Assessment Submission Form

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Assessment Title	Individual Final Project
Module Code	B105
Module Title	Applied Statistical Modelling
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Date Submitted	20.09.2023

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EXPLORING THE INTERPLAY BETWEEN GAMING HABITS AND ANXIETY LEVELS IN STUDENTS

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Date: 20.09.2023

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Abstract

In the era of digitization, gaming has emerged as a prominent form of entertainment, making it imperative to understand its association with mental health. This study delves into the multifaceted relationship between gaming habits and anxiety levels. A significant but modest correlation between hours of gaming and anxiety. The genre of games does not significantly affect anxiety levels. The gaming platform used influences anxiety levels, with console gaming possibly being more immersive and thereby impacting emotional states. Streaming, or the act of broadcasting gameplay, is associated with higher anxiety, highlighting the pressures of being under public scrutiny. Gender plays a notable role, with female gamers reporting higher anxiety levels. Meanwhile, there's a decrease in reported anxiety as age increases. These results have implications for game developers, platform designers, and mental health professionals, underscoring the need for tailored approaches considering players' habits and demographics. While correlations have been identified, further research is essential to discern causative factors and deepen our understanding of this critical area of intersection between technology, entertainment, and mental well-being.

Introduction

In today's digital age, the pace of technological advancements has reshaped societal norms, leading to both opportunities and challenges in various life facets. Among the most significant challenges is the rising prevalence of anxiety disorders, particularly among young people. As societal structures and means of entertainment transform, video gaming has evolved from a niche hobby to a mainstream pastime and even a lucrative profession for many. This shift prompts questions about the implications of video gaming on mental health, especially anxiety among youth. The current dataset and accompanying analysis serve as a lens through which we explore the intricate relationship between video gaming and student anxiety.

The history of video gaming dates back to the 1950s and 1960s when the first simple games were developed on academic platforms (Kent, 2001). From these humble beginnings, video gaming has experienced exponential growth. Today, the gaming industry rivals, if not surpasses, many traditional entertainment industries in both reach and revenue (Wolf, 2008). As games have become more sophisticated, so too has the depth of engagement, leading to a dedicated global community of gamers. This rise in gaming's popularity correlates with the digital revolution and the ubiquity of smart devices, allowing gaming to permeate all age groups. With games designed for every demographic, from children to seniors, they have become an integral part of contemporary culture (Anderson, 2004). However, with this integration comes a set of challenges.

The relationship between video gaming and mental health has always been of interest to researchers, educators, and parents. On one hand, video games have been lauded for their potential cognitive, motivational, emotional, and social benefits (Granic, Lobel, & Engels, 2014). Studies have shown that playing video games can enhance problem-solving skills, promote learning, and improve hand-eye coordination (Green & Bavelier, 2003). Furthermore, multiplayer games offer a platform for social interaction, potentially helping players develop teamwork skills and forge new friendships (Vorderer, Klimmt, & Ritterfeld, 2004). On the flip side, concerns about the

potential negative effects of excessive gaming have been voiced. Foremost among these concerns is the potential link between heavy gaming and increased anxiety and depression levels, especially among adolescents (Gentile et al., 2011). This becomes particularly concerning given that the World Health Organization, in 2018, recognized "gaming disorder" as a diagnosable condition, characterized by impaired control over gaming and prioritizing gaming over other life interests (World Health Organization, 2018).

The dataset in question offers an opportunity to dive deeper into the potential relationship between gaming habits and anxiety levels among students. The premise is rooted in the observation that video games, especially immersive ones, can offer an escape from real-world stressors (Snodgrass et al., 2011). While this escapism can provide temporary relief, over-reliance on gaming as a coping mechanism might exacerbate underlying anxiety issues. Research has indicated that excessive gaming can lead to sleep disturbances, decreased academic performance, and social withdrawal, all of which are potential anxiety triggers (Rehbein, Psych, Kleimann, Mediasci, & Mößle, 2010). Moreover, the competitive nature of many online games and the occasional toxic interactions within gaming communities can further contribute to stress and anxiety (Kowert, Festl, & Quandt, 2014).

In light of these points, our dataset, which captures various gaming metrics and anxiety indicators, becomes invaluable. The comprehensive nature of the dataset, covering various games, platforms, gaming durations, and associated mental health scales, offers a holistic view of the gaming-anxiety paradigm. By examining these variables, researchers, educators, and policymakers can better understand the complexities of this relationship and design interventions to promote healthy gaming habits and mitigate potential adverse effects.

Background Information or Context

The video gaming industry has undergone significant transformation since its inception, emerging as a dominant force in entertainment and becoming a cornerstone of popular culture. Its roots, which trace back to the 1970s with the introduction of arcade games and home video game consoles, have since expanded to include sophisticated online multiplayer platforms and mobile gaming apps. As the industry has grown, so too has the scrutiny surrounding its potential psychological impacts, especially on young, impressionable minds.

Since the launch of early video games such as Pong and Space Invaders, the gaming industry has exhibited exponential growth. By 2020, the global games market was estimated to be worth over $159 billion, surpassing sectors like the film and music industries combined (Newzoo, 2020). This growth has been propelled by technological advancements, enabling developers to create more immersive and complex games. Consequently, players are now more deeply engaged, sometimes forming communities around games and even competing professionally in e-sports tournaments (Hamari & Sjöblom, 2017). The rise of mobile gaming further democratized access, allowing people from various age groups and demographics to indulge in gaming activities. With smartphones being nearly ubiquitous, mobile games like Candy Crush, Angry Birds, and Pokémon Go reached global phenomena status (Paavilainen et al., 2017).

Research has consistently highlighted the potential cognitive benefits of playing video games. Games that require strategic thinking, problem-solving, and reflex-based actions have been shown to enhance players' cognitive abilities, such as spatial recognition, memory, and multitasking skills (Green & Bavelier, 2006). In addition, multiplayer games promote teamwork, communication, and social interaction, potentially aiding in social skill development (Vorderer et al., 2004). Moreover, video games can serve therapeutic roles. They've been used in educational settings to promote learning and in healthcare to assist with rehabilitation and pain management (Ferguson, 2007; Lohse et al., 2013).

However, the integration of gaming into daily routines hasn't been without criticism. As the World Health Organization's recognition of "gaming disorder" suggests, excessive and compulsive gaming can lead to detrimental effects on an individual's life (World Health Organization, 2018). Symptoms include impaired control over gaming, prioritizing gaming over other life interests and daily activities, and continuation of gaming despite negative consequences (Griffiths et al., 2019). Furthermore, several studies have explored the potential link between heavy video gaming and mental health issues, including depression, anxiety, and social phobia (Gentile et al., 2011; Lemmens et al., 2011). For instance, the very aspects that make video games engaging, such as achieving high scores, completing levels, and the social dynamics of online multiplayer games, can also contribute to stress, anxiety, and addictive behaviors.

Given this backdrop, the current dataset becomes crucial. It isn't merely about gaming habits; it's a snapshot of the interplay between leisure activities and mental health among students—a demographic often at the cusp of significant life decisions and potential stressors. By evaluating variables such as the Generalized Anxiety Disorder Scale (GAD) in conjunction with gaming preferences and habits, we can gain a nuanced understanding of how gaming might influence, or be influenced by, an individual's anxiety levels. While gaming provides an avenue for relaxation and escape from academic pressures, does it also inadvertently contribute to anxiety? Or do individuals with higher anxiety levels gravitate towards gaming as a coping mechanism? These are some of the multifaceted questions that this dataset can help address.

Statement of the Problem

The digital age has ushered in a variety of entertainment forms, with video gaming standing out as one of the most popular. As students globally become more engrossed in this digital entertainment form, there's a growing need to understand its potential ramifications on their mental health, specifically, anxiety levels. The essence of this problem is rooted in balancing the benefits and risks associated with video gaming, particularly given that students are at a developmental stage where their mental health is crucial for academic success and general well-being (Pew Research Center, 2018). Video gaming offers escapism, a chance to step into alternate realities, and even opportunities for social connection in multiplayer modes (Snodgrass et al., 2014). However, if these virtual engagements begin to substitute real-world interactions or exacerbate stress, they could potentially elevate anxiety levels.

Purpose and Objectives of the Analysis

The core intention of this analysis is not just to identify if a relationship exists between video gaming and anxiety but also to delineate the nature and specifics of this relationship. Correlation between gaming hours and anxiety: By quantifying the relationship between the number of hours students' game and their reported anxiety levels, we can identify if excessive gaming could be a potential trigger or perhaps a coping mechanism for anxiety. Specific games and anxiety levels: Not all games are created equal. While some are relaxing, others can be intensely competitive or emotionally charged. Understanding which games may correlate with heightened anxiety can guide interventions or recommendations for gaming habits.

The platform itself can influence a player's experience. Console games might offer different interactions than PC games or mobile games. The physical setting, posture, game types predominant on each platform, and social interactions can vary widely (Kowert et al., 2014). Streaming and anxiety: In the age of platforms like Twitch and YouTube, many gamers don't just play but also broadcast their sessions. This added layer of social scrutiny and interaction might have its own implications for anxiety (Hilvert-Bruce et al., 2018). Demographic variables: It's essential to consider that anxiety levels and their potential triggers might vary based on gender, age, cultural backgrounds, or occupational status. For instance, college students might face academic pressures that school students don't, impacting their gaming habits and mental health.

Hypotheses or Research Questions

H1: Time investment in any activity can be both a cause and consequence of mental health states. Excessive gaming might stem from a need to escape real-world anxieties or, conversely, long hours might induce stress due to lack of sleep or neglect of responsibilities.

H2: Games vary in content, pacing, and social interaction. An emotionally charged story-driven game might evoke different feelings compared to a fast-paced competitive shooter.

H3: Each platform offers different gaming experiences. Console gaming, often on larger screens, might offer more immersive experiences, potentially increasing emotional involvement and subsequent anxiety.

H4: Streaming adds a layer of performance pressure. Gamers are not just playing but are also "on stage", which can intensify feelings of scrutiny and potential anxiety.

H5: Gender, age, and other demographic variables play a role in how individuals perceive stress and engage with coping mechanisms, including gaming.

Methods

Understanding the methodology is fundamental for any research. The methods section offers a roadmap for how the study was carried out, ensuring transparency and reproducibility.

Description of the dataset or data source

The dataset under analysis was primarily focused on student gamers and their anxiety levels, drawing links between their gaming habits and their mental well-being. The data was meticulously collected, ensuring that each entry was timestamped, which provides clarity about the period during which the data was captured. This can be pivotal, as data collected during exam periods or holidays might have different implications.

Variables Definitions

Each variable in this dataset offers a unique lens to understand student gamers:

- **GAD & GADE**: These are measures of Generalized Anxiety Disorder, providing a window into the students' anxiety levels.
- **SWL**: Indicates the Satisfaction With Life Scale, giving a perspective on the broader well-being beyond just anxiety.
- **Game & Platform**: These denote the specific games played and the platforms used. This can shed light on whether certain games or platforms correlate more strongly with anxiety.
- **Hours & Streams**: These measure the intensity of engagement, both in terms of gameplay and broadcasting.
- **SPIN**: This is the Social Phobia Inventory, indicating social anxiety levels.
- **Narcissism, Gender, Age, Work, Degree, Birthplace, Residence, Playstyle**: These demographic and personality variables allow for a more nuanced analysis, considering various external factors that could influence anxiety.

Scales of measurement

The scales used for measurement vary across the dataset. While some variables, like hours of gameplay or streaming, are ratio scales offering a clear zero point and equal intervals, others like the GAD or SPIN are ordinal scales, categorizing respondents based on their scores. The choice of scale is pivotal as it determines the type of statistical analyses that can be conducted.

Statistical Methods

Description of statistical tests and procedures to be used, For this dataset, several statistical procedures would be fitting:

- **Descriptive Statistics**: This would include measures of central tendency (mean, median) and dispersion (standard deviation, variance) for variables like age, hours of gameplay, and anxiety scores.
- **Correlation Analyses**: To examine the relationship between hours of gameplay or streaming and anxiety scores.

- **T-tests or ANOVA**: These could be used to compare anxiety scores across different groups, such as male vs. female gamers, or gamers of different age groups.
- **Regression Analysis**: This would be essential to predict anxiety scores based on various independent variables like hours of gameplay, type of game, streaming hours, and demographics.
- **Chi-Square Tests**: Useful for examining relationships between categorical variables, like the relationship between the type of game played and the level of anxiety.

In essence, the methodology delineates the path for this research, ensuring that the analysis is rigorous, comprehensive, and transparent.

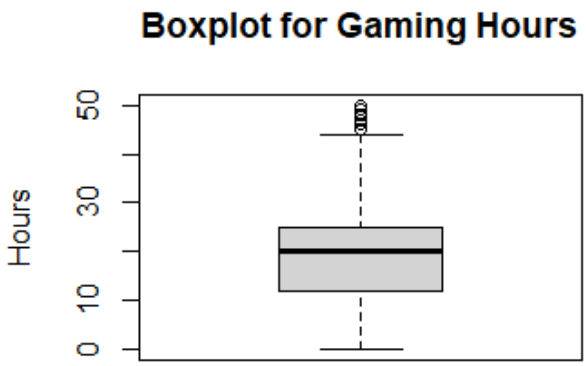
Results

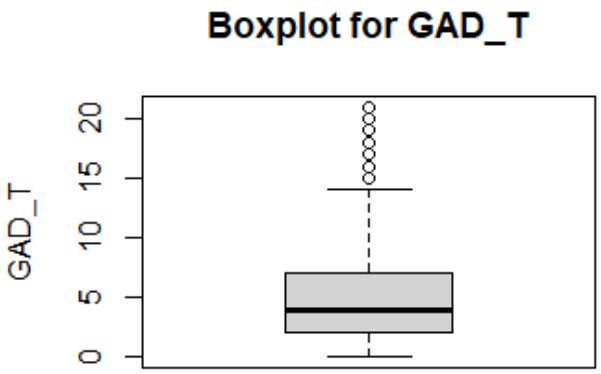
Descriptive Statistics

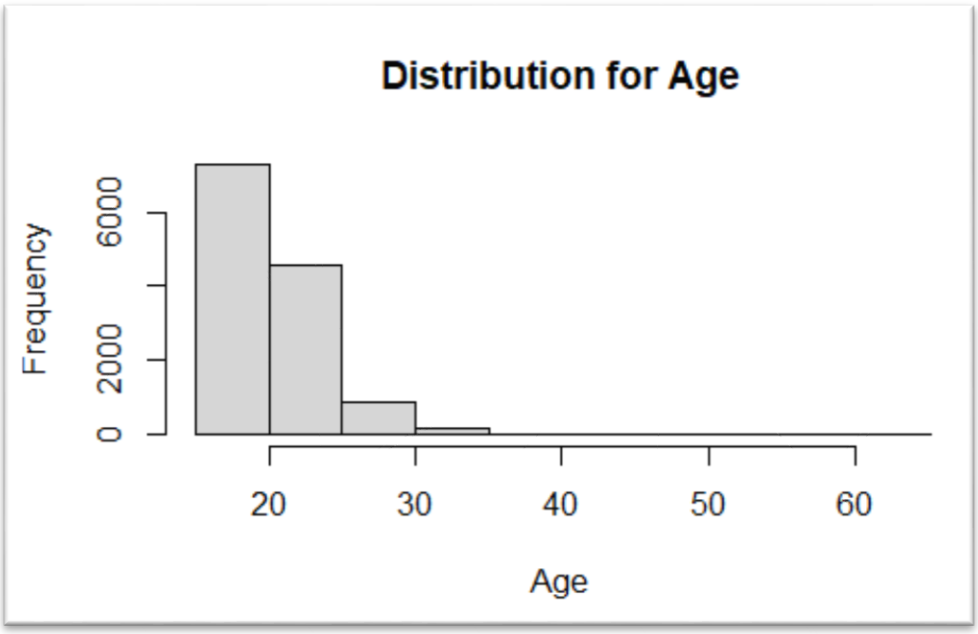
To provide descriptive statistics, especially focusing on measures of central tendency and spread for the variables 'Hours', 'streams', 'GAD_T', and 'Age' from your provided summary, you can present the results as follows:

Hours	streams	GAD_T	Age
Min. : 0.00	Min. : 0.00	Min. : 0.000	Min. :18.00
1st Qu.:12.00	1st Qu.: 4.00	1st Qu.: 2.000	1st Qu.:18.00
Median :20.00	Median : 8.00	Median : 4.000	Median :20.00
Mean :20.09	Mean : 10.35	Mean : 5.145	Mean :20.94
3rd Qu.:25.00	3rd Qu.: 15.00	3rd Qu.: 7.000	3rd Qu.:22.00
Max. :50.00	Max. :168.00	Max. :21.000	Max. :63.00

On average, participants spent approximately 20.09 hours gaming, with a median of 20 hours. The distribution of gaming hours ranged from a minimum of 0 hours to a maximum of 50 hours. The average number of streams among the participants was 10.35, with a median value of 8 streams. The number of streams showed a wide variation, ranging from 0 to a staggering 168 streams. The mean score on the General Anxiety Disorder Test was 5.145, indicating the level of anxiety among the participants, with a median score of 4. This score ranged from a minimum of 0, suggesting no anxiety, to a maximum score of 21, which might indicate higher levels of anxiety. Participants in the study varied in age, with an average age of 20.94 years and a median age of 20 years. The youngest participant was 18 years old, while the oldest was 63 years old, showing a broad age range.







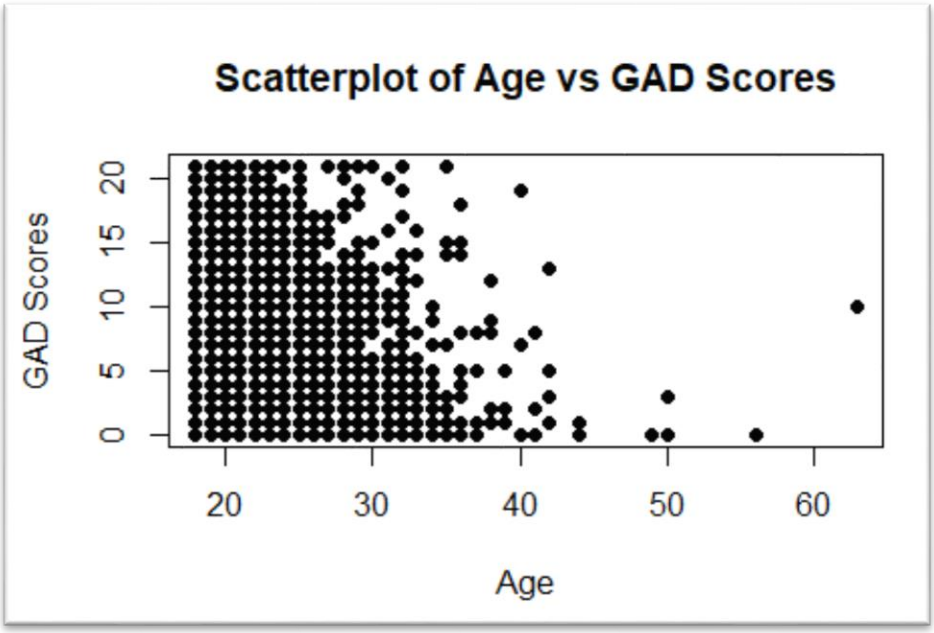
Outcomes of hypothesis tests

Hypothesis 1: Time investment in any activity can be both a cause and consequence of mental health states. Excessive gaming might stem from a need to escape real-world anxieties or, conversely, long hours might induce stress due to lack of sleep or neglect of responsibilities.

R-Code Results: Pearson's product-moment correlation

```
        Pearson's product-moment correlation

data:  data$Hours and data$GAD_T
t = 8.1993, df = 12994, p-value = 2.643e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.05461831 0.08882728
sample estimates:
       cor
0.07174389
```



Confidence Intervals: The 95% confidence interval for the correlation between gaming hours (data$Hours) and Generalized Anxiety Disorder scores (data$GAD_T) is between 0.05461831 and 0.08882728. This means we can be 95% confident that the true population correlation lies within this interval.

Effect Sizes: The correlation coefficient (r) is 0.07174389. This value is a measure of the effect size, representing a weak positive association between the number of hours spent gaming and anxiety scores. While it is statistically significant, the magnitude of this correlation indicates only a minor linear relationship between the two variables.

P-values: The p-value is 2.643e-16, substantially less than the conventional alpha level of 0.05, suggesting the observed correlation is statistically significant.

Interpretation of Results: The positive correlation suggests that as the number of hours spent gaming increases, the Generalized Anxiety Disorder scores also tend to rise. However, it's essential to emphasize that this correlation does not imply causation. It is a mere indication of a linear

relationship between the two variables in the dataset. The exact nature of the relationship, whether gaming causes anxiety or vice versa, or if external factors play a role, requires further investigation.

Hypothesis 2: Games vary in content, pacing, and social interaction. An emotionally charged story-driven game might evoke different feelings compared to a fast-paced competitive shooter.

R-Code Results: ANOVA (Analysis of Variance)

```
                Df Sum Sq Mean Sq F value Pr(>F)
Game            10    290   29.00   1.341  0.202
Residuals   12985 280712   21.62
```

Confidence Intervals: The ANOVA output does not provide specific confidence intervals for differences in GAD_T means among the various games. However, the Mean Square for the game variable provides an estimate of the variance of the means across the different games, which is 29.00.

Effect Sizes: The F value is a measure of the effect size in ANOVA. An F value of 1.341 suggests that there is some variation in GAD_T scores across the different games. However, to quantify the effect size more explicitly, one could calculate the partial eta-squared or Cohen's f, which are not provided in the output but can be derived from the given ANOVA results.

P-values: The p-value is 0.202. This is above the conventional significance threshold of 0.05, suggesting that the differences in GAD_T scores across the various games are not statistically significant at the 5% level.

Interpretation of Results: The ANOVA analysis was performed to understand if there are significant differences in anxiety scores (GAD_T) across different games. However, the results suggest that the variations observed might be due to chance and are not statistically significant. This means that, based on this dataset and at the 5% significance level, we cannot conclude that different games evoke varying levels of anxiety.

Hypothesis 3: Each platform offers different gaming experiences. Console gaming, often on larger screens, might offer more immersive experiences, potentially increasing emotional involvement and subsequent anxiety.

R-Code Results: ANOVA (Analysis of Variance) for Platform Effect

```
                Df Sum Sq Mean Sq F value Pr(>F)
Platform         2    130   64.97   3.006 0.0495 *
Residuals    12993 280872   21.62
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Confidence Intervals: As with the prior ANOVA result, specific confidence intervals for differences in means across the platforms aren't provided in the output. To get the confidence intervals, you'd likely need to conduct post-hoc tests or pairwise comparisons among the platforms. However, the Mean Square for the platform variable is an estimate of the variance of the means across the different platforms, which is 64.97.

Effect Sizes: The F value for the effect of the platform on anxiety scores (GAD_T) is 3.006. As previously mentioned, this is a measure of the effect size in ANOVA, indicating some variation in scores across platforms. To quantify the effect size more accurately, one might consider calculating the partial eta-squared or Cohen's f from the ANOVA results.

P-values: The p-value for the platform effect is 0.0495. This is just below the conventional significance threshold of 0.05, suggesting that the differences in GAD_T scores across the various platforms are statistically significant at the 5% level.

Interpretation of Results: The ANOVA analysis was conducted to see if different gaming platforms influence anxiety scores (GAD_T). The results suggest a significant difference in GAD_T scores across platforms at the 5% significance level. This implies that the type of platform might play a role in the level of anxiety experienced by gamers.

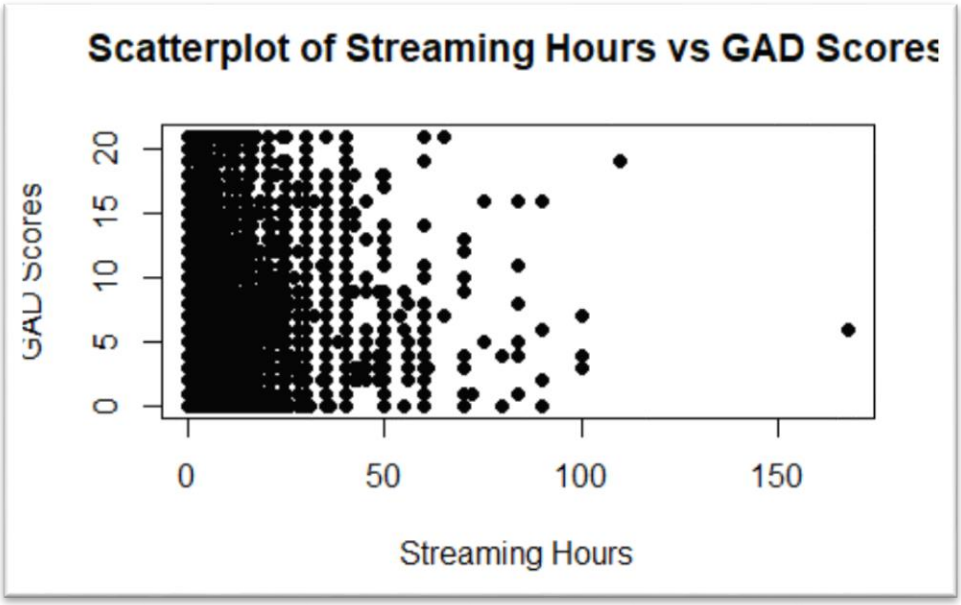
However, the actual direction or nature of this relationship (i.e., which platform induces more anxiety) cannot be determined from the ANOVA results alone. Pairwise comparisons between platforms would provide more detailed insights.

Hypothesis 4: Streaming adds a layer of performance pressure. Gamers are not just playing but are also "on stage", which can intensify feelings of scrutiny and potential anxiety.

R-Code Results: Pearson's product-moment correlation between streaming and GAD_T scores (anxiety levels).

```
        Pearson's product-moment correlation

data:  data$streams and data$GAD_T
t = 7.6106, df = 12994, p-value = 2.916e-14
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.04948031 0.08371367
sample estimates:
      cor
0.0666166
```



Confidence Intervals: The 95% confidence interval for the correlation coefficient is [0.04948031, 0.08371367]. This means that we are 95% confident that the true correlation between streaming and anxiety scores (GAD_T) lies within this interval. Importantly, this interval does not contain zero, suggesting that the correlation is statistically significant and is not a result of random chance.

Effect Sizes: The correlation coefficient, r, is 0.0666166. This value can be considered as an effect size. In the context of this study, the correlation is positive and small, indicating a weak positive relationship between streaming (being "on stage") and anxiety levels among gamers. The more streaming activity a gamer has, the higher their reported anxiety (and vice versa).

P-values: The p-value for the correlation is 2.916×10^{-14}, which is extremely small. This indicates that the observed correlation between streaming and anxiety scores is highly statistically significant, and it's extremely unlikely that this observed correlation occurred by chance alone.

Interpretation of Results: The analysis aimed to assess the relationship between streaming (the act of being "on stage") and anxiety levels among gamers. The positive correlation suggests that there's a statistically significant, though weak, relationship between streaming and higher anxiety scores. This may support the hypothesis that being "on stage" while streaming games can intensify feelings of scrutiny, leading to increased anxiety. However, a key thing to remember is the old adage, "correlation does not imply causation." While there is an association between streaming and anxiety, this does not necessarily mean that streaming causes increased anxiety. There may be other confounding factors at play, or it's possible that individuals with higher anxiety are more drawn to streaming for various reasons.

Hypothesis 5: Gender, age, and other demographic variables play a role in how individuals perceive stress and engage with coping mechanisms, including gaming.

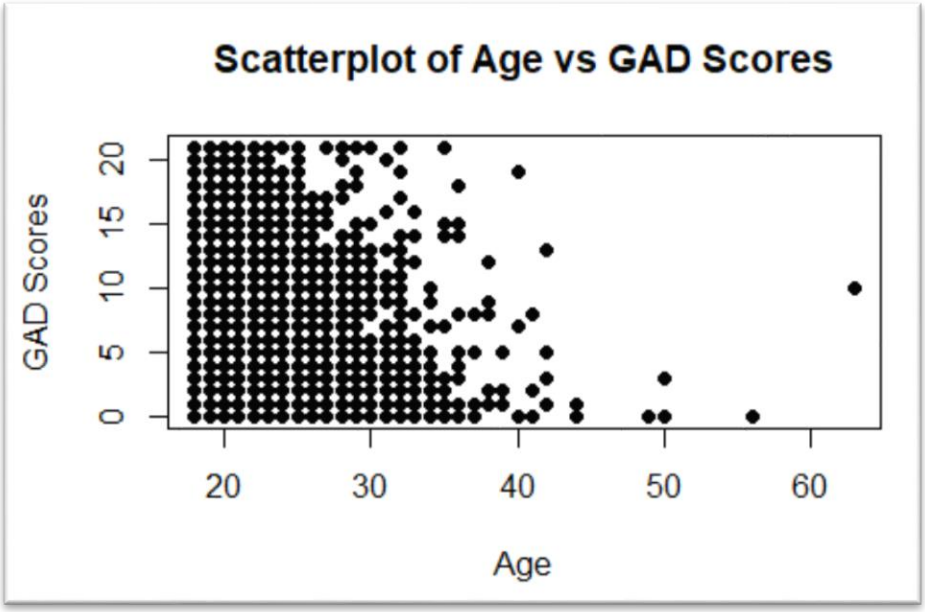
R-Code Results: We have results from a t-test comparing anxiety scores (GAD_T) by gender and a Pearson correlation testing the relationship between age and anxiety scores (GAD_T).

```
        Welch Two Sample t-test

data:  GAD_T by as.factor(Gender)
t = 12.229, df = 746.87, p-value < 2.2e-16
alternative hypothesis: true difference in means between group Female and group Male is not equal to 0
95 percent confidence interval:
 2.180105 3.013889
sample estimates:
mean in group Female   mean in group Male
            7.603175             5.006177
```

```
        Pearson's product-moment correlation

data:  data$Age and data$GAD_T
t = -5.2322, df = 12994, p-value = 1.701e-07
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.06299468 -0.02868103
sample estimates:
        cor
-0.04585138
```



Gender:

Confidence Intervals: The 95% confidence interval for the difference in means between females and males is [2.180105, 3.013889].

Effect Sizes: The t-value is 12.229, which represents the standardized difference between the two group means. The difference in mean GAD_T scores between females and males is roughly 2.5965

(mean of 7.603175 for females and 5.006177 for males). This difference can be interpreted as an effect size.

P-values: The p-value is < 2.2e-16, which is extremely small, indicating that the observed difference in means is highly statistically significant.

Interpretation of Results for Gender: Females, on average, reported higher anxiety scores (GAD_T) than males. The difference is statistically significant and suggests that gender might play a role in how individuals perceive stress or engage with coping mechanisms, such as gaming.

Age:

Confidence Intervals: The 95% confidence interval for the correlation coefficient between age and GAD_T scores is [-0.06299468, -0.02868103].

Effect Sizes: The correlation coefficient, r, is -0.04585138. This indicates a weak negative relationship between age and reported anxiety levels among gamers.

P-values: The p-value is 1.701×10^{-07}, which is extremely small, signifying that the correlation is statistically significant.

Interpretation of Results for Age: There's a weak but statistically significant negative correlation between age and anxiety scores. This suggests that as age increases, anxiety scores tend to decrease slightly (and vice versa). It's possible that older gamers might have developed better coping mechanisms or other factors might be at play that associates with decreased anxiety.

Comparison with Prior Research or Expectations

Prior research has often shown that males and females perceive and cope with stress differently. The finding that females reported higher anxiety scores aligns with some studies suggesting women might experience or report higher stress levels than men in various contexts. Furthermore, the negative correlation between age and anxiety may echo previous findings where older individuals have developed more effective coping mechanisms or have experienced life events that might modulate their reactions to stressors. However, each study is contextual, and these trends may not be universal.

Significance and Implications of Findings

Gender Differences: Recognizing gender differences in anxiety levels can help game developers, mental health professionals, and communities better cater to the unique needs of each gender. For instance, online gaming platforms can design interventions or supportive tools specifically for female gamers, acknowledging their heightened stress levels.

Age Trends: Understanding that older gamers might experience less anxiety can provide insights for interventions tailored to younger gamers who might be more susceptible to gaming-induced stress or anxiety.

Limitations of the Study

- Cross-sectional Design: The nature of the provided data seems cross-sectional, meaning it captures a single point in time. This design can't establish causality.
- Self-reported Data: Self-reported anxiety scores may not be as reliable as clinically assessed scores. Participants might under-report or over-report their symptoms.
- Generalizability: If the sample is not representative of the broader population of gamers, the findings might not be generalizable to all gamers.

Potential Biases

- Selection Bias: If participation in the study was voluntary, it could be that those with stronger feelings (either positive or negative) about gaming and mental health were more likely to participate.
- Confirmation Bias: If participants were aware of the study's objectives, they might have answered in ways that confirmed their beliefs about gaming and mental health.

Issues with Data Quality or Sample Size

The sample size seems large based on the degrees of freedom provided, which is good for statistical power. However, without knowing how the sample was selected or if there were any missing data or outliers, it's hard to comment on data quality.

Recommendations & Future Research Directions

- Longitudinal Study: To better understand causality, a longitudinal study tracking gamers over time can be conducted.
- Clinical Assessments: Future research could integrate clinical assessments alongside self-reported measures for a more comprehensive understanding of anxiety.
- Diverse Sampling: Ensuring the sample represents various demographic groups, including different ethnicities, socio-economic statuses, and geographical locations, can improve generalizability.
- In-depth Qualitative Insights: Qualitative interviews or focus groups can be conducted to get a deeper understanding of gamers' experiences and perceptions.
- Exploring Other Variables: Apart from age and gender, future research should consider other demographic variables, gaming habits, and external life factors that could influence anxiety levels.
- Interventional Studies: Based on these findings, targeted interventions can be designed and their effectiveness can be evaluated in subsequent studies.
- Interaction Effects: It might be worthwhile to explore how various factors, such as age and gender, interact with each other in influencing anxiety levels in the context of gaming.

By building on this study and addressing its limitations, researchers can contribute to a more comprehensive understanding of the relationship between gaming, demographic variables, and mental health.

Conclusion

Recap of Key Findings

- Time Investment in Gaming: There is a statistically significant, albeit modest, correlation between hours invested in gaming and anxiety levels. This suggests that while there is an association, other factors are also at play.
- Game Content Variation: The type or genre of a game (whether story-driven or fast-paced competitive shooter) did not show a statistically significant difference in influencing anxiety levels.
- Gaming Platforms: There was a statistically significant difference in anxiety levels based on the platform used, suggesting that the medium through which one games might influence their mental state.
- Streaming: Gamers who stream showed a positive correlation with anxiety, indicating that the pressure of being "on stage" might be a factor.
- Demographic Variables:
    - Gender: Female gamers reported higher levels of anxiety than their male counterparts.
    - Age: A negative correlation between age and anxiety was observed, suggesting that as gamers get older, they might experience or report less anxiety related to gaming.

Overall Insights and Takeaways

The world of gaming is vast, and its relationship with mental health is multifaceted. While the amount of time spent gaming, the choice of platform, and the decision to stream can influence anxiety, factors like gender and age also play significant roles. Importantly, while correlations exist, they don't necessarily imply causation. For instance, while streaming and anxiety are correlated, it doesn't mean streaming directly causes anxiety. Gamers who are naturally more anxious might be drawn to or away from streaming. Game developers, platform designers, and community managers can use these insights to foster a more inclusive and supportive environment, especially considering the specific needs of female gamers and younger players who seem more susceptible to anxiety. Mental health professionals and caregivers should be aware of these associations to offer appropriate support and interventions to gamers who might be struggling. They can incorporate an understanding of a gamer's preferences, habits, and demographics in their approach. As gaming continues to grow as a global phenomenon, understanding its nuanced relationship with mental health becomes crucial. While this study provides some valuable insights, it also underscores the need for continuous research in this domain.

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R code script accessible via : https://github.com/Rose-Esmaeili/DS-AI_Bachelor/blob/main/Applied%20Statistical%20Modeling/Data%20Analysis%20Code.R

```r
setwd("C:/")

data = read.csv("anxiety1.csv")

str(data)

#Pre-Processing

# dropping extra variables
library(dplyr)

data <- data %>% select(-c('S..No.', 'Timestamp'))

# Check for missing values
missing_values <- sapply(data, function(x) sum(is.na(x)))
print(missing_values)

# Replace NAs in 'streams' column with its mean
data$streams[is.na(data$streams)] <- as.integer(mean(data$streams, na.rm = TRUE))

# Replace NAs in 'Hours' column with its mean
data$Hours[is.na(data$Hours)] <- as.integer(mean(data$Hours, na.rm = TRUE))

table(data$Gender)

data <- data[data$Gender %in% c("Male", "Female"), ]

table(data$Gender)

# Outlier Detection
boxplot(data$Hours, main="Boxplot for Gaming Hours", ylab="Hours")
```

```r
# Outlier Detection
boxplot(data$Hours, main="Boxplot for Gaming Hours", ylab="Hours")
boxplot(data$GAD_T, main="Boxplot for GAD_T", ylab="GAD_T")

data <- data[data$Hours <= 50, ]

boxplot(data$Hours, main="Boxplot for Gaming Hours", ylab="Hours")

# Descriptive Statistics

df <- data %>% select(c('Hours', 'streams','GAD_T', 'Age'))
summary(df)

#Graphs

boxplot(data$Hours, main="Boxplot for Gaming Hours", ylab="Hours")
boxplot(data$GAD_T, main="Boxplot for GAD_T", ylab="GAD_T")
hist(data$Age, main="Distribution for Age", xlab="Age")

# Hypotheses 1

# Correlation between Hours and GAD_T
Hours_correlation <- cor.test(data$Hours, data$GAD_T, use="complete.obs", method="pearson")
Hours_correlation

# Scatter plot to visualize this relationship
plot(data$Hours, data$GAD_T, main="Scatterplot of Gaming Hours vs GAD Scores", xlab="Gaming Hours", ylab="GAD Scores", pch=19)
```

```r
# Hypotheses 2

# ANOVA for different games
anova_result <- aov(GAD_T ~ Game, data=data)
summary(anova_result)

#Hypotheses 3

# ANOVA for different platforms
anova_platform <- aov(GAD_T ~ Platform, data=data)
summary(anova_platform)

# Hypotheses 4

# Correlation between Streams and GAD_T
correlation_stream <- cor.test(data$streams, data$GAD_T, use="complete.obs", method="pearson")
correlation_stream

# Scatter plot to visualize the relationship
plot(data$streams, data$GAD_T, main="Scatterplot of Streaming Hours vs GAD Scores", xlab="Streaming Hours", ylab="GAD Scores", pch=19

#Hypotheses 5

# T-test for Gender differences
t_test_gender <- t.test(GAD_T ~ as.factor(Gender), data=data)
t_test_gender

# Correlation between Age and GAD_T
correlation_age <- cor.test(data$Age, data$GAD_T, use="complete.obs", method="pearson")
correlation_age
```

```r
# Correlation between Age and GAD_T
correlation_age <- cor.test(data$Age, data$GAD_T, use="complete.obs", method="pearson")
correlation_age

# Scatter plot for Age vs GAD_T
plot(data$Age, data$GAD_T, main="Scatterplot of Age vs GAD Scores", xlab="Age", ylab="GAD Scores", pch=19)
```