditional gamer group. Finally, we hypothesize that Pokémon GO players will endorse fewer symptoms of pathological gaming than traditional gamers. For the purposes of this study, we identify Pokémon GO players as individuals who play Pokémon GO but may or may not play other types of games. Similarly, we identify traditional gamers as those who play video games of any other type, but do not play Pokémon GO.

Methods

Participants

The participants were gamers from two subreddits, r/pokemongo and r/samplesize, which are special interest forums on the website Reddit. From there, the participants were divided between whether they endorsed playing Pokémon GO or not in the questionnaire. Individuals who endorsed that they play Pokémon GO were put in the Pokémon GO group, and individuals who endorsed that they do not play Pokémon GO were put in the non-Pokémon GO group.

Measures

Demographic information. The participants were first asked a series of questions regarding their background, including age, gender, ethnicity, and geographic area.

Video Game Play History Questionnaire. The Video Game Play History Questionnaire is an eleven-item self-report questionnaire modified from Gackenbach (2006) that asks questions regarding the participant's game usage.

Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a nine-item self-report questionnaire that asks how often the participant has experienced a particular symptom of depression within the previous two weeks (Spitzer 1999). The questionnaire uses an ordinal scale where 0 means that the participant has not experienced that symptom at all and 3 means the participant has experienced the symptom every day. The items are based on the nine-item *DSM* criteria for Major Depressive Disorder. A score of 5 is coded as mild depression, a score of 10 is coded moderate depression, a score of 15 is coded as moderately severe depression, and a score of 20 or more is coded as severe depression. The maximum score is a 27. The questionnaire has good reliability ($\alpha = 0.86-0.89$) (Kroenke, Spitzer, & Williams, 2001).

Generalized Anxiety Disorder-7 (GAD-7). The GAD-7 is a seven-item self-report questionnaire that asks how often the participant has experienced a particular symptom of anxiety within the previous two weeks (Spitzer, 2006). The questionnaire uses an ordinal scale where 0 means that the participant has not experienced that symptom at all and 3 means the participant has experienced the symptom every day. The items are based on the seven-item *DSM* criteria for Generalized Anxiety Disorder. A score of 5 is coded as mild anxiety, a score of 10 is coded as moderate anxiety, and a score of 15 or higher is coded as severe anxiety. The maximum is a score of 21. The questionnaire has good reliability ($\alpha = 0.89$) (Löwe et al., 2008).

Questions about anxiety attacks. The Patient Health Questionnaire (PHQ) also features a question asking if the participant has had a panic attack within the last month (Spitzer, 1999). If the answer is yes, the participant is asked four further questions about this incident and previous occurrences. Both the initial question and the follow up questions are answered “yes” or “no.”

Brief COPE. The Brief COPE is a 28-item survey that identifies various coping mechanisms that the participant may use (Carver, 1997). The questionnaire uses an ordinal scale where 1 means that the item is not done and 4 means the item is done a lot. The Brief COPE demonstrates lower reliability than the full COPE scale that it is based on (α 's ranging from .50-.90, differing by subscale) (Carver, 1997); however, considering its brevity it is seen as appropriate for the present study. The 28 questions are broken down into 14 subscales with two questions per subscale. The subscales are self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame.

Pathological Video Gaming. Pathological Video Gaming is a self-report measure by Groves, Gentile, Tapscott, & Lynch, 2015, that uses a modified version of the *DSM-IV* criteria for substance disorders to record symptoms of pathological video gaming. The answers are coded as “yes” or “no.” The scale has good reliability ($\alpha = .73$).

Supplemental Pokémon GO Questionnaire. The Pokémon GO group was also presented questions regarding their usage of the game that detail their experience with the game. This section was be presented only to the Pokémon GO gamer group and was included at the end as to not influence responses in the other sections of the survey.

Procedure

A link to the survey was posted as a thread in both subreddits. The survey was hosted through Qualtrics, an online survey platform. Participants were shown an informed consent form. Consenting participants were then presented the survey. At the conclusion, the participants were debriefed and entered into a drawing for a \$50 gift card. The debrief included information about mental health resources in the event that any question causes distress to a participant. The study was approved by the Eastern Illinois University Institutional Review Board (IRB).

Results

A total of 2277 individuals responded to the study. Regarding whether they play Pokémon GO, 1992 (93.0%) individuals responded that they play Pokémon GO, and 149 (7.0%) responded that they do not play Pokémon GO. There were 614 (28.7%) respondents who identified as female, 1482 (69.3%) identified as male, 37 (1.7%) identified as non-binary, and 7 (0.3%) reported that they preferred not to answer. Regarding race, 1452 (68.0%) participants reported that they identify as Caucasian, nine (0.4%) identified as black, 136 (6.4%) identified as Hispanic, 180 (8.4%) identified as Asian, and 357 (16.7%) identified as another race. Regarding location, 720 (33.7%) reported that they live in an urban setting, 729 (34.1%) reported suburban, 355 (16.6%) reported that they live in a smaller city, 219 (10.2%) reported that they live in a smaller town, and 116 (5.4%) reported that they live in a rural area. Regarding college attendance, 826 (38.6%) reported that they are currently attending college, and 1314 (61.4%) reported that they are not currently attending college. A breakdown of demographic information by gamer group can be found in Tables 1-4 in Appendix A.

Tables 5-11 in Appendix B show how participants responded on the gameplay usage portion of our survey. Results are broken down into responses by Pokémon GO players, traditional gamers, and the total responses.

To analyze the data, we scored the scales and ran independent-samples t-tests to determine if there were significant differences in the scores of the GO gamers and the traditional gamers. At an alpha level of .05, the analyses revealed no significant differences between the two groups on the depression, anxiety, and pathological gaming scales. For the depression scale, there were no significant differences found between the Pokémon GO gamers ($M = 7.04$, $SD = 5.93$) and the traditional gamers ($M = 7.57$, $SD = 6.91$), $t(151.4) = -.87$, $p = .19$, one-tailed. For the anxiety scale, there were no significant differences between the Pokémon GO gamers ($M = 5.38$, $SD = 5.12$) and the traditional gamers ($M = 5.23$, $SD = 4.94$), $t(1934) = .33$, $p = .37$, one-tailed.

The Brief COPE is designed to be analyzed by subscale rather than as a collective whole. When analyzing the fourteen subscales of the coping questionnaire, we found one subscale that showed a significant difference between the GO gamer and traditional gamer groups. At a Bonferroni-corrected alpha level of .0036, we found that Pokémon GO players ($M = 1.46$, $SD = .69$) were significantly less likely to endorse symptoms of behavioral disengagement (giving up on trying to cope) than traditional gamers ($M = 1.67$, $SD = .81$), $t(132.80) = -2.72$, $p = .0035$, one-tailed. There were no other subscales that were found to be statistically significant.

Looking at other trends in the data, there were other subscales that were significant without a Bonferroni correction. At an alpha level of .05, we found that Pokémon GO players ($M = 2.54$, $SD = .82$) tended to be less likely to use self-distraction

as a coping mechanism than traditional gamers ($M = 2.68$, $SD = .84$), $t(1780) = -1.72$, $p = .04$, one-tailed. We found that Pokémon GO players ($M = 2.49$, $SD = .84$) tended to be more likely to use active coping mechanisms than traditional gamers ($M = 2.31$, $SD = .81$), $t(1784) = 2.27$, $p = .01$, one-tailed. At an alpha level of 0.05, we found that Pokémon GO players ($M = 2.21$, $SD = .85$) tended to be more likely to use positive reframing than traditional gamers ($M = 2.01$, $SD = .87$) $t(1779) = 2.49$, $p = .004$, one-tailed. At an alpha level of .05, we found that Pokémon GO players ($M = 1.31$, $SD = .64$) tended to be more likely to use religion as a coping mechanism than traditional gamers ($M = 1.22$, $SD = .53$), $t(1777) = 1.71$, $p = .05$, one-tailed. Finally, we found that Pokémon GO players ($M = 2.32$, $SD = 1.00$) tended to report less self-blame than traditional gamers ($M = 2.55$, $SD = 1.01$) $t(1779) = -2.36$, $p = .01$, one-tailed. There were no trends found among any other coping subscale. The scores of the coping subscales are found in Table 12 on the next page.

For the pathological gaming scale, there were no significant differences between the Pokémon GO gamers ($M = 12.52$, $SD = 2.27$) and the traditional gamers ($M = 12.68$, $SD = 2.25$), $t(1760) = -.74$, $p = .23$, one-tailed. To get more detailed information about the symptoms of pathological gaming, we decided to break down the pathological gaming scale by question. When analyzing the pathological gaming scale by question, we found that at a Bonferroni-corrected alpha level of .006, Pokémon GO players ($M = 1.44$, $SD = .50$) were significantly more likely to endorse that they often keep playing a game to try to get a higher score than traditional gamers ($M = 1.59$, $SD = .49$) $p < .001$, one-tailed. No other pathological gaming questions were found to have statistically significant differences.

Table 12

Coping subscale results

Variable	Pokémon GO		Traditional Gamers		<i>t</i>	<i>df</i>	One-tailed <i>p</i>	95% CI	
	M	SD	M	SD				LL	UL
Self-distract*	2.54	.82	2.68	.84	-1.72	1780	.04	-.29	.02
Active coping*	2.49	.84	2.31	.81	2.27	1784	.01	.02	.33
Denial	1.21	.47	1.21	.54	-0.40	1786	.48	-.09	.08
Substance	1.47	.80	1.47	.89	0.04	1782	.48	-.15	.15
Emotional Support	2.26	.94	2.24	1.02	0.24	1781	.41	-.15	.20
Instrumental Support	2.07	.90	2.07	.91	0.05	1777	.48	-.16	.17
Behavioral Disengagement**	1.46	.69	1.67	.81	-2.72	132.80	.0035	-.36	-.06
Venting	1.91	.74	1.92	.77	-0.07	1781	.47	-.14	.13
Positive Reframe*	2.21	.85	2.01	.87	2.49	1779	.004	.04	.35
Planning	2.45	.88	2.44	.87	0.18	1775	.43	-.15	.17
Humor	2.35	1.04	2.48	1.04	-1.40	1780	.08	-.33	.05
Acceptance	2.59	.82	2.64	.80	-0.61	1776	.27	-.20	.10
Religion*	1.31	.64	1.22	.53	1.71	1777	.05	-.01	.19
Self-Blame*	2.32	1.00	2.55	1.01	-2.36	1779	.01	-.41	-.04

* Significant at 0.05

** Significant at a Bonferroni-corrected alpha of .0036

Table 13

Pathological Gaming by Question

Variable	Pokémon GO		Traditional Gamers		<i>t</i>	<i>df</i>	One-tailed <i>p</i>	95%CI	
	M	SD	M	SD				LL	UL
Interferes with homework?	1.72	.45	1.65	.48	1.71	136.97	.05	-.01	.17
Restless without play?	1.78	.41	1.78	.42	.07	1776	.48	-.07	.08
Done poorly at school?	1.59	.49	1.57	.50	.44	1775	.33	-.07	.11
Lied about game usage?	1.65	.48	1.69	.46	-1.05	141.97	.15	-.13	.04
Try to limit self?	1.35	.48	1.40	.49	-1.00	1775	.16	-.13	.04
Successful in limiting self?	1.77	.93	1.84	.95	-.83	1771	.21	-.24	.10
Played video games as escape?	1.23	.42	1.18	.39	1.46	144.71	.08	-.02	.12
Play again to get a higher score? **	1.44	.50	1.59	.49	-3.21	1775	<.001	-.24	-.06

** Significant at a Bonferroni-corrected alpha of .006

While not a part of our hypotheses, we did ask a question about panic attacks, and if an individual endorsed having panic attacks, four follow-up questions were asked. None of the questions were found to have significant differences between the groups.

Finally, we asked a series of questions to individuals who endorsed that they played Pokémon GO. We omitted the question asking if they played Pokémon GO in college because we forgot to include “not applicable” as an option, which skewed the results. When asked how often they play Pokémon GO, seven (0.4%) people said they play less than once per month, 21 (1.3%) said they play once per month, 61 (3.7%) said

they play several times per month, 31 (1.9%) said they play once per week, 337 (20.5%) said they play several times per week, and 1189 (72.2%) said they play daily. When asked how long they play per week, 25 (1.5%) said they played less than once per week, 70 (4.3%) said they played less than half an hour per week, 157 (9.5%) said they played between half an hour and one hour per week, 309 (18.8%) said they played between one and two hours per week, 446 (27.1%) said they played between two and four hours per week, and 639 (38.8%) said they played more than four hours per week. When asked about their mental health since starting playing Pokémon GO, 11 (0.7%) said their mental health has been much worse, 27 (1.6%) said it has been worse, 954 (58.1%) said it has been about the same, 505 (30.8%) said it has been better, and 145 (8.8%) said it has been much better. Finally, when asked about their physical health since starting playing Pokémon GO, 12 (0.7%) said their physical health has been much worse, 50 (3.0%) said it has been worse, 751 (45.7%) said it has been about the same, 659 (40.1%) said it has been better, and 170 (10.4%) said it has been much better.

Discussion

The present study was conducted to determine whether Pokémon GO players show fewer symptoms of depression, anxiety, and pathological gaming, as well as whether they endorse better coping skills than traditional gamers. There were no significant differences between the gamer groups in terms of depression, anxiety, and pathological gaming; however, one coping subscale showed significant differences. Pokémon GO players were significantly less likely to endorse behavioral disengagement (giving up on coping). Looking at other trends in the data, Pokémon GO players were less likely to report blaming themselves and less likely to use self-distraction as a coping

mechanism. Similarly, the trends showed that Pokémon GO players were more likely to endorse the use of active coping, positive reframing, and religion as coping skills.

We next looked at the pathological gaming scales by individual question. In the pathological gaming scale, there was one question with a significant difference, finding that Pokémon GO players were significantly more likely to endorse that they would play a game again to try to get a higher score (question 7). It is of interest that the GO group is more likely than the traditional gaming group to endorse that they often play again to get a higher score. While this could imply a symptom of pathological gaming, due to the nature of the question it is possible that this could instead indicate that GO players are more likely to persevere in the face of adversity, retrying an obstacle until they succeed. The game features “raids,” where players team up to try to defeat a larger monster. These raids are often unsuccessful and require multiple attempts to complete, rewarding the player for their perseverance. Considering this, it would be of interest to study this particular factor further, determining whether this is actually a symptom of pathological gaming or if it is instead indicative of perseverance during adversity.

It is also of note that the average scores for both Pokémon GO players and traditional gamers indicate that they both tend to endorse criteria for mild depression and mild anxiety. In a normative study of the PHQ-9 using a sample size of 5018 participants, the general population endorsed a mean of 2.91 with a standard deviation of 3.52 (Kocalevent, Hinz, & Brähler, 2013). Similarly, a study that sought to find the population norm of the GAD-7 found that the general population endorsed a mean of 2.95 with a standard deviation of 3.41 (Löwe, et al., 2008). This study had a total sample size of 5030 participants. The GO and traditional gamers had means of 7.04 and 7.57 for depression,

respectively, and means of 5.38 and 5.23 for anxiety, respectively. Both scales code scores between 5 and 9 as mild depression or anxiety, which is higher than the normed averages. These findings are consistent with much of the literature and indicate that gamers are a population that should be targeted for mental health intervention.

Even though we did not find that the Pokémon GO gamers were significantly different from the traditional gamers on our depression and anxiety inventories, it is still of note that the Pokémon GO gamers overwhelmingly endorsed that they felt that their physical and mental health has improved since they started playing the game. There were 39.6% of players who endorsed that they felt their mental health is either better or much better since playing the game, and 50.5% of them indicated that their physical health is either better or much better. In comparison, only 2.3% of respondents said they felt their mental health was either worse or much worse, and only 3.7% responded that their physical health was worse or much worse. We included this question in the supplementary GO questionnaire at the end of the survey, so the traditional gamers were not asked a control question; however, it provides subjective evidence that could be the focus of future research. The focus of our study was depression, anxiety, coping, and pathological gaming, but there are other facets of mental health that these items may reflect. Additionally, the nature of these questions may have triggered deeper introspection in the participants, causing stronger responses to emerge. On the other hand, due to the face validity of these items, some respondents may have intentionally selected the positive responses to make Pokémon GO look better. Regardless, the strong responses are of particular interest to this study and future research could provide deeper insight.

Regarding the other questions in the GO supplemental survey, it is of note that 72.2% of respondents endorsed that they play daily. Similarly, 38.8% of respondents said they play more than four hours a week, and 27.1% said they play between two and four hours per week. These results are possibly due to the population we used, since the more active GO players are probably more likely to browse a dedicated GO forum. Future research could target a broader player group to see if these results are indicative of the entire GO player population or if they are skewed due to our population.

To our knowledge, this is the first study of Pokémon GO players to examine mental health issues. Considering the shifting trends in gaming, it is important to research the significance of new types of gaming on mental health. Though we only found a significant difference in one coping subscale, we still found several trends that may indicate that GO players have other positive coping mechanisms. Future research could examine these particular scales in different ways to develop a better understanding of how mental health might change between the groups. Additionally, we limited ourselves to only four different aspects of mental health for the purposes of this study. Future research could examine other aspects of mental health, and could even incorporate physical health into the study, considering its relationship with mental health. A future study could also isolate Pokémon GO players who do not play traditional games at all, since the scope of our study only divided the participants into two groups: individuals who play traditional games but not Pokémon GO, and individuals who play Pokémon GO. Individuals who play Pokémon GO may or may not play traditional games as well, so future research could separate these groups, determining if there is a significant difference between GO players who do not play traditional games and players who play

exclusively traditional games. It is also of note that only nine respondents reported being black. This may be a limitation of the population we used, and future studies could focus on individuals of non-white racial backgrounds.

Considering that three of our hypotheses were not directly supported, it is important to consider why. It is possible that Pokémon GO does not influence or correlate with depression, anxiety, or pathological gaming. Considering the limitations of the study, it is also possible that our data does not accurately represent the possible effects of the game on mental health, whether positively or negatively. For example, there are other video games that involve physical activity, such as *Just Dance* and *Wii Fit*, that individuals in our traditional gaming group may play. Similarly, there are other traditional video games that include a social aspect, such as online games and games that involve local multiplayer, where players each have a controller and sit in the same room. Since we did not control for these potentially overlapping factors, there may be individuals in our traditional gaming group who may experience benefits from certain overlapping game types.

There were important limitations of our study. Firstly, we used Reddit as a representation of gamers, so we could have a large pool of Pokémon GO gamers from which to sample; however, the usage of this group may have affected participant responses. It is possible that individuals wanting to make Pokémon GO look good (or bad) may have answered accordingly. Secondly, while the scales were found to be generally reliable, the face value of the test questions may have affected the responses of certain participants. The variations between Pokémon GO players and traditional players meant we could not assume equal variances for some of our t-tests as well.

In summary, in our sample there were not any significant differences between Pokémon GO gamers and traditional gamers on scales of depression, anxiety, and pathological gaming; however, there was a significant difference found for one aspect of coping, and there were trends on five other coping subscales. It is our hope that others may advance this research further to discover the effect of Pokémon GO on mental health, helping to inform the public on possible benefits or detriments.

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Appendix A

Table 1

Gender Identity

	Female	Male	Non-Binary	Prefer not to answer	Total
PoGo	572 (28.7%)	1381 (69.4%)	33 (1.7%)	5 (0.3%)	1991
Trad	42 (28.2%)	101 (67.8%)	4 (2.7%)	2 (1.3%)	149
Total	614 (28.7%)	1482 (69.3%)	37 (1.7%)	7 (0.3%)	2140

Table 2

Racial Background

	Caucasian	Black	Hispanic	Asian	Other	Total
PoGo	1347 (67.8%)	7 (0.4%)	129 (6.5%)	166 (8.4%)	337 (17.0%)	1986
Trad	105 (70.9%)	2 (1.4%)	7 (4.7%)	14 (9.5%)	20 (13.5%)	148
Total	1452 (68%)	9 (0.4%)	136 (6.4%)	180 (8.4%)	357 (16.7%)	2134

Table 3

Type of Community

	Urban	Suburban	Smaller City	Smaller Town	Rural	Total
PoGo	673 (33.8%)	678 (34.1%)	331 (16.6%)	202 (10.2%)	106 (5.3%)	1990
Trad	47 (31.5%)	51 (34.2%)	24 (16.1%)	17 (11.4%)	10 (6.7%)	149
Total	720 (33.7%)	729 (34.1%)	355 (16.6%)	219 (10.2%)	116 (5.4%)	2139

Table 4

College enrollment

	Yes	No	Total
PoGo	765 (38.4%)	1226 (61.6%)	1991
Trad	61 (40.9%)	88 (59.1%)	149
Total	826 (38.6%)	1314 (61.4%)	2140

Appendix B

Table 5

What kinds of games do you play?

	Pokémon GO	Traditional	Total
First-Person Shooter	701 (35.2%)	56 (37.6%)	757 (35.4%)
Online Role-Playing Game	570 (28.6%)	32 (21.5%)	602 (28.1%)
Offline Role-Playing Game	1004 (50.4%)	95 (63.8%)	1099 (51.3%)
Real-Time Strategy	309 (15.5%)	28 (18.8%)	337 (15.7%)
Strategy	437 (21.9%)	48 (32.2%)	485 (22.7%)
Simulation	472 (23.7%)	46 (30.9%)	518 (24.2%)
Adventure	468 (23.5%)	34 (22.8%)	502 (23.4%)
Action-Adventure	632 (31.7%)	66 (44.3%)	698 (32.6%)
Fighting	278 (14.0%)	23 (15.4%)	301 (14.1%)
Sandbox	696 (34.9%)	67 (45.0%)	763 (35.6%)
Driving	215 (10.8%)	16 (10.7%)	231 (10.8%)
Sports	236 (11.8%)	13 (8.7%)	249 (11.6%)
Puzzle	505 (25.4%)	35 (23.5%)	540 (25.2%)
Music/Dance	245 (12.3%)	18 (12.1%)	263 (12.3%)
Casual	239 (12.0%)	13 (8.7%)	252 (11.8%)

Note: For examples of game types, see Appendix B.

Table 6

Frequency of video game play

	Rarely or never	Several times per year	Several times per month	Several times per wcek	Daily	Total
PoGO	32 (1.7%)	45 (2.4%)	131 (6.9%)	536 (28.3%)	1152 (60.8%)	1896
Trad.	0 (0.0%)	1 (0.7%)	16 (11.5%)	49 (35.3%)	73 (52.5%)	139
Total	32 (1.6%)	46 (2.3%)	147 (7.2%)	585 (28.7%)	1225 (60.2%)	2035

Table 7

How long is your typical playing session?

	Don't currently play	1-2 hours	3-4 hours	5-6 hours	7-8 hours	8-12 hours	More than 12 hours	Total
PoGO	22 (1.2%)	1031 (54.3%)	657 (34.6%)	144 (7.6%)	29 (1.5%)	13 (0.7%)	1 (0.1%)	1897
Trad.	0 (0%)	49 (35.3%)	67 (48.2%)	20 (14.4%)	0 (0%)	3 (2.2%)	0 (0%)	139
Total	22 (1.1%)	1080 (53.0%)	724 (35.6%)	164 (8.1%)	29 (1.4%)	16 (0.8%)	1 (<.01%)	2036

Table 8

Total number of different games played in lifetime

		1-5	6-20	21-50	51-100	Over 100	Total
How many different games in any format have you played in your life?	PoGO	191 (10.1%)	307 (16.2%)	280 (14.8%)	313 (16.5%)	804 (42.4%)	1895
	Trad.	10 (7.2%)	16 (11.5%)	12 (8.6%)	34 (24.5%)	67 (48.2%)	139
	Total	201 (9.9%)	323 (15.9%)	292 (14.4%)	347 (17.1%)	871 (42.8%)	2034

Table 9

Age of first video game play

		30s	20s	Grade 10-12	Grade 7-9	Grade 4-6	K-Grade 3	Under K	Total
How old were you when you played your first video game?	PoGO	4 (0.2%)	18 (0.9%)	31 (1.6%)	150 (7.9%)	402 (21.2%)	881 (46.5%)	409 (21.6%)	1895
	Trad.	0 (0%)	0 (0%)	0 (0%)	11 (8.0%)	32 (23.2%)	62 (44.9%)	33 (23.9%)	138
	Total	4 (0.2%)	18 (0.9%)	31 (1.5%)	161 (7.9%)	434 (21.3%)	943 (46.4%)	442 (21.7%)	2033

Note: No participants endorsed that they were in their 40s or 50 and older.

Table 10

Video game play in past 12 hours

	Yes	No	Total
PoGO	1672 (88.4%)	220 (11.6%)	1892
Trad.	103 (74.1%)	36 (25.9%)	139
Total	1775 (87.4%)	256 (12.6%)	2031

Table 11

Other video game involvement

		Never	Rarely	Sometimes	Often	Always	Total
How often do you read books, blogs, or news reports about video games?	PoGO	52 (2.7%)	375 (19.8%)	779 (41.2%)	568 (30.0%)	119 (6.3%)	1893
	Trad.	4 (2.9%)	31 (22.3%)	58 (41.7%)	37 (26.6%)	9 (6.5%)	139
	Total	56 (2.8%)	406 (20.0%)	837 (41.2%)	605 (29.8%)	128 (6.3%)	2032
How often do you think about a video game outside of the time you are playing the game?	PoGO	15 (0.8%)	291 (15.4%)	877 (46.3%)	636 (33.6%)	74 (3.9%)	1893
	Trad.	2 (1.4%)	18 (12.9%)	79 (56.8%)	34 (24.5%)	6 (4.3%)	139
	Total	17 (0.8%)	309 (15.2%)	956 (47.0%)	670 (33.0%)	80 (3.9%)	2032
How often do you talk about video games with friends?	PoGO	29 (1.5%)	201 (10.6%)	677 (35.7%)	851 (44.9%)	136 (7.2%)	1894
	Trad.	4 (2.9%)	25 (18.0%)	49 (35.3%)	52 (37.4%)	9 (6.5%)	139
	Total	33 (1.6%)	226 (11.1%)	726 (35.7%)	903 (44.4%)	145 (7.1%)	2033

Appendix C

Demographic Form

What is your age in years?

- _____

What is your gender? (Female, male, non-binary, prefer not to answer)

- Female
- Male
- Non-binary
- Prefer not to answer

What is your racial background?

- Caucasian
- Black
- Hispanic
- Asian
- Other _____

What country are you from?

- _____

What type of community do you live in?

- Urban
- Suburban
- Smaller city
- Small town
- Rural Area

Are you in college?

- Yes
- No

What types of games do you normally play?

- _____

Do you currently play Pokémon GO?

- Yes
- No

Is there any other information you would like to provide us that you haven't already?

- _____

Appendix D

Video Game Play History Questionnaire

1. How often do you typically play video games?

- Rarely or never
- Several times a year
- Several times a month
- Several times a week
- Daily

2. How long is your typical playing session?

- I no longer play video games
- Less than an hour
- 1-2 hours
- 3-4 hours
- 5-6 hours
- 7-8 hours
- 9-10 hours
- 11-12 hours
- 13 hours or more

3. How many different video games in any format (e.g. PC, console, phone) have you played in your life?

- One to five
- Six to twenty
- Twenty-one to fifty
- Fifty-one to one hundred
- Over one hundred

4. How old were you when you played your first video game?

- During my 50s or older
- During my 40s
- During my 30s
- During my 20s
- Grade 10 to grade 12
- Grade 7 to grade 9
- Grade 4 to grade 6
- Kindergarten to grade 3
- Before Kindergarten

5. What is your favorite type/genre of game? (Participants could pick as many as applicable)

- First person shooter (e.g. Call of Duty, Battlefield)
- MMORPG (Massively Multiplayer Online Role-Playing Game, e.g. World of Warcraft)
- Offline role-playing game (e.g. The Elder Scrolls, Fallout)
- Real time strategy (e.g. Starcraft, Command and Conquer, Age of Empires)
- Strategy (e.g. Civilization, Total War)
- Simulation (e.g. the Sims, Kerbal Space Program, SimCity)
- Adventure (Point and click games)
- Action-adventure (Uncharted, Tomb Raider)
- Fighting (e.g. Street Fighter, Mortal Kombat, Injustice)
- Sandbox (e.g. Minecraft, Grand Theft Auto)
- Driving (e.g. Forza, Gran Turismo)
- Sports (e.g. Madden, MLB the Show, 2K sports)
- Puzzle (Bejeweled, Candy Crush)
- Music/dance (e.g. Just Dance, Guitar Hero)
- Casual (e.g. Facebook games)
- None of the above _____

6. Why is this genre your favorite?

- _____

7. What is your favorite video game?

- _____

8. Have you played a video game in the 12 hours prior to filling out this questionnaire?

- Yes
- No

9. How often do you read books, blogs, or new reports about video games?

- Never
- Rarely
- Sometimes
- Often
- Always

10. How often do you think about a video game outside of the time you are playing the game?

- Never
- Rarely
- Sometimes

- Often
- Always

11. How often do you talk about video games with friends online or off?

- Never
- Rarely
- Sometimes
- Often
- Always

Appendix E

PHQ-9

Over the last two weeks, how often have you been bothered by any of the following problems?

Not at all, Several days, More than half the days, Nearly every day

1. Feeling little pleasure or interest in doing things?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
2. Feeling down, depressed, or hopeless?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
3. Trouble falling or staying asleep, or sleeping too much?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
4. Feeling tired or having little energy?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
5. Poor appetite or overeating?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
7. Trouble concentrating on things, such as reading the newspaper or watching television?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day

8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual?

- Not at all
- Several days
- More than half the days
- Nearly every day

9. Thoughts that you would be better off dead or hurting yourself in some way?

- Not at all
- Several days
- More than half the days
- Nearly every day

Appendix F

GAD-7

Over the last 2 weeks, how often have you been bothered by any of the following problems?

Not at all, Several days, More than half the days, Nearly every day

1. Feeling nervous anxiety or on edge?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
2. Not being able to stop or control worrying?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
3. Worrying too much about different things?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
4. Trouble relaxing?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
5. Being so restless that it is hard to sit still?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
6. Becoming easily annoyed or irritable?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day
7. Feeling afraid as if something awful might happen?
 - Not at all
 - Several days
 - More than half the days
 - Nearly every day

Appendix G

Questions about anxiety attacks (from the PHQ)

1. In the last 4 weeks, have you had a panic attack – suddenly feeling fear or panic?

- Yes
- No

IF YES

a. Has this ever happened before?

- Yes
- No

b. Do some of these attacks come suddenly out of the blue – that is, in situations where you don't expect to be nervous or uncomfortable?

- Yes
- No

c. Do these attacks bother you a lot or are you worried about having another attack?

- Yes
- No

d. During your last bad panic attack, did you have symptoms like shortness of breath, sweating, or your heart racing, pounding or skipping?

- Yes
- No

Appendix H

Brief COPE

- 1 = I haven't been doing this at all
2 = I've been doing this a little bit
3 = I've been doing this a medium amount
4 = I've been doing this a lot

1. I've been turning to work or other activities to take my mind off things.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
2. I've been concentrating my efforts on doing something about the situation I'm in.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
3. I've been saying to myself "this isn't real."
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
4. I've been using alcohol or other drugs to make myself feel better.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
5. I've been getting emotional support from others.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
6. I've been giving up trying to deal with it.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
7. I've been taking action to try to make the situation better.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot

8. I've been refusing to believe that it has happened.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
9. I've been saying things to let my unpleasant feelings escape.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
10. I've been getting help and advice from other people.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
11. I've been using alcohol or other drugs to help me get through it.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
12. I've been trying to see it in a different light, to make it seem more positive.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
13. I've been criticizing myself.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
14. I've been trying to come up with a strategy about what to do.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
15. I've been getting comfort and understanding from someone.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
16. I've been giving up the attempt to cope.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot

17. I've been looking for something good in what is happening.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
18. I've been making jokes about it.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
20. I've been accepting the reality of the fact that it has happened.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
21. I've been expressing my negative feelings.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
22. I've been trying to find comfort in my religion or spiritual beliefs.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
23. I've been trying to get advice or help from other people about what to do.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
24. I've been learning to live with it.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
25. I've been thinking hard about what steps to take.
 - I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot

26. I've been blaming myself for things that happened.
- I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
27. I've been praying or meditating.
- I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot
28. I've been making fun of the situation.
- I haven't been doing this at all
 - I've been doing this a little bit
 - I've been doing this a medium amount
 - I've been doing this a lot

Appendix I

Pathological Video Gaming

1. Do you ever play so much that it interferes with your homework?
 - Yes
 - No

2. Do you feel restless if you cannot play video games?
 - Yes
 - No

3. Have you ever done poorly on a school assignment or test because you spent too much time playing video games?
 - Yes
 - No

4. Have you ever lied to family or friends about how much you play VGs?
 - Yes
 - No

5. Do you sometimes try to limit your own playing/ If yes, are you successful in limiting yourself?
 - Yes
 - Yes
 - No
 - No

6. Have you ever played video games as a way to escape from problems?
 - Yes
 - No

7. After playing video games, do you often play again to try to get a higher score?
 - Yes
 - No

Appendix J

Pokémon GO Supplemental Survey

If you are in college, do you play Pokémon GO at your university?

- Yes
- No
- Not applicable

About how often do you play Pokémon GO?

- Less than once a month
- Once a month
- Several times a month
- Once a week
- Several times a week
- Daily

About how long do you play Pokémon GO each week?

- I play Pokémon GO less than once per week
- Less than half an hour per week
- Between half an hour and an hour per week
- Between 1 and 2 hours per week
- Between 2 and 4 hours per week
- More than 4 hours per week

What level are you in Pokémon GO? (If you don't remember, estimates are okay)

- _____

What is your favorite aspect of Pokémon GO? (Raids, catching monsters, etc)

- _____

Since starting playing Pokémon GO, would you say your mental health has:

- Been much worse
- Been worse
- Been about the same
- Been better
- Been much better

Since starting playing Pokémon GO, would you say your physical health has:

- Been much worse
- Been worse
- Been about the same
- Been better
- Been much better

(Optional) Would you like to comment on your personal experience with the game?

- _____

Informed Consent

CONSENT TO PARTICIPATE IN RESEARCH

You are invited to participate in a research study conducted by Nathaniel Ed and Dr. Russell Gruber (faculty sponsor) from the Psychology Department at Eastern Illinois University.

Your participation in this study is entirely voluntary.

PURPOSE OF THE STUDY

The aim of this study is to examine mental health in gamers.

PROCEDURE

If you volunteer to participate in this study, you will be asked to complete a brief demographic questionnaire, including questions about age, gender, and video game play. You will then complete a questionnaire that measures different areas of mental health.

The study will be over after completing the questionnaire. Questions should take around 30 minutes to complete.

POTENTIAL RISKS AND DISCOMFORT

This study asks questions about mental health that may cause discomfort or emotional distress. If you are discomforted in any way during the survey, do not hesitate to take advantage of the following resources that are also presented at the end of the study:

National Suicide Prevention Lifeline - 1-800-273-8255

Find a counselor near you - <https://www.psychologytoday.com/us/therapists>

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

There are no explicit benefits to participating; however, the results found may lead to the improvement of psychological interventions, inform social policies, and inspire future research.

INCENTIVES FOR PARTICIPATION (OPTIONAL)

All participants will be entered in a drawing to receive a 50 dollar Amazon gift card. You will enter your email address on the first page of the survey. Completion of the study is not necessary to enter. If you are a winner, the code will be emailed to you. Your email address will be deleted upon completion of the giveaway.

CONFIDENTIALITY

Any information obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Confidentiality will be maintained by means of assigning random identification numbers to your responses. Your information will be kept by the researchers involved with this study and destroyed when the project is completed. The only people who will see your responses will be those directly involved in analyzing the results of the study

PARTICIPATION AND WITHDRAWAL

Participation in this research study is voluntary and not a requirement or a condition for being the recipient of benefits or services from Eastern Illinois University or any other organization sponsoring the research project. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled.

There is no penalty if you withdraw from the study and you will not lose any benefits to which you are otherwise entitled.

IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns, feel free to contact:

Nathaniel Ed B.A. (Principal Investigator; nmed@eiu.edu)

Dr. Russell Gruber Ph.D. (Faculty Sponsor; regruber@eiu.edu)

RIGHTS OF RESEARCH SUBJECTS

Institutional Review Board
Eastern Illinois University
600 Lincoln Ave.
Charleston, IL 61920
Telephone: (217) 581-8576
E-mail: eiuirb@eiu.edu

You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with EIU. The IRB has reviewed and approved this study.

By proceeding with this study you are agreeing to the following terms:

"I voluntarily agree to participate in this study. I have read the above terms and I understand that I am free to withdraw my consent and discontinue my participation at any time."

You may print this document if you wish to do so.

Debrief Form

Thank you for participating in this study! The aim of this study is to determine the effects of Pokémon GO on mental health when compared to gamers who do not play Pokémon GO. The questions you answered assess several measures of mental health, such as symptoms of depression and anxiety.

Please do not discuss the contents of this survey with people who have not completed the survey, especially in the comments section of the thread. We need the best information we can get from gamers like you, so to discuss the questions makes our data weaker. Again, thank you for participating in this study. We really appreciate it!

If any of the questions caused you any stress, or if you are concerned at all about your mental health, do not hesitate to use any of the following resources. You are important.

National Suicide Prevention Lifeline - 1-800-273-8255

Find a counselor near you - <https://www.psychologytoday.com/us/therapists>

We would love to answer any questions, comments, or concerns you may have about the study. You may contact me, Nathaniel Ed, at nmed@eiu.edu.