INTRODUCTION

According to an online study, gaming has a significant hold on individuals across the globe. The study suggests that while there were almost two billion video gamers across the world in 2015, the figure is expected to rise to over three billion gamers by 2023 (Clement, 2021). While the average gamer spends 8 hours and 27 minutes a day immersed in the virtual gaming experience, binge gaming is constantly on the rise. In just a year, this number was a product of an increase of 14%. Not only is the act of playing video games on the rise, but with recent surveys, researchers have come to conclude that respondents in the 18-35 age bracket would much rather watch gamers play online than watch traditional sports (Combs, 2021). With video games in general being a significant factor in the lives of a fairly large proportion of individuals, we intend to look at hours played and how this affects social anxiety. Kaggle supplies a dataset consisting of data by gamers worldwide in order to look further into anxiety and life satisfaction of those who play video games across the globe, along with data associated with gender, playstyle, hours played, occupation, etc.

This dataset is of importance to the group because it reflects on our interests in rapidly developing technology and its direct effect on our evolving society - specifically within the context of psychology. A recent article published by Healthy Place suggests that the relationship between video games and anxiety is associated with personality traits. Peterson (2020) states, "many find that video games help with anxiety by providing a different focus for thoughts thanks to a need for total concentration on a game. Video games distract from daily troubles by providing an engaging escape. Escape is a big part of the allure of gaming. Video games often relieve stress and anxiety." Along with this, it is also noted that "of all anxiety disorders, social anxiety has the closest relationship with the gaming lifestyle. Social anxiety can lead to excessive gaming, and excessive gaming can worsen social anxiety (Peterson, 2021). The video game industry is one that is continuously on the rise and with this dataset, we hope to identify the aspects of gaming that affect social anxiety by using the Social Phobia Inventory (SPIN).

LITERATURE REVIEW

Emily:

Wei, HT., Chen, MH., Huang, PC. *et al.* The association between online gaming, social phobia, and depression: an internet survey. *BMC Psychiatry* 12, 92 (2012).

In this study, an online questionnaire was created to examine characteristics of online gamers, and relationship between hours spent playing, social phobia and depression. The scales used in this study to measure depression, social anxiety and internet addiction were Depression and Somatic Symptoms Scale (DSSS), Social Phobia Inventory (SPIN) and Chen's Internet Addiction Scale (CIAS). The survey was posted on multiple online game websites, ensuring complete anonymity for the participants. There were five sections of the questionnaire: Demographics, Total hours of internet usage and gaming, DSSS, SPIN, and CIAS. For online gaming use in genders, the results of the questionnaire showed females played less than males but had a higher score of DSSS and SPIN. There was a positive correlation between gaming hours and internet addiction including depression and social phobia, indicating that excessive amount of gaming leads to less interest in outside activities such as work and school. Another result showed a positive correlation between SPIN scores and online gaming hours, suggesting players with social phobias are more likely to engage in virtual reality to avoid stress in real life.

Marino, C., Canale, N., Vieno, A., Caselli, G., Scacchi, L., & Spada, M. M. (2020). Social anxiety and Internet gaming disorder: The role of motives and metacognitions, Journal of Behavioral Addictions, 9(3), 617-628. Retrieved Dec 13, 2021.

A survey of online gamers was used to examine the relationships between social anxiety, motives, metacognitions about online gaming and preference of online social interactions. Researchers believe there are a wider range of psychological and health related concepts to Internet Gaming Disorder. They hypothesized social anxiety is directly linked as an emotional trigger to Internet Gaming Disorder. Researchers collected a sample of 5043 gamers and used these four scales: Internet Gaming Disorder (IGD), Social Phobia Inventory (SPIN), Preference of Online Social Interactions (POSI), and The Motives for Online Gaming Questionnaire (MOGQ). The result of this study suggests there is a direct relationship between increase of social anxiety and IGD, gamers avoid feelings of loneliness by creating an online social self therefore, they tend to have increases symptoms of IGD symptoms such as prioritizing gaming over work/school. The significant mediator variables between the two are: POSI and escape motives. This indicates gamers are motivated by the satisfaction of social needs and using gaming as a coping strategy for escaping everyday difficulties and compensate for their social anxiety.

Marcel Martončik and Ján Lokša. 2016. Do World of Warcraft (MMORPG) players experience less loneliness and social anxiety in online world (virtual environment) than in real world (offline)? Comput. Hum. Behav. 56, C (March 2016), 127–134.

A study was conducted to compare social anxiety and loneliness in online and real-world conditions by using a social phobia inventory (SPIN) and the UCLA Loneliness scale. Researchers believed players experience less loneliness and social anxiety in the online world versus the real world. Participants were recruited through a message board in World of Warcraft (WoW), there were two questionaries given out to World of Warcraft players, to assess their affiliation with the guild, total time spent playing, the frequency of communication between guilds, and how often do they play with their friends. The results of the study show a decrease in SPIN and UCLA scores for online players versus offline players and WoW is a gaming environment that encourages cooperation, socialization, and friendship. This is due to the participation in a guild/team players have more opportunities to gain social support from other players. They suggest total time played is not a significant factor to this, it is based on what kind of environment they are in.

Nicole:

Barr, Matthew, and Alicia Copeland-Stewart. "Playing Video Games During the COVID-19 Pandemic and Effects on Players' Well-Being." Games and Culture, vol. 17, no. 1, Jan. 2022, pp. 122–139.

Video games have often been the subject of scrutiny regarding mental health and anxiety. In this study, Barr, Matthew, and Alicia Copeland-Stewart investigate the change in behavior of video game players within the microcosm of the COVID-19 pandemic. Specifically, the concentrated atmosphere of quarantined individuals provides a unique glimpse into the effects of video games on individuals under an extreme scenario. Differences in players' gameplay can be indicative of how individuals handled an environment of isolation during the pandemic. The study also takes a look into the shift from singleplayer to multiplayer platforms. Through the medium of an online survey, the authors found that not only had time spent playing video games increased, but a majority of participants reported an increase in their well-being as a result of the time spent playing video games. The authors tracked several reasons for the effect on players including cognitive stimulation, opportunities to socialize, as well as reduction in anxiety and stress. The authors concluded that playing video games overall had a positive impact on players' well-being and mental health during an extreme situation.

Kevin Koban, Jonathan Biehl, Julian Bornemeier & Peter Ohler (2021) Compensatory video gaming. Gaming behaviours and adverse outcomes and the moderating role of stress, social interaction anxiety, and loneliness, Behaviour & Information Technology.

The authors of this article investigate the role of state- (perceived stress) and trait-level (social interaction, anxiety, and loneliness) factors within the context of video game consumption, motivation for playing, and level of engagement. The authors sampled a large population of mostly heavy gamers. This study aims to help answer a long debated topic of video games rooted in the positive or negative result gaming has on an individual psychologically. The study explores behavioral compensation through the analysis of gamer behavior. The authors conclude that based on their results, accepting video games as a solution to psychological issues rather than dismissing them as a threat to gamers' mental well-being.

Von der Heiden, Juliane M et al. "The Association Between Video Gaming and Psychological Functioning." Frontiers in psychology vol. 10 1731. 26 Jul. 2019,

This study investigated the psychological effect that problematic excessive gaming has on individuals. With a sample of almost 3,000 gamers, the researchers posted a questionnaire on various online forums as well as popular online gaming websites. With a majority of the responses being from male participants, the authors expected to find a negative correlation between problematic video gaming and negative psychological functioning. The assumption being that more time spent playing video games would lead to more social inadequacy and poor grades as well as other factors based on lack of time in real world environments. Other factors included in the study were the genre/type of game that gamers were playing in addition to the reasons for playing. The authors utilized the Scale for the Assessment of Internet and Computer game Addiction in order to correlate gamers' behaviors with potential problematic use. The study found there to be a positive affect socially whilst playing. However, a negative psychological impact was also observed in heavy gamers.

Jonathan:

Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017, January 30). Internet gaming disorder: Social phobia and identifying with your virtual self. Computers in Human Behavior. Retrieved December 15, 2021.

This scholarly peer reviewed article was acquired through the Hunter College Library Database and published by ScienceDirect on January 30, 2017. The research was conducted by Sioni, Burleson, and Bekerian with association to Arizona State University and California School of Professional Psychology. The article focuses mainly on the gaming lifestyle with reference to social phobia and player-avatar identification. The study itself talks a lot about massively multiplayer online role-playing games (MMORPG) and how these games tend to be the most appealing for those who are struggling with self-identity. In MMORPG's, the player is typically instructed to create an avatar that is highly customizable because of this, it's suggested that when presented in situations where the player doesn't get to interact behind a customizable avatar, they will experience greater social anxiety.

Goh, C., Jones, C., & Copello, A. (2019). A further test of the impact of online gaming on psychological wellbeing and the role of play motivations and problematic use. Psychiatric Quarterly, 90(4), 747–760

This study was obtained through the Hunter College Library Database and conducted by Goh, Jones, and Copello. The study focuses on the impact of increased online gaming play time on psychological wellbeing on the Multiplayer Online Battle Arena game genre (MOBA). A cross-sectional, online questionnaire design was employed with participants (N = 165) to examine the relationship between weekly average hours played and psychological wellbeing. The study looks to examine five variable with focus on MOBA. These five categories being psychological wellbeing, motivations for play, self-esteem, self-efficacy, and social desirability. Demographic questions were presented first, followed by the General Health Questionnaire, the Motivations for Play Questionnaire, the Rosenberg Self-Esteem Scale, the Generalised Self-Efficacy Scale, and the Social Desirability Scale.After online questionnaires were conducted, results revealed a significant correlation with higher levels of play time associated with poorer psychological wellbeing.

Liu, Y., Gong, R., Yu, Y., Xu, C., Yu, X., Cheng, R., Wang, H., Wang, S., Wang, Q., & Cai, Y. (2021, July 7). Longitudinal predictors for incidence of internet gaming disorder among adolescents: The roles of time spent on gaming and depressive symptoms.

This study focuses on internet gaming disorder (IGD) among adolescents along with time spent and depressive symptoms. Participants were 1121 adolescents from six junior high schools in Shanghai, China and multivariate logistic regression analysis was conducted to test the associations between other factors and IGD incidence. While conducting the study, researchers found that adolescence is a specific period when IGD peaks as young gamers seem to be more mentally occupied by online games. Several cross-sectional studies have revealed that during adolescence, IGD is associated with both comorbid psychiatric disorders, e.g. depression as well as higher severity of psychiatric symptoms in those without clinical diagnoses of mental health problems. The variables included in the study were internet gaming disorder, insomnia, depressive symptoms, substance use, time spent on gaming, demographic covariates, statistical analysis, and ethics. It's assumed by many researchers that individuals with depressive symptoms might retreat into online gaming as an escape from reality and the present study found that depressive symptoms are a predictor for the incidence of IGD among junior high school students.

DATA DESCRIPTION

The dataset we will be working with was provided to us through Kaggle, an online community of data scientists and machine learning practitioners that allows it's users to explore and publish datasets. The data consists of 13464 users (12699 male, 713 female, 52 other) between 18 and 63 years (M = 20.93) who completed the survey. Participants resided in 109 different countries with most of the participants coming from the USA (4569), Germany (1413), the UK (1032) and Canada (994). Researchers assessed six demographic factors in total; age, gender, country of origin, country of residence, employment status, and highest degree earned. Along with this, the gaming habits assessed included main game played, hours played per week, platform, motivation, and sociality. The scales used in order to evaluate measures of anxiety, social phobia, life satisfaction and narcissism include the Social Phobia Inventory (SPIN), Generalized Anxiety Disorder Screener (GAD-7), Satisfaction with Life Scale (SWL), and Single Item Narcissism Scale (SINS). The data was scraped from the Center for Open Science's site which was in turn collected as a part of a survey by the original authors Marian Sauter and Dejan Draschkow. While the study is crafted with multiple variables in mind, there are a few implications. One of the major implications being that the researchers don't specify where exactly the participants were gathered from. They state that the participants took part in an online survey, however there is no indication of where they got the participants from (such as a Facebook group or a random selection method) which can be problematic. Another implication to the study would be that most participants are coming from America. While we do have a large enough dataset to get accurate results, we think that it would have been more precise if the participants from each country were closer in numbers.

MODEL 1

Nicole: Model1 <- glm(SPIN_T ~ Age + whyplay + Hours, data = gs1)

Escape is a big part of the allure of gaming. Video games often relieve stress and anxiety. This holds true for not just trait anxiety but a specific type of anxiety disorder as well: social anxiety or social phobia. Of

all anxiety disorders,

social anxiety has the closest relationship with the gaming lifestyle. Social anxiety can lead to excessive gaming, and excessive gaming can worsen social anxiety. Individuals with social anxiety still crave and need human connection, however, video games offer them an outlet to fulfill this need without having to leave the comfort of their room (Peterson, 2021). By joining online chats and forums, the player is no longer on the outside looking in and is able to participate in activities with groups of other people and put their worries aside due to the gamers true identity being concealed behind a make-believe avatar. While this seems all good and well, unfortunately the more someone is hiding out and seeking comfort in a fictional world, the more they begin to become familiar with online friends making real-world people seem more intimidating and anxiety-provoking. Our project focuses mainly on online gaming anxiety and how a variety of factors contribute to social anxiety (SPIN_T) in the gaming lifestyle. The variables that we will be comparing to the SPIN_T scores include Gender, Age, whyplay, Hours, Playstyle, and Game. Model 1 in particular aims to look at SPIN_T scores and it's correlation to Age, whyplay, and Hours.

In

Model 1, all of the variables are statistically significant proving that there is a correlation between each of the variables presented. The first thing that was noticed in Model 1 was that whyplay has the strongest correlation to social anxiety (0.564). When looking at the summary's of each of the variables for Model 1 using the summary() command, we can see that the median age is 20 with a minimum age of 18 and a maximum age of 63. Due to whyplay being a qualitative variable, the data was coded to make it uniform and quantitative with 1 being "having fun", 2 being "relaxing", 3 being "improving", 4 being "winning", 5 being "having fun and improving", and 6 being "all of the above." The majority of respondents chose 1, "having fun" (5302). For hours played, the median is 20 hours with a mean of 22.25.

ggplot(gs, aes(SPIN_T, Age)) + geom_point() + geom_smooth() introduces us to a scatterplot presenting the relationship between SPIN_T scores and Age. When looking at this graph in particular we can see that the oldest participant has one of the lowest SPIN_T scores proving that they have minimal social anxiety while the majority of young individuals are spread out evenly across the buttom of the graph revealing that younger individuals range in SPIN_T scores. From this graph we can conclude that most younger individuals have some amount of social anxiety however it's hard to tell if there are other factors contributing to this.

`According

to a Data Science Blog (2018), the null deviance shows how well the response is predicted

by the model with nothing but an intercept. The residual deviance shows how well the response is predicted by the model when the predictors are included. The lower the value, the better the model is able to predict the value of the response variable. When calling glm(formula = SPIN_T ~ Age + whyplay + Hours, data =

gs1), I found that there are 2 Fisher Scoring Iterations simply having to do with how the model was estimated. Along with this, I noticed that the null deviance = 2267527 on 12549 degrees of freedom with the residual deviance = 2230619 on 12546 degrees of freedom.

MODEL 2 - Jonathan

Whyplay vs Playstyle vs Hours → SPIN Score

Estimate Std. Error t value Pr(>|t|)

(Intercept) 18.064764 0.380238 47.509 < 2e-16 *

whyplay 0.545965 0.088370 6.178 6.69e-10 *

Playstyle 0.093020 0.113447 0.820 0.412

Hours 0.008796 0.001652 5.325 1.03e-07 *

There are many different reasons why people play video games: escape, to win, for a challenge, to socialize, to let off steam, etc. There are also several different ways to play including online, offline, multiplayer, in person with other people, etc. And finally, the amount of time people spend online can differ as well, however, usually in the scale of hours. When all of these factors are taken into account, and correlated with social anxiety scores, the results are rather interesting. There is a positive correlation between hours played and social anxiety scores. The strongest correlation (.564) is between Whyplay and social anxiety. And finally, the correlation between Playstyle and social anxiety is very weak and positive.

When taking into account the various reasons, mediums, types of gameplay, and types of social environments included in the modern video game scene, people will play video games for different amounts of time. There are people who need to let off steam so they play one round of a first person shooter or a different kind of fighting style game for about an hour. Then there are video game addicts that can easily rank up 10+ hours of gameplay. Generally, these extreme gamers are playing video games to this extent for anfun, it makes sense that there is a positive correlation between players' social anxiety and reasons why they play. For example, it would make sense that gamers who play to let off steam or to escape would score a higher level of social anxiety, while those playing for fun or for a challenge would score lower. Whyplay was our strongest positive correlation between a variable and SPIN score and the conceptual reason for this supports the data.

The final variable that Model2 investigated against was Playstyle. Playstyle refers to the mode of play. Whether it is singleplayer, multiplayer, online, offline, etc. Mode of play is directly correlated with social anxiety as it determines the social environment of gameplay. For example, someone with a higher SPIN score is less likely to play an online or multiplayer game whereas someone with a lower level of social anxiety would be expected to play more lobby style online games with multiple people. In fact the social environment of multiplayer games most likely inspires them to play in that fashion. Furthermore, it would be expected that multiplayer Playstyle encourages longer hours of play and more multiplayer format games.

The gaming community is rapidly expanding with new types of games coming out every year. In addition, player communities and the quality of games is also seeing rapid development. With video game culture on the rise and with no end in sight to the evolution of game mediums and formats, it would make sense to conduct further research into how these social environments impact gamers of all ages for different Playstyles and why people play.

MODEL 3 – Emily

H1: Playing video games for an increased number of hours may lead to higher SPIN_T

H0: Playing video games for an increased number of hours does not lead to higher SPIN_T scores

This is a linear model of shows us the relationship between the number of hours played for which game that correlates the highest to SPIN_T scores. The results show that the number of Hours played in Diablo 3 leads to high SPIN_T scores. For context, Diablo 3 is a hack-and-slash role playing game with many horror elements about angels and demons. In the linear plot we analyzed earlier showed a relationship between video games and SPIN_T. The y-intercept was the Hours played in that specific game. There is a strong correlation showing Diablo 3 players with the longest hours of gameplay reported having higher SPIN_T scores by 4.64 (STD =1.67) compared to other games. This could possibly mean playing the game for an excessive amount of time leads to developing social anxiety. I want to investigate this further by using a bigger sample of Diablo 3 players, the data was collected has a majority of League of Legend Players. However, we can reject the null hypothesis that playing video games for an x number of hours lead to higher SPIN_T scores.

This plot shows us that majority of players are using PC and without a doubt have the highest SPIN-T compared to the players who use console and Smartphone/Tablets. I was curious to know which console and age group experienced high SPIN_T scores. I used a line plot to show the Game with highest SPIN_T scores **and used summary to assess how many entries were there per game. League of Legends has the highest amount of entries, while skyrim has the least amount.**

Counter Strike	Destiny	Diablo 3	Guild Wars 2
298	18	83	36

Hearthstone	Heroes of the Storm	League of Legends	Other
95	40	10750	969

Skyrim	Starcraft 2	World of Warcraft
23	325	149

This plot visualizes the relationship between Hours and SPIN_T scores for each video game. Diablo 3 once again shows that an increase of time played lead to higher social anxiety scores, proof that my hypothesis was correct. Also, there is a slight increase of League of Legends and an average decline in Destiny. The summary of the data showed League of Legends having the highest number of entries that could be a possible reason why it looks like an incline.

References

Clement, J. (2021, June 1). *Number of gamers worldwide 2023*. Statista. Retrieved December 7, 2021, from https://www.statista.com/statistics/748044/number-video-gamers-world/.

Combs, V. (2021, March 10). *8 hours and 27 minutes. that's how long the average gamer plays each week*. TechRepublic. Retrieved December 7, 2021, from https://www.techrepublic.com/article/8-hours-and-27-minutes-thats-how-long-the-average-gamer-plays-each-week/

Peterson, T. J. (2021, October 25). *The relationship between video games and anxiety*. HealthyPlace. Retrieved December 7, 2021, from https://www.healthyplace.com/addictions/gaming-disorder/the-relationship-between-video-games-and-anxiety.