

# Understanding Video Game on General Anxiety: Age, Gender, Education, Employment Status, Number of Hours Spent Playing

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## Abstract

Gaming disorder, which is often associated with an addiction to video games, is characterized by an increasing prioritization of gaming. This issue affects people of all demographics and inhibits one from performing daily activities, leading to increased anxiety and distress. This study outlined the multitude of factors associated with anxiety levels among video game players and a range of demographic and gaming habit variables. By analyzing demographic factors and gaming habits, this research uncovered potential predictors of anxiety levels among those who play video games in order to contribute to a better understanding of general anxiety among certain demographics of video gamers. This paper studied what variables are associated with game players' anxiety levels. The dataset used in this study consists of 6 groups of variables collected from 13464 users, including Generalized Anxiety Disorder, satisfaction with life scale, social phobia inventory, single-item narcissism scale, gaming habits, and demographics. Correlation analysis and Chi-square tests were conducted to study the association between these variables with general anxiety. This study suggests that younger people as well as females are more prone to developing Generalized Anxiety Disorder. In addition, players who spend more hours playing video games and those who do not have an education degree tend to be more prone to developing Generalized Anxiety Disorder.

*Keywords: General anxiety, Video game, Satisfaction, Addiction, Social anxiety*

## 1. Introduction

In today's digital age, gaming disorder is increasingly recognized as a prevalent issue that affects individuals across different age groups and backgrounds. This disorder manifests as a compulsive preoccupation with gaming, resulting in an inability to control the time spent playing, neglect of responsibilities, and disruptions in personal relationships and daily functioning (*Internet Gaming*, n.d.). Symptoms commonly associated with gaming disorder include irritability, restlessness, withdrawal from social activities, decreased interest in non-gaming pursuits, and experiencing general anxiety disorder (GAD) or distress when unable to play.

Research conducted by (Gentile, 2009) on a sample of 1,158 residents between the ages of 8 and 18 revealed that a significant percentage of participants admitted to playing video games despite being aware of pending homework, and deliberately using games as a means to avoid their academic responsibilities. These findings suggest that children, despite understanding the importance of prioritizing tasks, are more inclined to engage in video game play. A study by Limelight Networks in 2020 also found gaming is not limited to adolescents, as growing number of adults were also found to be consuming and engaging with online video games at a higher frequency than before (*The State of Online Video 2020*, 2020).

So, what mechanisms within video games prompt such behavior? Video games are designed to be fun, interesting, and thrilling, often presenting a more enticing world than our own. Additionally, the absence of serious consequences

within the game environment further enhances the appeal. The release of dopamine during gameplay induces feelings of happiness and motivation, while subsequent serotonin activation strengthens the association between pleasurable experiences and video games, perpetuating a desire to revisit these enjoyable moments (Kühn, 2011). However, excessive engagement and addiction to video games can result in individuals losing touch with reality, prioritizing virtual experiences over real-life obligations and activities. This issue has been exacerbated during and after the Covid-19 pandemic, as gaming witnessed a surge in participants. However, as institutions and organizations promoted gaming during the pandemic, research has shown a correlation between gaming and the development of anxiety and depression (Teng Z et al., 2021).

Numerous risk factors contribute to the development of Generalized Anxiety Disorder. These factors include psychological elements such as low self-esteem, high-stress levels, and underlying mental health conditions such as depression (Newman 2016). Environmental factors, such as easy access to games, social influences, and a lack of parental or societal monitoring, also contribute to its onset. Additionally, certain aspects of game design, such as immersive storytelling, rewarding achievements, and social interactions within games, further enhance their appeal and addictive potential.

The consequences of Generalized Anxiety Disorder can be far-reaching, impacting various aspects of an individual's life. Academic or occupational performance may decline (Barrera and Norton 2009) due to decreased focus and increased absenteeism. Physical health may be compromised due to sedentary behaviors and neglect of exercise. Relationships with family and friends may deteriorate, leading to social isolation and a diminished sense of belonging. Furthermore, individuals with Generalized Anxiety Disorder may experience heightened levels of stress, anxiety, and depression, exacerbating their overall mental well-being.

The objective of this research is to comprehensively analyze the factors associated with the development of general anxiety disorders among video gamers. Specifically, this research aims to examine the associations of age, gender, education level, employment status, and the number of hours spent playing with the likelihood of developing Generalized Anxiety Disorder. Furthermore, this paper seeks to explore the potential consequences and outcomes associated with severe general anxiety.

The null hypothesis of the research is that the proportions of participants experiencing different levels of Generalized Anxiety Disorder are the same among different players' age groups, gender, employment status, education level, and categorized weekly playing hours, respectively. The alternative hypothesis is that the proportions of participants experiencing different levels of Generalized Anxiety Disorder are different among different players' age groups, gender, employment status, education level, and categorized weekly playing hours, respectively.

## **2. Materials and Methods**

### **2.1 Dataset Description**

The dataset used in this study was originally collected by researchers from the Department of General and Experimental Psychology at Ludwig-Maximilians-Universität München, Germany (2018). It is composed of 13464 users (12699 male, 713 female, 52 other) between 18 and 63 years. It has 6 groups of variables, including (1) the Generalized Anxiety Disorder 7 (GAD-7; Spitzer et al, 2006); (2) the Satisfaction with Life Scale (SWLS; Diener et al, 1985); (3) the Social Phobia Inventory (SPIN; Antony et al, 2006); (4) gaming habits including average playtime per week, the preferred mode of playing (single player, multiplayer), and preferred platform; as well as (5) several demographics including age, gender, country of residence/birth and employment status.

### **2.2 Data Collection Process and Methodology Employed**

The dataset was collected through online forums through voluntary responses. Participants were asked to answer a set of questions across various online forums and were provided with information about the study objectives. The survey included closed-ended questions about variables of interest, such as age, gender, education, and employment status. This survey was administered electronically through online platforms. Questions were answered through a

Google form, and the data was then collected and compiled onto a Google sheet.

## 2.2 Procedure and Analysis Methods

The first study done, was the Pearson correlations between Total GAD, Total SWLS, Total SPIN, age, and average weekly hours among all the players. Pearson correlation values are denoted by  $r$  and shows the degree of correlation between two variables. Total GAD, Total SWLS, and Total SPIN values were calculated by summing up the values in their corresponding items. Following that, the total GAD was categorized into 4 levels: low, mild, moderate, and severe based on cut-off scores of 5, 10, and 15, respectively. The total satisfaction with life values was divided into three levels: low, medium, and high, based on cut-off values of 10 and 20. These cutoff values were decided by standardized categories for GAD and SWLS scores, imposed by numerous institutions and studies. The reasoning for the categorization was to better visualize and understand potential patterns, correlations, and outcomes. Finally, the Chi-square significance tests for homogeneity were run, comparing the proportions of participants experiencing different levels of GAD among different players' age groups, gender, employment status, education level, and categorized weekly playing hours, respectively. For the significance tests, the significance level used in the tests was 0.05. The significance level will be referred to as the  $p$ -value, a value used to assess whether the results of a study are statistically significant or if they could have occurred by chance. A smaller  $p$ -value typically indicates stronger evidence against the null hypotheses, suggesting that the observed effect is unlikely to be due to random variation alone. R studio was used for statistical analysis done in the study. The data table was imported to R Studio to run statistical analysis. Commands such as `cor.test` were run to calculate values like significance value.

Calculation of Chi-square test for homogeneity is shown in equation 1, and calculation for expected value used in the Chi-square test is shown in equation 2.

Equation 1.

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O - E)^2}{E}$$

$O$  represents the observed frequency in the  $i$ th row and  $j$ th column of the contingency table.  $E$  represents the expected frequency in the  $i$ th row and  $j$ th column of the contingency table under the assumption of homogeneity.

Equation 2.

$$E = \sum_{i=1}^r \sum_{j=1}^c \frac{T_i * T_j}{n}$$

- $T_i$  is the total count in the  $i$ th row
- $T_j$  is the total count is the  $j$ th column
- $n$  is the total sample size

Throughout the paper, multiple correlation analyses were done including correlations between General Anxiety Disorder (GAD) and: 1) Real-life satisfaction (negative), 2) social anxiety (positive)<sup>\*\*\*</sup>, 3) Age (younger players tend to develop higher levels of anxiety than older players), 4) Education level (Those who have lower education levels tend to develop some level of General Anxiety compared to postgraduates), 5) Gender (females develop higher levels of anxiety more often), 6) time in hours spent playing (positive).

## 3. Results

Table 1 summarizes the correlations between Total GAD, Total SWLS, Total SPIN, age, and average weekly hours among all the players, where the bolded numbers represent statistically significant correlations. The correlations indicate the strength of the linear associations between these variables.

Table 1. summary of correlation coefficients between Total Gad, Total SWLS, Total SPIN, Age, and Average Weekly Play Hours

	Total GAD	Total SWL	Total SPIN	Age	Hours
Total GAD	1	<b>-0.40169375</b>	<b>0.46183686</b>	<b>-0.05839808</b>	0.08544925
Total SWL	<b>-0.40169375</b>	1	<b>-0.30268993</b>	0.03716908	-0.11421419
Total SPIN	<b>0.46183686</b>	<b>-0.30268993</b>	1	<b>-0.11511714</b>	0.09314954
Age	<b>-0.05839808</b>	0.03716908	<b>-0.11511714</b>	1	<b>-0.09976878</b>
Hours	0.08544925	-0.11421419	0.09314954	<b>-0.09976878</b>	1

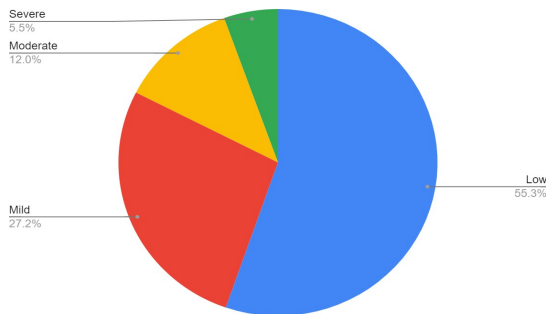


Figure 1. Distribution of the Four Levels of GAD

Figure 1 illustrates the distribution of the four levels of GAD among the players for a better understanding of the overall anxiety levels of the players in the dataset. It shows that among the surveyed participants in the dataset, nearly 18% of respondents have moderate to severe levels of GAD, including 5.5% for severe GAD, and 12% for moderate GAD. While mild and low GAD have 27.2% and 55.3% respectively.

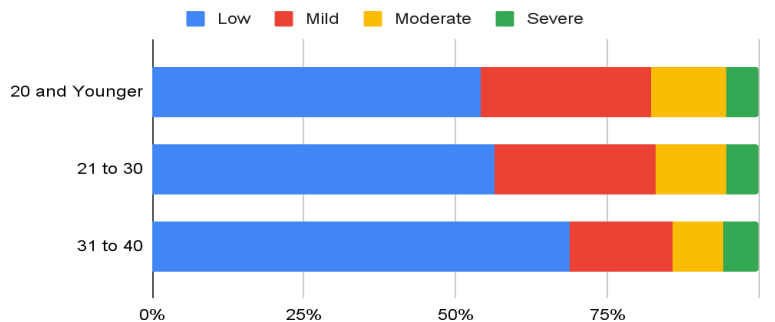


Figure 2. Distribution of Generalized Anxiety Disorder Levels Among Different Age Groups

Figure 2 illustrates the distribution of Generalized Anxiety Disorder levels among three age groups to compare how video game players at different points in their lives experience anxiety. All three categories have generally the same percentage of those in the severe anxiety range at 5.5%. However, those aged 20 and younger have a higher percentage of people within the mild to moderate GAD range as compared to those 31 and older.

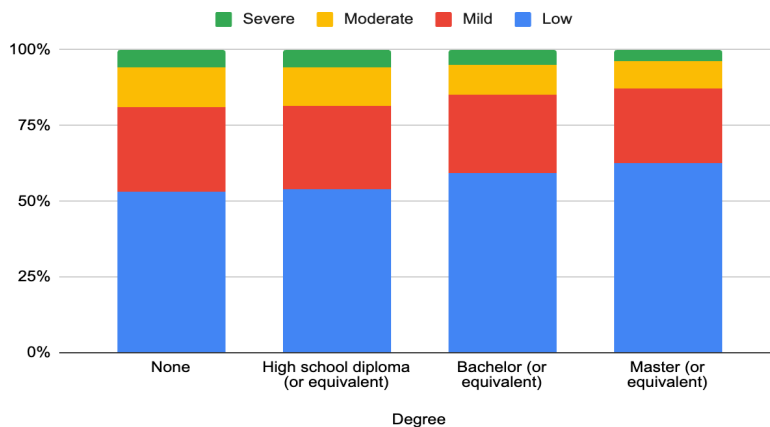


Figure 3. Distribution of GAD Among Education Levels

Figure 3 illustrates the distribution of GAD levels among four education levels to compare the anxiety levels among players of different educational backgrounds. Highschool diplomas and no degrees have similar percentages in each group, with 53%, 28%, 13%, and 6% in low, mild, moderate, and severe GAD respectively. Bachelor and above degrees showcase higher a percentage of low GAD and a lower percentage of severe to moderate GAD.

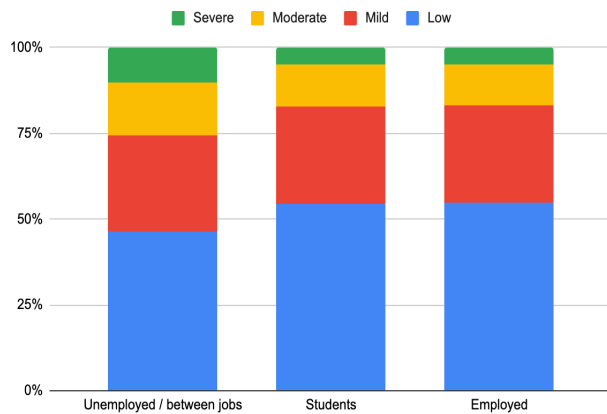


Figure 4. Distribution of GAD Among Employment Status

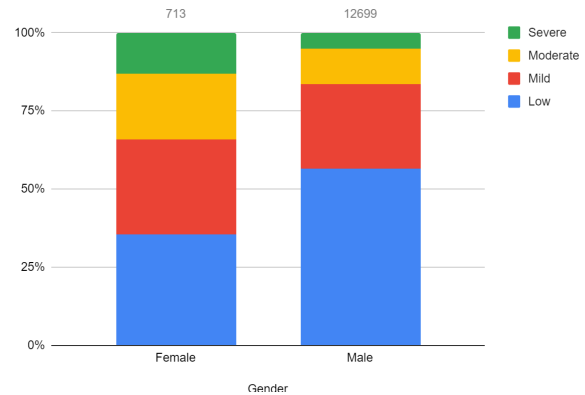


Figure 5. Distribution of GAD Between Gender Groups

Figure 4 illustrates the distribution of GAD levels among three employment categories to compare the anxiety levels among video game players of different employment statuses. Students and Employed status display similar distributions of GAD levels, while unemployed/between jobs has a significantly higher percentage of severe GAD.

Figure 5 illustrates the distribution of GAD levels between two gender groups to compare the anxiety levels between players of different genders. Females show higher percentages of moderate to severe levels of GAD.

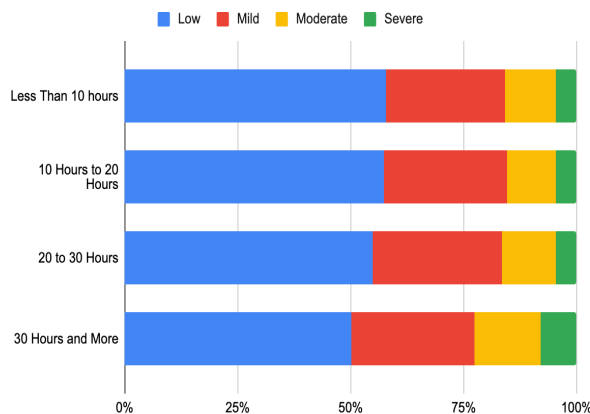


Figure 6. Distribution of GAD Among Levels of Weekly Playing Hours

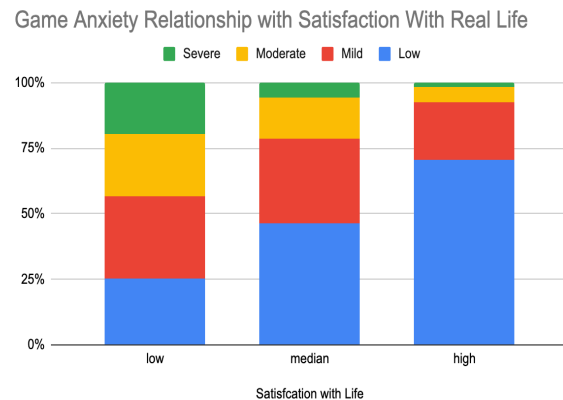


Figure 7. Distribution of GAD Among Satisfaction with Life Scale

Figure 6 illustrates the distribution of GAD levels among 4 levels of the number of hours the respondents spend playing weekly to show how anxiety levels are associated with the amount of time spent playing games. There is little difference between the GAD level distributions among those who play less than 10 hours to 20 hours weekly. The distribution for under 20 weekly hours is distributed roughly 57%, 27%, 11%, and 5% for low, mild, moderate, and severe respectively. There are increases to mild, moderate, and severe levels of GAD past 20 hours weekly.

Figure 7 illustrates the distribution of GAD among the categorized levels of SWLS. There are higher levels of severe GAD in low SWLS, 19.8%, compared to 1.77% in high SWLS. Those with lower SWLS are distributed more towards the higher levels of GAD.

## 4. Discussion

### 4.1 Life Satisfaction Analysis

Among all variables, the Satisfaction Level of Real Life is one of the most negatively correlated with general anxiety, as indicated by the moderately strong Pearson correlation coefficient of -0.4 (Table 1). Surveyed participants with low levels of life satisfaction have an 11 times higher likelihood of experiencing severe general anxiety compared to those with high levels of satisfaction, and a 3 times higher likelihood compared to those with median satisfaction. Additionally, individuals with median satisfaction rates have a 3 times higher likelihood of experiencing severe general anxiety compared to those with high levels of satisfaction (Figure 7). A formal Chi-square significance test for homogeneity was also done, comparing the proportions of participants experiencing different levels of general anxiety among the three levels of satisfaction in real life. The test shows significantly different proportions of participants experiencing different levels of general anxiety among the three levels of satisfaction in real life (with a p-value much smaller than 0.05).

It can reasonably be concluded that people who have low real-life satisfaction tend to be addicted to the game and have more severe general anxiety. People who are not satisfied with their lives are often searching for a resolution to find that meaning and satisfaction within their lives. People who are unable to feel satisfied with their lives look for easy ways to satisfy this need or escape from it. People whose needs are not met were found more likely to resort to video games and develop an addiction (Kaya A. et al., 2023).

Gaming addictions and anxiety are a “result” of low real-life satisfaction. However, resolving the low real-life satisfaction is critical, as people can switch to other activities to escape from real life (e.g. Drugs, Alcohol, etc.). Gaming is just making it easier for people to access. Internet gaming Disorder or classified as IGD by the American psychiatric association is found to have a positive correlation and influence on developing Gaming Anxiety Disorder (GAD) (Wang C et al., 2017).

### 4.2 Demographic Analysis

The research suggests that age has a limited impact on high general anxiety levels. Figure 2 shows that individuals aged 30 and older tend to have a lower percentage of developing mild to severe GAD. The most noticeable change in GAD levels is observed in the mild range, which decreased by about 10% when comparing the participants younger than 30 years old and the older participants. Additionally, there was around a 3% increase in the moderate range, but less than a 1% increase in the severe range. A formal Chi-square significance test for homogeneity was also done, comparing the proportions of participants experiencing different levels of general anxiety among the three age groups. The test shows significantly different proportions of participants experiencing different levels of general anxiety among the three age groups (with a p-value much smaller than 0.05).

Gender, on the other hand, played a more significant role in general anxiety. Figure 5 illustrates that female respondents are more likely to experience moderate to severe GAD than their male counterparts, with over 50 percent of females developing some level of General Anxiety Disorder. However, it is worth noting that the overall proportion of female respondents in the survey was only 5.6% of the total sample size.

Previous research suggests that Generalized Anxiety Disorder is found more often in women, blacks, young adults, and those with low income or occupational status (Bahrami and Yousefi, 2011). It is adolescents who are under 20 and are still developing that more noticeably develop Generalized Anxiety Disorder. Adolescence is the period in which they are looking for their identity and still discovering themselves. As a result, adolescents try to satisfy some of their psychological needs via the Internet (Shen et al., 2013). And as a result, are more prone to the addictive nature of video games early on and find they are only satisfied through the virtual world achievements brought by video games.

### 4.3 Education and Employment Analysis

Our analysis shows that unemployment is a strong indicator of Generalized Anxiety Disorder. Figure 4 displays

unemployed respondents who reported a significantly higher percentage of moderate or severe Generalized Anxiety Disorder, with a p-value of much less than 0.05.

In addition, compared to the respondents who have a bachelor's degree or higher, those without a degree tend to have high percentages of developing moderate to severe Generalized Anxiety Disorder, with a p-value much lower than 0.05. This finding is consistent with a previous study, which suggests people who are unemployed and are unable to make good use of their time tend to develop more severe anxiety and dissatisfaction with life (Akay et al., 2021).

#### 4.4 Playing Hours Analysis

Individuals who play more than 30 hours a week have a higher percentage of (almost double) developing severe GAD compared to those who play less than 30 hours (Figure 6). However, since the p-value exceeds the threshold for statistical significance, there is no significant correlation between general anxiety and the number of hours spent playing (p-value = 0.14). It can be noted that general anxiety levels did not differ significantly among respondents who played less than 30 hours a week, regardless of the number of hours they played.

### 5. Conclusion

In this paper, a large dataset measuring multidimensional characteristics of well-being in video game players was analyzed, particularly how players' demographics and gaming habits are associated with their likelihood of developing Generalized Anxiety Disorder. The analysis suggests all the proposed hypotheses are supported by the data. Younger people as well as females were found to be more prone to developing Generalized Anxiety Disorder. In addition, players who spend more hours playing video games and those who do not have an education degree tend to be more prone to developing Generalized Anxiety Disorder.

However, limitations of the study include the potential response bias introduced by the use of volunteer response sampling through online forums. Individuals who voluntarily participated in the study may have different characteristics compared to those who did not participate, leading to biased results. Despite efforts to mitigate bias through anonymity, the possibility of this bias can not be ruled out. Consequently, observed associations and conclusions from data may be influenced to some extent.

To address the need for a more comprehensive discussion, there is an importance of expanding upon the implications of the results within the context of gaming disorder research. These findings shed light on the demographic and behavioral factors associated with Generalized Anxiety Disorder among video game players, highlighting the need for targeted interventions and support systems for certain at-risk populations. By identifying potential risk factors for GAD, this study contributes to the growing body of knowledge aimed at understanding and addressing mental health issues in the gaming community.

Future research directions could explore the underlying reasons driving the observed associations, explore the long term effects of gaming habits on mental health outcomes, and investigate the efficacy of preventive measures and interventions targeting vulnerable populations. Additionally, incorporating qualitative methodologies to gain insights into the life experiences of individuals affected by gaming disorder could provide valuable perspectives for informing clinical practice and policy development.

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