Impact of Extended Gaming Hours on Academic Performance and Mental Health Among Bangladeshi Undergraduate Students: An Analysis Using SPSS and SmartPLS

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. We have acknowledged all main sources of help.

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Abstract

The increasing prevalence of gaming among Bangladeshi undergraduate students has raised concerns regarding its effects on academic performance and mental health. This thesis investigates the relationship between gaming habits and academic outcomes, focusing on prolonged gaming hours, stress, and life satisfaction. Utilizing a mixed-methods approach with SPSS for confirmatory analyses and SmartPLS for exploratory analyses, the study examines responses from 588 students. Results indicate that excessive gaming negatively impacts CGPA and increases stress, while factors such as sleep patterns and social engagement moderate these effects. Gender differences were observed, with males achieving higher CGPA despite fewer social challenges related to gaming. This research highlights the interplay between gaming behaviors, emotional well-being, and academic performance, offering evidence-based recommendations for balanced gaming practices to optimize educational and mental health outcomes.

Keywords: Gaming habits, academic performance, mental health, CGPA, stress, undergraduate students, SmartPLS, SPSS, Bangladeshi students, gender differences.

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Chapter 1

Introduction

1.1 Background

The increasing prevalence of gaming, particularly among university students, has raised critical concerns regarding its impact on academic performance and mental health. This thesis explores the intricate relationship between gaming habits and their influence on the academic and psychological well-being of undergraduate students in Bangladesh. By analyzing survey responses from 588 participants, the study delves into the effects of prolonged gaming hours, stress levels, social engagement, and life satisfaction on students' CGPA and mental health.[9]

The detrimental effects of excessive gaming on psychological and academic outcomes have been highlighted in prior research. For instance, studies have reported that prolonged gaming hours significantly reduce sleep quality and increase stress levels, leading to impaired academic performance (Zohurul et al., 2021; Mohammed et al., 2019). Moreover, gaming addiction has been linked to heightened psychological distress, including anxiety and depression, as well as lower life satisfaction among students (Abu et al., 2021; Yoonhe Sung et al., 2020). Gender differences also play a significant role, with male students exhibiting higher levels of gaming addiction but better academic outcomes compared to females, who often face greater social and emotional challenges due to gaming (Sahab et al., 2016).[5]

A mixed-methods approach was employed in this study, utilizing SPSS for confirmatory analyses, including ANOVA and independent t-tests, and SmartPLS for exploratory research through Structural Equation Modeling (SEM). This dual-framework approach allowed for a comprehensive examination of both observed and latent variables, yielding nuanced insights into the multidimensional impact of gaming on student life.[3]

By integrating findings from previous studies and generating novel insights through advanced statistical techniques, this research aims to contribute to the growing body of literature on the effects of gaming. It investigates predictors of academic and mental health outcomes while offering evidence-based recommendations to balance gaming habits and educational priorities among Bangladeshi students.[7]

1.2 Identified Literature Gap

Existing studies on the impact of gaming behaviors have largely focused on psychological outcomes, such as anxiety, depression, and stress, without adequately addressing the academic consequences, particularly in the context of Bangladeshi undergraduate students. Research such as Zohurul et al. (2021) and Mohammed et al. (2019) highlights the correlation between excessive gaming and mental health issues but fails to explore how these behaviors directly influence CGPA and other academic metrics. Additionally, while gender differences in gaming addiction and psychological impacts have been noted (e.g., Sahab et al., 2016; Abu et al., 2021), these studies lack a detailed examination of how gender interacts with gaming habits to influence academic performance, creating a gap in understanding the nuanced effects of gaming on diverse student demographics.

Furthermore, many related works, such as Liu (2022) and Abrar et al. (2021), fail to account for moderating lifestyle factors like sleep quality and social interaction, which can significantly influence the relationship between gaming behaviors and life satisfaction. While prior studies briefly mention these aspects, they do not provide comprehensive analyses of their interplay with gaming habits. The reliance on basic statistical methods like ANOVA and t-tests in most research (e.g., Tahani et al., 2020) limits their ability to uncover complex interdependencies between variables. This study addresses these gaps by using advanced techniques like Structural Equation Modeling (SEM) to examine the multidimensional relationships between gaming habits, academic outcomes, and psychological well-being.

1.3 Research Motivation

The increasing prevalence of gaming among university students has sparked critical concerns about its effects on academic performance and mental health, especially in the Bangladeshi context. Prior research has explored the psychological ramifications of gaming, including anxiety, depression, and stress, but often neglects its direct academic consequences, such as CGPA and study time. Moreover, existing studies largely overlook the moderating roles of factors like sleep quality, social interactions, and gender-specific dynamics.

This research aims to fill these gaps by employing a mixed-methods approach, combining SPSS and SmartPLS for confirmatory and exploratory analyses. The study provides a comprehensive investigation of how prolonged gaming hours, gaming-induced stress, and social engagement influence academic and psychological outcomes. By integrating advanced statistical techniques, the research offers nuanced insights into the interdependent effects of gaming on the academic and mental health of Bangladeshi undergraduates, addressing critical gaps in the current body of literature.

The findings of this study will contribute not only to academic discourse but also to the development of practical interventions aimed at balancing gaming habits with educational priorities. This is particularly vital in the Bangladeshi context, where cultural, social, and academic pressures uniquely shape students' gaming behaviors

and their impacts.

1.4 Research Objectives

The primary objective of this thesis is to investigate the multifaceted effects of gaming habits on the academic performance (measured by CGPA) and mental well-being of Bangladeshi undergraduate students. Specifically, the research aims to:

1. **Analyze the Influence of Gaming Duration and Patterns:** Examine how prolonged gaming hours and patterns of play (e.g., daily and weekend gaming) impact students' academic performance and study time.
2. **Evaluate the Psychological Impacts of Gaming:** Assess the relationship between gaming-induced stress levels, emotional well-being, and mental health outcomes such as anxiety, depression, and life satisfaction
3. **Examine Moderating and Interacting Factors:** Investigate the role of moderating variables such as gender, sleep quality, and social engagement in shaping the academic and psychological outcomes of gaming.
4. **Explore the Structural Relationships:** Use advanced statistical models (e.g., SEM via SmartPLS) to identify and validate the direct and indirect pathways through which gaming habits influence academic and mental health outcomes.
5. **Provide Evidence-Based Recommendations:** Develop actionable insights and interventions to balance gaming behaviors and optimize educational and mental health outcomes for Bangladeshi undergraduate students.

1.5 Methodological Overview

This quantitative study examined responses from 588 undergraduate students who were asked Likert-scale questions in an anonymous online survey. The study looked at the connections between long-term gaming, stress levels at work, social engagement, wellbeing, and academic achievement.
Data analysis was conducted using SPSS and SmartPLS software:

- **SPSS** was used for descriptive statistics and hypothesis testing, including one-way ANOVA, two-way ANOVA, and independent samples t-tests. This enabled the validation of original assumptions and the identification of key variables influencing mental health and academic achievement.
- **SmartPLS** was used to develop and validate measurement and structural models, allowing for the examination of intricate connections between latent variables including emotional health, life satisfaction, and gaming stress levels. This method made it easier to test more theories and gave more information on how the variables were related to one another.

The study was able to thoroughly examine both observable and latent variables by integrating various statistical approaches, which improved the findings' resilience.

1.6 Research Contributions and Novelty

The study provides an in-depth analysis of the effects of gaming habits on academic performance (CGPA) and mental well-being, integrating psychological, academic, and social dimensions. By employing both confirmatory (SPSS) and exploratory (SmartPLS) methods, the research offers robust statistical insights, addressing gaps in earlier studies that relied on simpler statistical techniques.
What's unique about this study is that it uses both of these tools together and looks at students in a developing country. Some key takeaways from the study are:

- **Integration of Advanced Statistical Techniques:** The use of Structural Equation Modeling (SEM) via SmartPLS for exploring latent variables is novel in the context of gaming impact studies, providing a multidimensional understanding.
- **Detailed Examination of Moderating Variables:** The study investigates moderating factors like sleep quality, stress levels, and social interactions, which have been underexplored in prior research.
- **Comprehensive Survey Design:** The survey questionnaire is meticulously designed to capture a broad spectrum of variables, including life satisfaction, gaming-induced stress, and academic metrics.
- **Two-Step Analytical Framework:** The sequential use of SPSS for hypothesis validation and SmartPLS for exploring complex interrelations between variables sets this study apart from conventional approaches.

This work is positioned to bridge significant gaps in understanding the academic and psychological effects of gaming, especially within the unique demographic of Bangladeshi undergraduate students.

Chapter 2

Background and Related Works

2.1 Background

2.1.1 Two-Step Statistical Analysis Using SPSS and SmartPLS

SPSS and SmartPLS were used to investigate the correlations between important variables and their scales. Six initial hypotheses were developed using ANOVA and Independent Sample T-tests to discover significant variables for the desired outcome. Using SPSS, all six hypotheses were evaluated and accepted, assisting in the identification of significant traits. These attributes were then studied further using SmartPLS to acquire a better understanding of the key factors influencing the target variable. This two-step technique produced a thorough study that highlighted the most important predictors.

2.1.2 Research Approach

One popular method in statistics and certain experimental domains (like psychology) is to differentiate between exploratory and confirmatory research. Exploratory research is open-ended, beginning with hunches or imprecise inquiries that determine what you'll look for but not a definite theory.[1] Confirmatory research, on the other hand, starts with a single hypothesis and aims to rigorously evaluate it. Our confirmatory research was conducted using SPSS (fixed 10 rows/features), whereas the exploratory research was conducted using SmartPLS (4 scale multiple combination features).

2.1.3 SPSS- Statistical Package for the Social Sciences

SPSS is a strong tool for doing a variety of statistical analysis, particularly with survey data. It enabled the use of descriptive statistics for this study, such as mean, median, mode, and standard deviation calculations, as well as inferential statistics and reliability assessment. The descriptive statistics provided a general picture of the dataset by summarizing variables such as gaming time, CGPA, employment instability, and mental health markers. The most significant SPSS capabilities in

this context are inferential statistics, notably ANOVA and the Independent Sample T-test.[13]

(i) ANOVA Test: Analysis of Variance (ANOVA) is a statistical test that can be used to determine whether there are variations in the means of more than two groups, effectively comparing various populations. In essence, ANOVA compares arithmetic means across three or more groups at the same time. A one-way ANOVA is the most basic type of ANOVA, with only one independent variable. A two-way ANOVA is an analysis with two independent variables.[25] The ANOVA test is used by analysts to determine the power of independent variables in a regression investigation.
Thus, the ANOVA formula is:

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}} = \frac{\frac{\sum_{k=1}^{k} n_k(\bar{X}_k - \bar{X})^2}{k-1}}{\frac{\sum_{i=1}^{n}(X_{ik} - \bar{X}_k)^2}{n-k}}$$

where:

$$\begin{aligned} MS_{\text{between}} &= \text{Mean Square Between Groups} \\ MS_{\text{within}} &= \text{Mean Square Within Groups} \\ n &= \text{Total number of observations} \\ k &= \text{Number of groups} \\ \bar{X}_k &= \text{Mean of group } k \\ \bar{X} &= \text{Overall mean of all groups} \\ X_{ik} &= \text{Individual observation from group } k \end{aligned}$$

(ii) T-tests: : Using hypothesis testing, a t-test (known as student's t-test) is a method for assessing the means of one or two populations. A t-test can be used to determine if two groups differ from one another (an independent two-sample t-test), whether a single group deviates from a known value (a one-sample t-test), or whether paired measures differ significantly (a paired, or dependent samples t-test). It makes it possible to evaluate disparities in gaming time and mental health by comparing two groups (for example, male and female students or students with and without scholarships). [27]

The formula for the independent t-test is:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where:

$$\begin{aligned} \bar{X}_1, \bar{X}_2 &= \text{the sample means} \\ s_1^2, s_2^2 &= \text{the sample variances} \\ n_1, n_2 &= \text{the sample sizes of the two groups} \end{aligned}$$

2.1.4 SmartPLS- Partial Least Squares Structural Equation Modeling

SmartPLS is used to analyze complicated interactions between variables that may be difficult to capture using classic approaches such as ANOVA or t-tests.[12] It enables Structural Equation Modeling (SEM) to investigate the interactions between latent variables that are not readily visible. SmartPLS helps to validate hypotheses by:
(i) Measurement Model: It confirms if the observed data reliably represent the underlying latent variables using metrics like Composite Reliability (CR) and Average Variance Extracted (AVE).[23]

The formulas for these metrics are as follows:

$$\text{Composite Reliability (CR)} = \frac{(\sum_{i=1}^{n} \lambda_i)^2}{(\sum_{i=1}^{n} \lambda_i)^2 + \sum_{i=1}^{n} \epsilon_i}$$
$$\text{Average Variance Extracted (AVE)} = \frac{\sum_{i=1}^{n} \lambda_i^2}{\sum_{i=1}^{n} \lambda_i^2 + \sum_{i=1}^{n} \epsilon_i}$$

where:

$$\lambda_i = \text{the factor loading of the } i^{th} \text{ item}$$
$$\epsilon_i = \text{the error variance of the } i^{th} \text{ item}$$
$$n = \text{the total number of items}$$

(ii) Structural Model: A structural model assesses the links between latent variables by calculating direct and indirect effects via route coefficients. It assesses direct and indirect effects between variables using route coefficients and bootstrapping to determine significance.

The structural model can be represented by the following equations:

$$\eta_1 = \beta_{11}\xi_1 + \beta_{12}\xi_2 + \epsilon_1$$
$$\eta_2 = \beta_{21}\xi_1 + \beta_{22}\xi_2 + \epsilon_2$$

where:

$$\eta_j = \text{Endogenous latent variable}$$
$$\xi_i = \text{Exogenous latent variable}$$
$$\beta_{ij} = \text{Path coefficient from } \xi_i \text{ to } \eta_j$$
$$\epsilon_j = \text{Error term for endogenous variable } \eta_j$$

SmartPLS also supports the usage of the PLS Algorithm, which estimates model parameters, and Bootstrapping for significance testing.[22] SmartPLS will also provide

tools such as R-squared values to help explain the variation in our scale variables (including mental health, cgpa, social interaction, and stress). This method is perfect for evaluating complicated, interdependent interactions in data, giving deeper insights into how variables such as gaming time and academic performance interact in students' lives.

2.2 Related Works

Abu et al. (2021) attempted to find the relationship between mental health and online gaming addiction using a survey of 404 university students in Bangladesh. Students who were engaged in gaming for extended periods were found to have an elevated possibility of psychological distress as they showed 1.7 times more likelihood of PIU than those who did not and those with PIU are reported to have 2.7 times more likely to suffer from severe psychological distress. The paper calls for the urgent need for target intervention of students who engage in heavy gaming to reduce negative psychological consequences. [17]

The goal of this paper is to dive in to gather more about the structure of IGD which is abbreviation for Internet Gaming Disorder and also the affiliated childhood trauma,depression,anxiety among college student.This study standardized assessment for adolescent trauma ,depression,anxiety and IGD.The model used here to analyze the mediation effects of anxiety and depression between childhood trauma and gaming behavior was Structural equation modeling(SEM).again the Generalized Anxiety Disorder-7 (GAD-7) scale has been mentioned to use to assess anxiety symptoms.Another method called the Quick Inventory of Depressive Symptomatology-Self Report (QIDS-SR) has also been mentioned to use to scale depressive behaviours.The key result of this paper points out the total effect of childhood trauma on internet gaming which is 0.18 while along with direct effects on adolescence trauma on internet gaming is 0.11 and specify the effect which is 0.02 in the pathway of childhood-trauma-depression-internet gaming.Again in the childhood-anxiety-internet gaming pathway it is 0.05.The study observed the correlation of anxiety and depression is quiet significant. [9]

Zohurul et al. (2021) analyzed the impact of gaming addiction on the sleep quality of 400 university students aged 18-26 in Bangladesh. The results showed 54% of students have been classified as PIU of which a large portion are engaged in gaming for extended periods. This data marked gaming as a major contributor to PIU. The findings also include students who played games are 28% less likely to have good sleep compared to those who did not. The research asks for controlled intervention in gaming addiction to ensure sleep hygiene among university students. [16]

Soo et. al looked into the association of Internet gaming disorder and various factors such as gaming avatar, motivation, and immersion based on a survey of Malaysian Multiplayer Online Battle Arena (MOBA) gamers aged between 18 and 29. By analyzing 1175 responses using SmartPls version 3.0 and other tools, immersion motivation stood out as the strongest predictor of IGD with a beta value of 0.366 followed by avatar identification (= 0.366) while socialization motivation (= -

0.273) played a protective factor. Over 45% of the variance in IGD can be explained by these motivational and identificational factors. Players with hyper attachment to avatars often struggle with distinguishing between real and virtual life increasing their risk of poor mental health consequences such as impulsivity, depression and anxiety. The study stresses the need for target interventions to reduce avatar attachment, foster emotional regulation and develop real-world coping mechanisms among vulnerable youth population.[12]

This study deals with the addiction of online games that are based on battle or Multiple Online Battle Arena(MOBA).In this study the authors have emphasized on behavioral,emotional and cognitive influences regarding these addiction of games.The theories that has been used here are firstly Leisure Theory,secondly Usage and Gratification Theory and finally Emotional Design Theory[22].After using these theories the key finding was that various human capabilities like visual and auditory stimuli,behavioural pattern and reflective processes specifically related to games are influenced by the addition.Furthermore the study push forwards to understand more about MOBA addiction by enhancing both emotional and cognitive frameworks that welcomes insights into building preventive mechanism.However some limitations have been found for instance,exclusivity of negative emotion impacts and relying on data that are self-reported which suggest ways for further research in future.[24]

The latest research works emphasizing on the fact that the concern of Internet Gaming Disorder (IGD) is taking a hike day by day .This concern is more specifically about young adolescence and students .The world Health Organization(WHO) defines that overindulgence in gaming impairs daily functional abilities .And this trait is more visible to male students than female.Studies have observed that young adults with IGD seldom face hardship keeping up with academic pressure and success.Gender differences also distinguish some facts in IDG as male genuinely exhibits to be way more motivated towards gaming than females and more competitive in this sector as well.The existing literature highlights the needs for enmarking interventions to eliminate the inauspicious effects on IGD on education and mental health and recommends parents to be more conscious and promote well balanced use of internet for their children.[22]

Mohammed et al. (2019) inspected the prevalence and causes of Problematic Internet Use (PIU) among university students in Bangladesh. Online gaming is an important component of PIU. The paper used a survey of 405 students. Using the Internet addiction test(IAT), 32.6% students showed signs of PIU with a higher prevalence in males. The paper discovered a correlation between PIU and mental health issues which demonstrates that 70.5% and 40.2% exhibited depressive symptoms and stress respectively. The authors highlighted the importance of mental health support and counseling to address PIU-related psychological issues. [5]

The goal of this cross section study was to illustrate the extensiveness of video game disorder(VGD) among juvenile students specifically undergraduate students and identify the relative predictors and asses the effect on their mental health.The approach that has been taken in this study is that a convenience sample of 2364 students were taken who were egyptian undergrads and were from Menoufia Uni-

versity.Data collected through closed-ended questions by online has been used .The questions included socio demographic data,gaming activity (using the Internet Gaming Disorder-20 (IGD-20) questionnaire), and mental health (using the Mental Health-5 (MH-5) questionnaire)(Raouf,2022).This study discovered a video game disorder(VGD)prevalence of 18.91%.The prime predictors of VGD included gender being male,living in city or town,longer gaming duration,shorter sleep duration and higher body mass index.On the contrary inferior socioeconomic status was a protective factor.A strong negative correlation had been observed between VGD and mental health .These games that came up were often violent and action games while the key motivation for the gamers were relaxation.[9]

Sahab et al. (2016) examined the impact of internet addiction on the psychological well-being of university students in Bangladesh using a survey of 475 students from five universities. Extended hours of gaming happened to be one of the leading causes of internet addiction. Using IAT, GHQ-12, BDI-2 tests, the study revealed 47.7% of male and 44.5% of female students reported severe internet addiction while 29.7% of males and 32.5% of females exhibited severe psychological distress along with severe depression in 44.7% of males and 41.6% of females. The study appeared to have found a great link between gaming addiction and mental distress.[3]

In this study,the impact of internet gaming along with social media usage had been calculated based on the habits like physical activity,sleep cycle,quality of life(QoL),performance in the university etc were considered.The test subjects of this study were students from Hong Kong.

Here 15 students with average age 26.87 years were observed where longitudinal design was used and this observation was done over a 3 month of period of time.During this period their activity,sleep,screen time had been observed .Additionally questionnaires and GPA data were accumulated to assess psychological,physical and academic influences.The result of this study portrayed negative correlation between internet gaming and physical activity which was $rs = -0.62$,sleep quality $rs = -0.52$ and psychological QoL $rs = -0.49$.The findings of this study implies that excessive gaming and social media use might affect students well-being underlining the necessity of balanced digital habit.[15]

Courtney et al. (2020) aim to find the correlation and causes of computer gaming and mental health based on a survey of over 43000 students. The findings showed students with gaming addiction were 2 times more likely to feel hopelessness and more than 2 times more likely to suffer from exhaustion or sadness (71.1% and 82.5% respectively) Students with problematic gaming addiction tend to have a higher rate of overwhelming anxiety and self-harm (1.96 times and 1.5 times respectively). The study emphasizes the importance of tailored programs to bring down the impact of computer gaming addiction.[10]

This study explores Internet Gaming Disorder (IGD) among male undergraduate students in Nanchong,China.athis study emphasizes on IGD's prevalence,risk factors and protective factors.Here as sample ,report of 2533 students has been used to do the cross-section survey reporting IGD symptoms ,depressive symptoms and

peer support or pressure.Reserchers examined IGD based on DSM-5 criteria with an 11.6% prevalence of IGD symptoms founded in the sample reports.The key findings of this paper is it illustrates the depressive symptoms taking a hike indicating IGD when strong peer support reduce the risk.Precisely students having moderate depressive symptoms possessed 2.7 times higher odds of IGD and those with comparatively more depressive symptoms had 4.8 times higher odds.On the other hand students with higher family peer support had 58% chance to not be affected with IGD symptoms(Liu,2022).This study highlights that proper peer support can be extremely helpful to be immune to these kinds of symptoms. [20]

Yoonhe Sung et al. (2020) analyzed the influence of internet gaming addiction on the Psychological well-being of students, especially those with insecure attachment styles. Based on a survey of 337 Korean university students, 29.4% of students classified with internet gaming addiction with more prevalence in males compared to females. Students with attachment style anxiety are more inclined towards developing severe internet gaming addiction (25%) This results in elevated feelings of anxiety (54.2%) and depression (47.3%) suggesting a very strong correlation between problematic gaming behavior and negative psychological consequences. The paper stresses the need for emotional regulation and mental health support to alleviate the psychological impact of gaming addiction.[11]

The goal of this paper was to make an assessment based on the pooled prevalence rates of both the internet and the gaming addiction that comes along with it.And this assessment was subjected on Asia,more specifically South-east part of this continent.This analysis had been based on on the meta-analytic review of epi demographic research that had been conducted in the specific region through meta-analysis.The key finding of this paper is that the pooled prevalence rate in the above mentioned region which is 20% in internet addiction and 10.1% in the field of gaming addiction..The methods that have been used here are comprehensive search strategy across multiple databases ,compliances to PRISMA guideline for selecting studies,data extraction to convert into standardized spreadsheets and statistical analysis use random-effect model along with statistical analysis for meta-analysis.[6]

Concetta et al. (2020) classified 5.3% of participants with Internet Gaming Disorder (IGD) based on DM-5 criteria utilizing a survey of 566 Italian young adults aged 18-35. People diagnosed with IGD exhibited increased levels of mental health issues such as depression, anxiety, and psychoticism (50%,36% and 43% respectively) They are also related to poor social adaptation and relationships (38%).[7]

In this paper Ferguson and co authors (2011) presented meta-analysis of pathological gaming prevalence .This meta-analysis explores the prevalence and impact of pathological gaming,connecting dots with mental health along with academic and social problems.After analyzing 33 studies the the study discloses how different measurement methods affect reported prevalence rates.furthermore studies applying "pathological gambling" model report a higher prevalence rate which is about 8.9%.Conversely other approaches that stresses the disruptive gaming on daily life results a lower estimate of only 3.1%.This study saw that pathological gaming has a little to moderate association with mental issue (r = 0.19),academic problems (r

= 0.12), and social issues (r = 0.25).Result implies that measuring gaming based interference provide a more accurate prevalence rather than gambling like criteria .The authors also recommend to emphasize on behavior that might dispute daily life coming out of gaming disorder. [1]

Tahani et al. (2020) investigated the impact of online gaming on mental health, especially depression, anxiety,sleep disorder based on a survey of 457 first-year undergraduate students using (IGDS9-SF), (GAD-7), (PHQ-9) and (PSQI). The findings revealed major gender differences as female students are prone to anxiety and depression compared to male students. The results showed a direct correlation between gaming addiction and depression, anxiety and poor sleep quality. The study demands increased mental health support during the critical freshman year of undergraduate students to deal with the adverse effects of gaming addiction.[19]

The goal of this study was to explore how Internet Gaming Disorder(IGD) affects young adolescents and young adults over time.Here a longitudinal approach has been explored where the sample was the data of 1054 first year university students and they were assessed at three points across a year.The result of this study points out that IGD negatively impacted all three well-being indicators.However these factors did not predict IGD developments.IGD was affiliated with symptoms like lower self-esteem,lesser social support and decline of life satisfaction over time .Arguably these effects were more prominent among male participants.[13]

Abrar et al. (2021) explored the effect of mobile game addiction on the mental health of students using a cross-sectional survey of 1125 students from three universities in Bangladesh. The findings reveal that 54.3% of students were severely addicted, with males showing a higher prevalence than females(15.4% vs 11%) Students who were playing for more than 4 hours had an addiction rate 7 times higher than those who played less than 2 hours daily (58.9% vs 8%) Student were found using games as coping mechanism to get away from real-world challenges and distress which lead various psychological issues such as depression, anxiety, loneliness, isolation. [18]

The paper analyzed the effect of gamification on the motivation and educational circumstances or performance in academics of university students.This study emphasized on those students who were under training to become physical education teachers in the coming days.The study had the goal to assess if gamification can expand and enhance student motivation and academic performance.This study used quasi-experimental design along with non-equivalent control group in order to evaluate the effect of gamification on motivation and academic performance.Participents had two diversions where one was gamified experimental group and the other was control group.The key result of this paper shows that although gamification brought positive impact on academic performance but does not enhance natural motivation.The experimental group that had gone through gamification had portrayed a hike in external regulation and achieved better academic performance than the control group. [8]

Azharul et al. (2016) explored the association of Problematic gaming addiction with Psychological distress among 573 students of the University of Dhaka. Gaming was

one of the primary factors of PIU along with social media. 48.6% of students seem to have PIU with 22.4% diagnosed as severely addicted. Students who were heavily engaged in gaming demonstrated elevated psychological issues as 30.2 % showed psychological distress and 16.5% classified as severe depression. [2]

This study is about the assessment on the relationship between Gaming Disorder (IGD) and dissociative experiences.This assessment has been performed on 221 Italian undergraduate students where the age range was 18-25 .Using the IGD scale short form and dissociative experience questions had been asked in order to scrutiny the the symptoms like passive influence and depersonalization.The outcome implied that 14.9% of students had the clinical threshold for IGD and in this arena a notable saturation of male students had been identified.Furthermore 84.61% displayed a high risk of IGD.The outcomes illustrated strong connections between IGD risk and dissociative symptoms,for instance feeling of detachment with correlation such as r0.311 for depersonalization.This implies that person with more risk for IGD also experience more dissociative symptoms.This contributes to the theory that IGD might reduce one's point of view towards reality. [4]

Chapter 3

Methodology

3.1 Dataset Description

In this work, we generated our dataset by administering a survey questionnaire with 28 questions. We used four Likert scales and several additional questions.[19] The poll included 588 participants from Bangladesh's private universities. The survey responses examine the effects of stress on gaming, well-being, and personal satisfaction, with an emphasis on prolonged gaming hours, gaming stress, and life satisfaction. The gender breakdown consists of 485 male students (82.3%) and 104 female students (17.7%). To guarantee that the study's findings were representative of the total population, we determined the requisite sample size using the Krejcie and Morgan formula. Given a population of 1,233,529 (Bangladesh Education Statistics 2022) , a 95% confidence level, and a 0.5 standard deviation. [14]

Survey Questionnaire

Section 0: Student's Basic Information

Which university are you from?

- BRAC University
- Other (Enter your university name)

Gender

- Male
- Female

Age

- 18-27

Section 1: Gaming Habits

Do you prefer playing online or offline games?

- Online

- Offline
- Both

How many days per week do you play games?

- 1-2 days
- 3-4 days
- 5-6 days
- Everyday

What is your average daily gaming time?

- 1-2 hours
- 3-4 hours
- 5-6 hours
- 5+ hours

How much time do you spend gaming on weekends?

- 1-2 hours
- 3-4 hours
- 5-6 hours
- 5+ hours

What is your typical sleep time on weekdays when gaming?

- Less then 4 hours
- 4-6 hours
- 7-8 hours
- More than 8 hours

Section 2: Mental Stress Level and Social Connection

How stressed do you feel during gaming sessions? : 1 (Not stressed), 2, 3, 4, 5 (very Stressed).

How stressed do you feel when you cannot play games? : 1 (Not stressed), 2, 3, 4, 5 (very Stressed).

What is your level of social interaction?

- Very High

- High
- Moderate
- Low
- Very Low

What is your current CGPA?

- Below 2.5
- 2.5 - 3.0
- 3.1 - 3.5
- Above 3.5

Section 3: Feeling Check-In and Personal Satisfaction

I feel anxious about my gaming habits.
(1 = Strongly Disagree, 5 = Strongly Agree)

How much difficulty do you experience sleeping due to gaming-related concerns?
(1 = Strongly Disagree, 5 = Strongly Agree)

I am irritable because of my gaming habits.
(1 = Strongly Disagree, 5 = Strongly Agree)

My muscles feel tense due to worries about my gaming habits.
(1 = Strongly Disagree, 5 = Strongly Agree)

I feel fatigued or sick because of worries about my gaming habits.
(1 = Strongly Disagree, 5 = Strongly Agree)

How often have you felt the following emotions in the past few days?
(Afraid, Distressed, Nervous, Scared, Upset,)
(Rarely, Occasionally, Sometimes, Frequently, Very Often)

On a scale of 1 to 5, how strongly do you agree with the following statements? (1 = Strongly Disagree, 2, 3, 4, 5 = Strongly Agree)

3.2 Outlier Removal

Outlier data point's value can be extremely high or low compared to other observations in the dataset, which stands out significantly from the rest of the dataset. Measurement of errors, natural variation in the data or unexpected discoveries can

cause outliers. Depending on the research problem that is solved and the nature of the outliers, to solve the outlier issues, several methods can be solved. To keep the dataset robust and maintain accurate analysis, this research uses Interquartile Range (IQR) to detect and address outliers [17]. The method of IQR to identify the outliers is : measuring spread of the middle 50% of the data. The difference between the third quartile (Q3) and the first quartile (Q1) is IQR and we calculate that first.

$$IQR = Q_3 - Q_1$$

An outlier is defined as any data point that falls outside the range of:

$$\text{Lower Bound} = Q_1 - 1.5 \times IQR$$
$$\text{Upper Bound} = Q_3 + 1.5 \times IQR$$

3.2.1 Data normalization and encoding

In order to get proper consistency in the scoring systems and interpretation of all scales used in the dataset, we normalized the data set using label encoding and ordinal encoding. For data such as "Gender" we used label encoding as it is categorical data. We encoded male to 1 and female to 2. On the contrary, we used ordinal encoding for ordinal data. Some ordinal data was encoded like this : low means 1, medium means 2, medium high means 3 and high means 4. Some ordinal encoding in the dataset was started with 0 and some ending ended with 7 depending on the levels that were set in the ordinal values.

Lebel Encoding The only categorical data type present in the dataset is "Gender". Categorical data are encoded to label type. Here, for male, it was encoded to 1 and for females, encoded to 2.

Ordinal Encoding
For normalizing data that are ordinal type, we used ordinal encoding. For instance, from the dataset, cgpa, days_played, time_spent etc are encoded depending on their ordinal values such as very low is encoded to 1, low is encoded to 2, normal is encoded to 3 and high is encoded to 4. Some column's encoding started from 1 and ended at 7 such as satisfaction_life, important_things etc.

3.3 Scale Standardization

In order to get proper consistency in the scoring systems and interpretation of all scales used in the dataset, scale standardization was used. Using Standardized score index (SSI), the comparisons were made simpler by normalizing the score to a 100 point scale. This process transformed the raw scores into scale (0% means lowest,

100% means highest), which retained uniformity. Additional categories were used such as : 0-20% means low, 20-40% means moderate low, 40-60% means moderate, 60-80% means moderate high, 80-100% means high. Standardization helped with efficient comparison that helped with better accuracy with hypothesis testings. We used label encoding and ordinal encoding. For data such as "Gender" we used label encoding as it is categorical data. We encoded male to 1 and female to 2. On the contrary, we used ordinal encoding for ordinal data. Some ordinal data was encoded like this : low means 1, medium means 2, medium high means 3 and high means 4. Some ordinal encoding in the dataset was started with 0 and some ending.

3.4 SSI- The Standardized Score Index

Standardized score index (SSI) is used to normalize the CGPA of students.[14] The first approach was to find minimum and maximum values of CGPA and converting the scores into 100 point range we used this formula :

$$SSI = 100 \times \frac{\text{max\_score} - \text{min\_score}}{\text{sum\_score} - \text{min\_score}}$$

3.5 Methodology Diagram

The methodology diagram is to represent the whole process into a visual representation for better understanding the whole research done. This visual illustration represents the research done where all the stages are present : online survey, data pre preprocessing (including outlier removal and data encoding and normalization). In the diagram, all the tests that took place are also visually shown : SPSS (ANOVA test, Independent Samples T test) and for finding structural equation modeling which leads to findings and interpretation phase done by using SmartPLS 4.

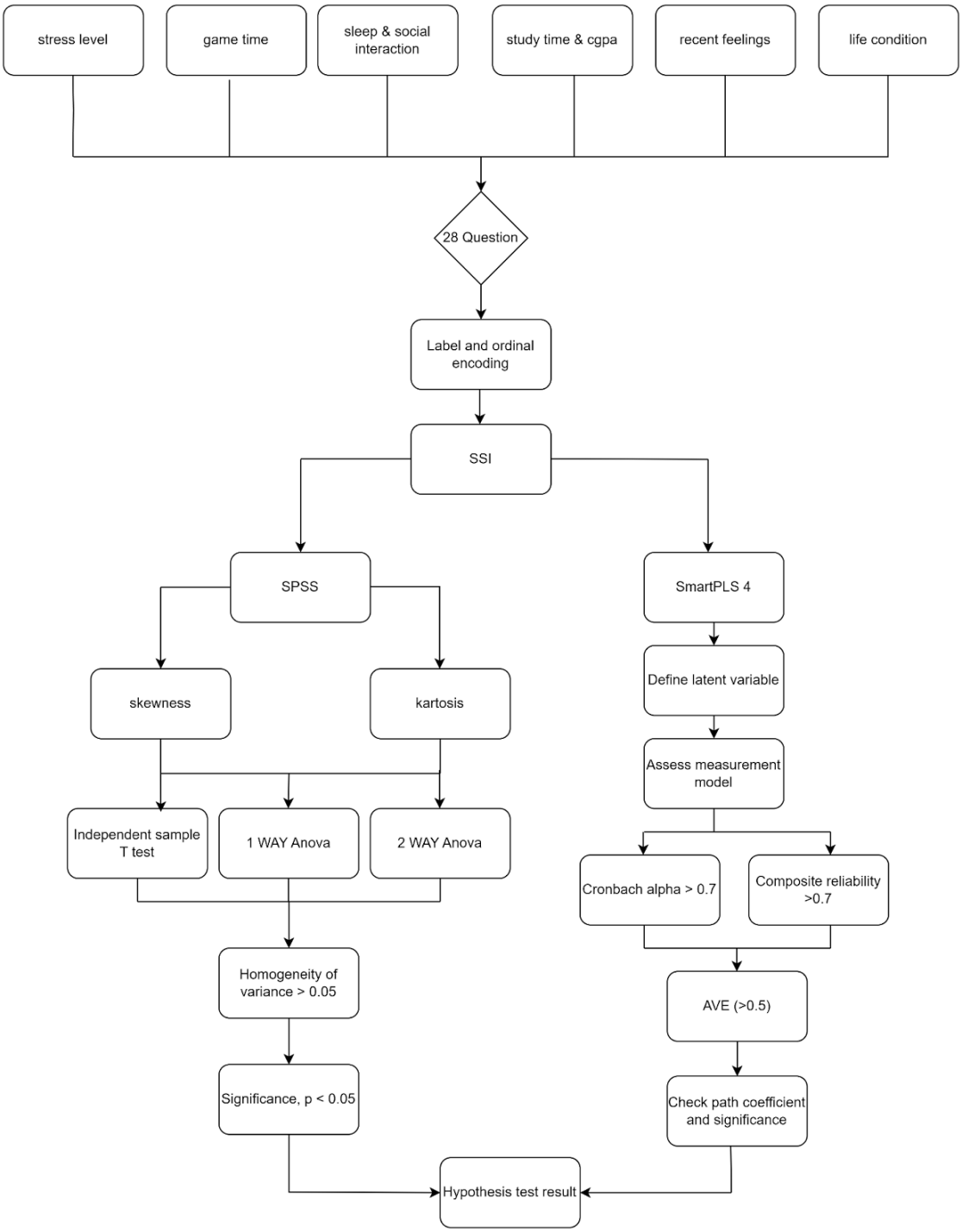

Figure 3.1: Methodology Diagram

Chapter 4

Statistical Analysis

4.1 SPSS Analysis

In this study, we employed two widely recognized SPSS techniques, Kurtosis and Skewness, to validate our dataset:

- **Kurtosis:** This metric evaluates the "peakedness" or "tailedness" of a distribution in relation to a normal distribution. The kurtosis values in our analysis fall within the accepted range of -2 to +2, indicating that the data aligns with the properties of a normal distribution.
- **Skewness:** This metric assesses the asymmetry of a distribution, determining whether it is symmetrical or skewed. Our skewness values are within the range of -2 to +2, confirming that the data meets the assumptions necessary for conducting valid statistical tests.[12]

These results confirm the validity of our data and support the robustness of the statistical methods used in evaluating the impact of gaming addiction on CGPA and mental health outcomes among Bangladeshi undergraduate students.

4.1.1 One-way ANOVA Test

The one-way ANOVA test was used to evaluate the following hypotheses:

Hypothesis 1

- **Null Hypothesis (H_0):** There is no difference in the assessment of Average daily time spent on gaming /CGPA among respondents.
- **Alternate Hypothesis (H_1):** There is a difference in the assessment of Average daily time spent on gaming /CGPA among respondents.

Table 4.1: ANOVA Results for Average Daily Time Spent on Gaming/CGPA

Source	**Levene Statistic**	**F**	**df1**	**df2**	**Sig. (Homogeneity of variance)**	**Sum of Squares**	**Mean Square**	**Sig. (ANOVA)**
Average daily time spent on gaming/CGPA	26.135	200.992	3	583	**.302**	159.651	53.217	**.000**
Based on Median	5.418		3	583	**.076**			
Based on Trimmed Mean	17.614		3	583	**.036**			

Result Description: The results of the hypothesis test show a statistically significant difference in CGPA based on the average daily time spent on gaming. The ANOVA result (F = 200.992, Sig. = .000) indicates that the time spent gaming significantly impacts students' academic performance, leading to the rejection of the null hypothesis. The Levene's test for homogeneity of variances (Sig. = .302) shows that variances across the groups are equal, which not violates the assumption of homogeneity of variances. Despite this, the significant ANOVA result suggests a meaningful relationship.

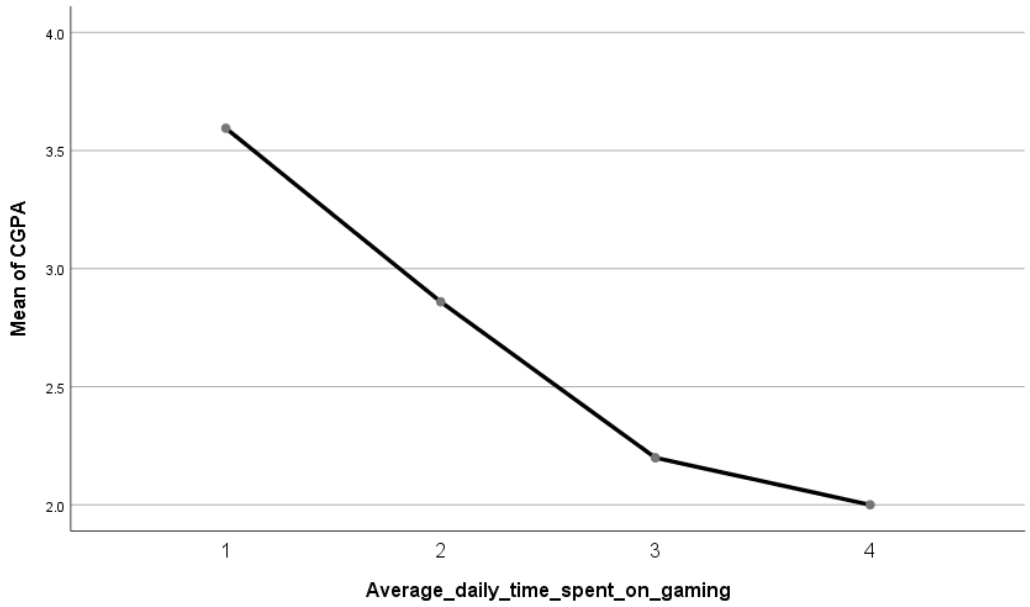

Figure 4.1: Effect of avg gaming time on academic CGPA.

Graph Description: The graph shows how the average daily time spent on gaming impacts students' academic performance as measured by CGPA. The gaming time increases moving to the right side of the x-axis, and the mean CGPA is displayed on the y-axis. Here, as gaming time increases (moving from category 1 to category 4 on the x-axis), the mean CGPA steadily declines. Students who spend less time gaming (category 1) achieve the highest CGPA, close to 4.0. Conversely, those who spend the most time gaming (category 4) experience a significant drop in CGPA, averaging near 2.0.

Hypothesis 2

- **Null Hypothesis (H_0):** Stress levels during gaming sessions have no significant effect on CGPA.
- **Alternate Hypothesis (H_1):** There is a different stress levels during gaming sessions significantly affect CGPA.

Table 4.2: ANOVA Results for Stress Level During Gaming Sessions/CGPA

Source	**Levene Statistic**	**F**	**df1**	**df2**	**Sig. (Homogeneity of variance)**	**Sum of Squares**	**Mean Square**	**Sig. (ANOVA)**
Stress level during gaming session/CGPA	55.025	56.977	3	583	**.291**	170.930	56.977	**.000**
Based on Median	31.242		3	583	**.278**			
Based on Trimmed Mean	62.093		3	583	**.302**			

Result Description: : The results of the hypothesis test show a statistically significant difference in the stress level during gaming sessions across CGPA groups. The ANOVA result (Sig. < 0.001) is highly significant, allowing us to reject the null hypothesis and accept the alternative hypothesis that stress levels during gaming sessions differ significantly depending on CGPA. The Levene's test (Sig. $= .291$) indicates a violation of the assumption of equal variances across groups. This suggests variability in stress levels is consistent across CGPA categories.

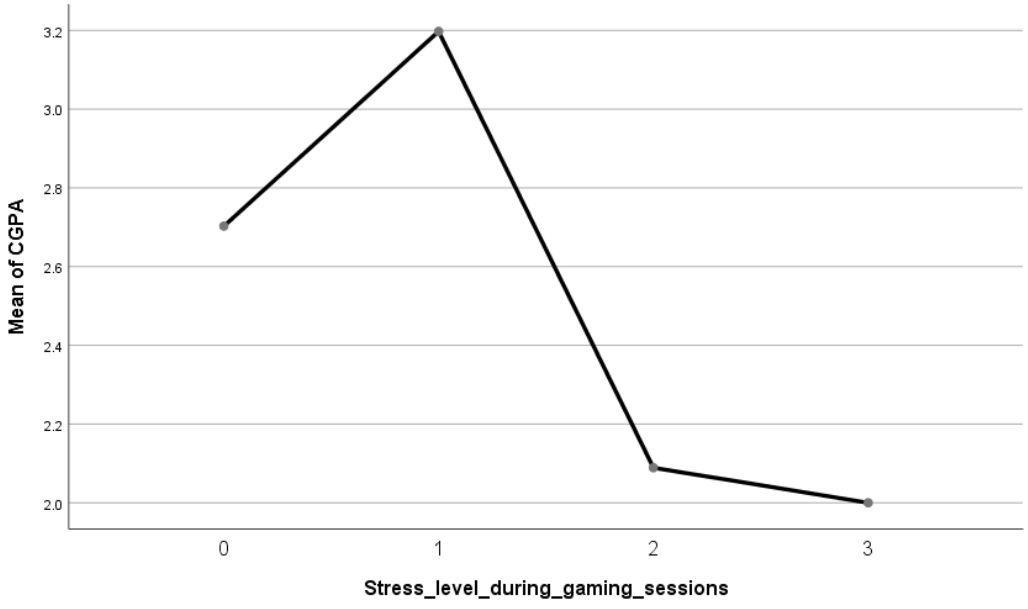

Figure 4.2: Effect of stress level during gaming session on academic CGPA.

Graph Description: The graph illustrates the relationship between stress levels during gaming sessions (x-axis) and the mean CGPA (y-axis). Higher values on the y-axis represent better academic performance, while the x-axis reflects increasing

stress levels during gaming sessions, ranging from 0 to 3. At stress level 0, the CGPA begins at a moderate level, indicating relatively balanced academic performance. As the stress level increases to 1, the mean CGPA reaches its peak, suggesting that a low-to-moderate level of stress during gaming sessions might correlate with improved academic performance. However, as stress levels rise further to 2 and 3, the CGPA declines sharply, reflecting a significant drop in academic performance.

4.1.2 Two-way ANOVA Test

The two-way ANOVA test was performed to examine the interaction between multiple factors, testing the following hypotheses:

Hypothesis 1

- **Null Hypothesis (H_0):** There is no significant effect of Gender, Time spend gaming on weekends, or their interaction on students' CGPA.
- **Alternate Hypothesis (H_1):** There is a significant effect of Gender Time spend gaming on weekends, or their interaction on students' CGPA.

Source	**F**	**Sig.**
Levene's Test		
Based on Mean		0.000
Based on Median		0.000
Between-Subjects Effects		
Gender	8.781	0.003
Time spent gaming on weekends	29.396	0.000
Gender * Time spent gaming on weekends	2.438	9.185

Table 4.3: ANOVA Results: Effects of Gender and Time spent gaming on weekends.

Result Description: From the table, Gender ($F = 8.781$, $p = 0.003$) gives a significant score to reject the null hypothesis. This means that gender has a significant impact on students' CGPA. Similarly, Time Spent Gaming on Weekends ($F = 29.396$, $p < 0.000$) also shows a significant effect, ensuring that this factor greatly influences CGPA. However, the interaction between Gender and Time Spent Gaming on Weekends ($F = 2.438$, $p = 9.185$) is not significant, indicating no combined effect of these variables on CGPA. Therefore, our null hypothesis is partially rejected, as gender and time spent gaming independently have significant effects, but their interaction does not.

Hypothesis 2

- **Null Hypothesis (H_0):** There is no significant effect of felt upset, Fatigued or sick due to worry about gaming, or their interaction on students' CGPA.
- **Alternate Hypothesis (H_1):** There is significant effect of felt upset, Fatigued or sick due to worry about gaming, or their interaction on students' CGPA.

Source	F	Sig.
Levene's Test		
Based on Mean		0.000
Based on Median		0.000
Between-Subjects Effects		
Felt upset in few days	4.407	0.002
Fatigued or sick due to worry about gaming	3.956	0.004
Felt upset in few days * Fatigued or sick due to worry about gaming	18.210	0.000

Table 4.4: ANOVA Results: Effects of feeling upset and fatigue due to worry about gaming.

Result Description: The null hypothesis is rejected. Feeling upset in a few days ($F = 4.407$, $p = 0.002$) and being fatigued or sick due to worry about gaming ($F = 3.956$, $p = 0.004$) significantly affect the outcome. Additionally, their interaction ($F = 18.210$, $p = 0.000$) has a highly significant combined effect, indicating that these factors together amplify the overall impact.

4.1.3 Independent Sample T-test

The independent sample t-test was employed to compare the means between gender groups, testing the following hypotheses:

Hypothesis 1

- **Null Hypothesis (H_0):** There is no significant difference in the CGPA condition between the two gender groups.
- **Alternate Hypothesis (H_1):** There is significant difference in the CGPA condition between the two gender groups.

Source	N	Mean	Std. Deviation	Mean Difference	t	df	Sig. (2-tailed)	95% CI (Lower-Upper)
Gender 1 (Male)	483	2.75	0.740	0.226	2.875	585	0.004	0.072 - 0.372
Gender 2 (Female)	104	2.52	0.668	0.226	3.070	-	0.003	0.081 - 0.372

Table 4.5: T-test results comparing Gender 1 and Gender 2.

Result Description: Since the p-value is less than 0.05 for both gender groups (Sig. 2-tailed = 0.004 and 0.003, respectively), there is a statistically significant difference in CGPA between male and female students. The 95% confidence interval for the mean difference does not include 0, further confirming this significance. This result suggests that gender has a measurable impact on CGPA, with males having

a higher mean CGPA compared to females.

Hypothesis 2

- **Null Hypothesis (H_0):** There is no significant difference in social interaction with Gaming caused issues in relationships with friends or family between the two gender groups.
- **Alternate Hypothesis (H_1):** There is significant difference in social interaction with Gaming caused issues in relationships with friends or family between the two gender groups.

Source	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t**	**df**	**Sig. (2-tailed)**	**95% CI (Lower - Upper)**	
Gender 1 (Male)	483	1.90	0.762	-0.836	-9.725	585	0.000	-1.004 - -0.667	
Gender 2 (Female)	104	2.74	0.935	-0.836	-8.528	133.972	0.000	-1.004 - -642	

Table 4.6: T-test results comparing Gender 1 and Gender 2 for the first variable.

Source	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t**	**df**	**Sig. (2-tailed)**	**95% CI (Lower - Upper)**	
Gender 1 (Male)	483	0.64	0.677	-0.070	-0.922	585	0.357	-0.218 - 0.079	
Gender 2 (Female)	104	0.71	0.797	-0.070	-0.30	136.848	0.408	-.236-0.96	

Table 4.7: T-test results comparing Gender 1 and Gender 2 for the second variable.

Result Description: The results show a significant gender difference in gaming-related social interaction issues with friends or family, as females (M=2.74) reported more issues than males (M=1.90) with (p=0.000). However, no significant gender difference was found in another aspect of social interaction issues ($p>0.05$). This highlights that gender impacts some but not all dimensions of gaming-related social challenges.

4.2 SmartPLS Analysis

4.2.1 Testing for Convergent Validity

To test for convergent validity in your model, ensure that all indicators for each latent variable (LV) have significant standardized factor loadings, ideally 0.70. Calculate the Average Variance Extracted (AVE) for each LV, which should be 0.50 to confirm that the construct explains more variance in its indicators than error. Additionally, compute the Composite Reliability (CR) to measure internal consistency, which should be 0.70. Together, significant loadings, an AVE of at least 0.50, and a CR of 0.70 or higher demonstrate that the indicators converge to represent the intended construct effectively.[24] [23]

4.2.2 Testing for Discriminant Validity

Using Heterotrait-Monotrait (HTMT) and Fornell-Lacker criterion, discriminant validity was tested. Comparing correlation with other constructs, the square root of AVE for each construct should be greater according to the Fornell-Lacker criterion. The requirement is fulfilled for all the constructs in the model. The constructs are distinct from each other as the HTMT ratio is below 0.85, and HTMT the suggested HTMT threshold value is 0.85. If the HTMT value was greater than threshold value, then it could be declared that the construct has discriminant validity, however, all the values are below the threshold.[23] [12]

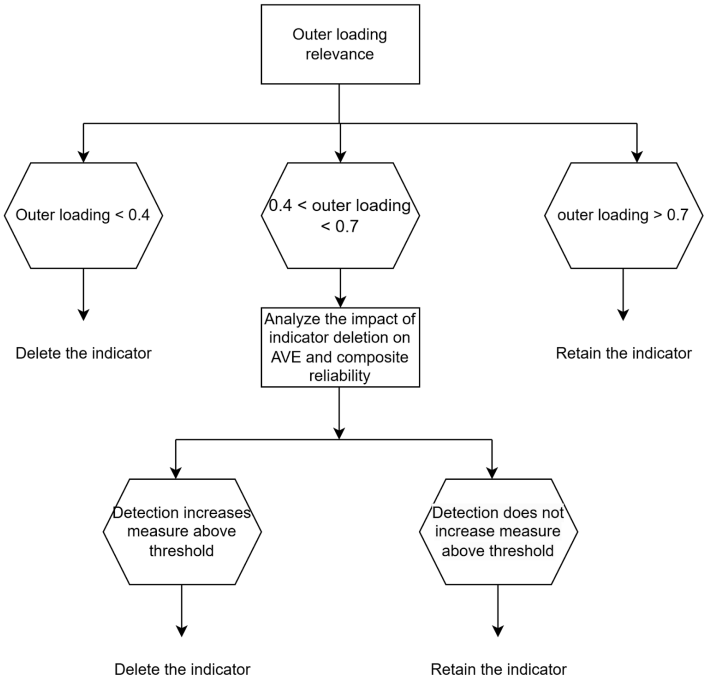

Figure 4.3: Convergent Discriminant validity testing algorithm

4.2.3 Structural Equation Modeling (SEM)

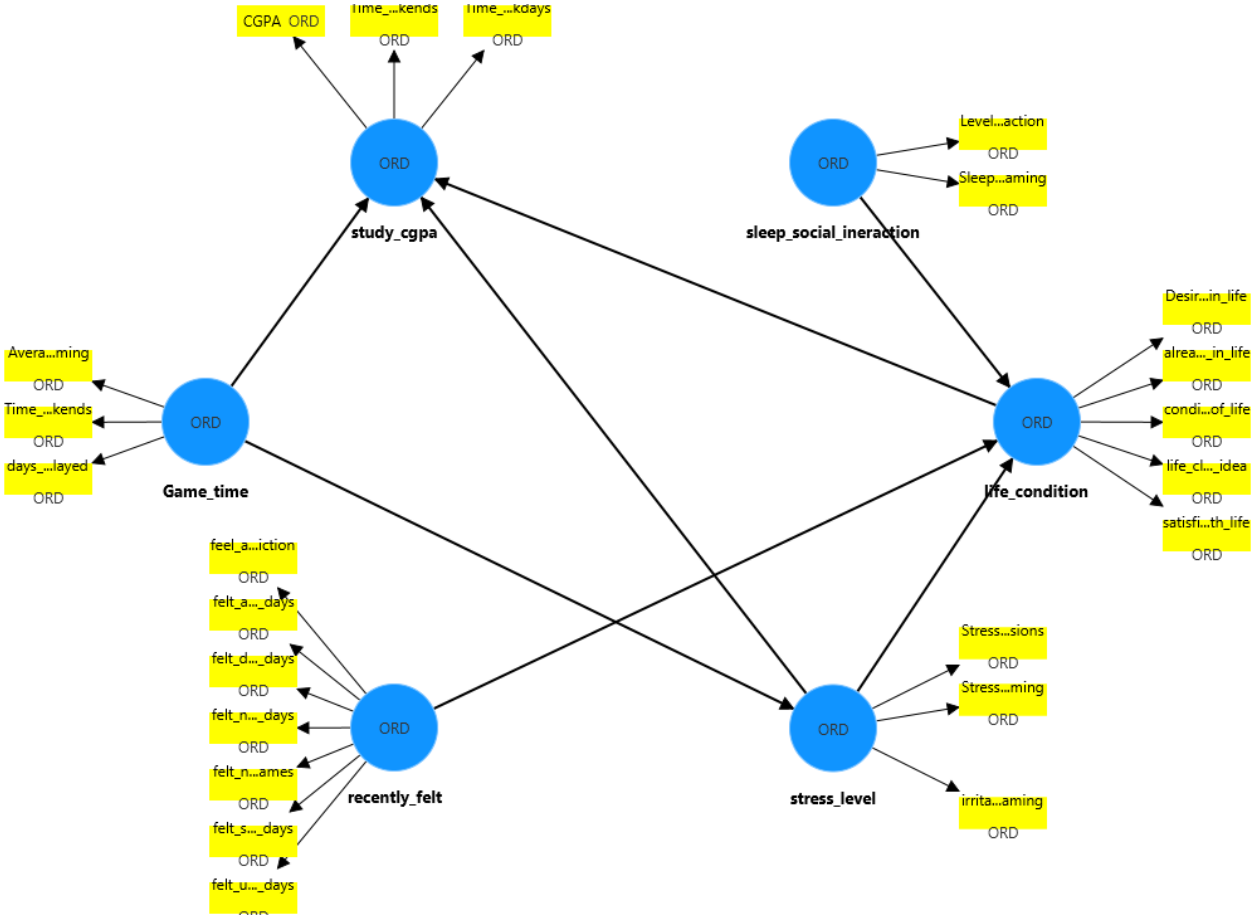

Figure 4.4: Latent Variable Measurement Model

Latent Variables	Items	Mean	SD	Loadings	Cronbach's Alpha	Composite reliability rho_a	Composite reliability rho_c	Average variance extracted (AVE)
Game Time	GT1	2.290	0.818	0.892	0.820	0.945	0.884	0.719
	GT2	2.709	0.871	0.882				
	GT3	2.181	0.940	0.763				
Life Condition	LC1	3.639	1.614	0.911	0.884	0.826	0.894	0.681
	LC2	3.620	1.539	0.926				
	LC3	3.383	1.383	0.9				
	LC4	3.779	1.184	-0.03				
	LC5	3.371	1.664	0.952				
Recently Felt	RF1	3.181	1.475	0.742	0.827	0.937	0.904	0.673
	RF2	2.646	1.051	0.934				
	RF3	2.722	0.978	0.856				
	RF4	2.560	1.172	0.944				
	RF5	1.119	0.913	-0.505				
	RF6	2.472	1.175	0.948				
	RF7	3.061	0.970	0.716				
Sleep/Social Interaction Issues	SLSI1	2.053	0.855	0.698	0.744	0.704	0.749	0.601
	SLSI2	2.032	0.768	0.845				
Stress Level	SL1	1.414	0.708	0.578	0.709	0.866	0.796	0.771
	SL2	0.436	0.708	-0.094				
	SL3	2.610	1.101	0.878				
Study CGPA	SG1	2.705	0.731	0.364	0.702	0.826	0.818	0.729
	SG2	2.273	0.999	0.928				
	SG3	2.181	0.810	0.944				

Table 4.8: Summary of key indicators and Reliability and Validity Metrics for Latent Variables

Variable	Game time	life condition	recently felt	sleep social interaction	stress level	study cgpa
Game time	0.848					
life condition	-0.232	0.825				
recently felt	0.413	-0.641	0.821			
sleep social interaction	-0.337	0.516	-0.503	0.775		
stress level	0.597	-0.496	0.603	-0.658	0.609	
study cgpa	-0.484	0.705	-0.712	0.691	-0.754	0.793

Table 4.9: Fornell–Larcker criterion

Variable	Game time	life condition	recently felt	sleep social interaction	stress level	study cgpa
Game time						
life condition	0.427					
recently felt	0.409	0.603				
sleep social interaction	0.716	0.849	0.805			
stress level	0.461	0.772	0.836	0.637		
study cgpa	0.754	0.849	0.841	0.606	0.303	

Table 4.10: Heterotrait-monotrait Ratio (HTMT).

Correlation Matrix

The correlation matrix provides insight into the bi-variate relationships between the key constructs.

4.2.4 Summary of Correlations

- **Game_time** : Game time is negatively correlated (-0.098) with study time and cgpa but positively 0.597 correlated with stress_level. This suggests that students who spend more time on playing games tend to spend less time on their studies and their cgpa is lower but since they play games, their stress level is much higher.

- **life_condition** : Life condition has four connections and among them, negative correlations are with recent feelings (-0.564). But positive correlations with study time and cgpa (0.447), sleep time social interaction (0.3), stress level (0.103). This indicates that students with better life conditions tend to have better situations with their recent feelings. However, their study time and cgpa is better, sleep and social interactions are also positively correlated and stress level is slightly high.

- **Recently_felt** : Recent feelings are negatively correlated with life condition (-0.564). This suggests that students who had worse recent feelings tend to have bad life conditions.

- **sleep_social_ineraction** : Sleep time and social interaction has positive correlation with life condition (0.3), which indicates that students with better sleep time and social interaction has positive impact on their overall life condition.

- **stress_level** : Stress level has positive correlation with game time (0.597), life condition (0.103) but negative correlation with study time and cgpa (-0.564). Which suggests, students who play games more often tend to be stressed more and somewhat have good life conditions. But they spend less time on studying and have lower cgpa.

- **study_cgpa** : CGPA and study time is positively correlated with life condition (0.447) but has negative correlation with game time (-0.098), recent feelings (-0.473). This suggests that recent feelings and game time has a negative impact on time spent on studying and cgpa but better life conditions has a significant positive correlation with time spent on studying and cgpa of the students.

Chapter 5

Findings

5.1 Experimental Setup

This section describes the study's experimental setup, including the software installation process, registration and license information, and the steps involved in integrating the dataset with the analytical tools.

5.1.1 Software Installation

This study analyzed data using two software tools: **SPSS** and **SmartPLS**.

- **SPSS** Statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences), including ANOVA and independent sample t-tests. The installation process is as follows:
  - Download the newest SPSS version from the IBM website.
  - Follow the installation instructions for your operating system (Windows or Mac).
  - Ensure all necessary libraries and dependencies are installed for optimal functionality.
- **SmartPLS** Partial Least Squares Structural Equation Modeling. In order to evaluate latent variables and examine the connections between academic CGPA and mental health, structural equation modeling (SEM) was carried out using Smart-PLS.
  - To install the software, go to the official SmartPLS website and download it.
  - Then, follow operating system's installation instructions.

5.1.2 Registration and Licensing

- **IBM SPSS License:**
  - - A valid license key is needed after SPSS has been installed. The license was acquired either an individual subscription or an IBM university program.

- By entering the license key to activate the software, registration and licensing were finished via the IBM License Authorization Wizard.

- **SmartPLS License:**
  - SmartPLS provides a full version that requires a membership in addition to a free version with restricted features. For this investigation, the complete version was utilized.
  - The software has to be registered after downloading. Upon purchase, a license key was given, which was input to unlock all capabilities of the software when it was launched.

5.1.3 Dataset Integration

588 answers to an anonymous online survey made up the dataset used in this investigation. Likert-scale questions were incorporated into the survey to assess the correlation between Bangladeshi undergraduate students' academic CGPA and mental health outcomes.

- **Dataset Preparation:**
  - The online survey tool(google form) provided the data in CSV format. In order to exclude invalid or partial responses, the dataset was preprocessed before to integration with SPSS and SmartPLS.

- **Integration with SPSS:**
  - SPSS's Open Data function was used to import the cleaned dataset. Variables were labeled appropriately after the CSV file was chosen.
  - Likert scale responses were converted into numerical values for analysis, among other data transformations, where needed.

- **Integration with SmartPLS:**
  - In order to model the structural equations, the dataset was loaded into SmartPLS. Observable variables were assigned to their corresponding latent constructs (e.g., academic CGPA, mental stress, and mental health) once the variables were imported and mapped into the software's interface.
  - Paths were used to model data linkages and reflect the tested hypotheses

This approach ensured that SPSS and SmartPLS were used efficiently to analyze the dataset and test hypotheses about the effects of extended gaming hours on academic cgpa and mental health.

5.2 Results

5.2.1 SPSS Results

Category	Factors	P-Value	Accepted Hypothesis	Hypothesis
1-Way ANOVA	Avg. daily time spent on gaming → Academic Performance/CGPA	0.000	Alternative	Extended gaming time affects academic performance/CGPA.
1-Way ANOVA	Stress level during gaming session → Academic Performance/CGPA	0.000	Alternative	Students' mental stress level affects academic CGPA.
2-Way ANOVA	Gender, time spent gaming on weekends → Academic Performance/CGPA	0.003 0.00 9.185	Null Hypothesis (Partially Rejected)	Gender and time spent gaming independently have significant effects, but their interaction does not.
2-Way ANOVA	Felt upset and sick due to worry about gaming → Academic Performance/CGPA	0.002 0.004 0.000	Alternative	Effect of feeling upset, fatigued, or sick due to worry about gaming, or their interaction on students' CGPA.
Independent Sample T-Test	Academic Performance/CGPA → Male and Female	0.004 0.003	Alternative	Academic CGPA differs significantly between gender groups.
Independent Sample T-Test	Social interaction issues caused by gaming → Male and Female	0.000 0.357 0.408	Null Hypothesis (Partially Rejected)	Social interaction has significant effects on gender, but gaming issues do not interact with gender.

Table 5.1: SPSS Confirmatory Research Results.

5.2.2 SmartPLS Results

Factors	**Path Coefficient**	**P-Value**	**Result**	**Hypothesis**
H1: Game_time → stress_level	0.597	0.000	Accepted	Extensive game sessions increase the stress level of students.
H2: Game_time → study_cgpa	-0.098	0.040	Accepted	Spending more time on playing games reduces study time and impacts CGPA negatively.
H3: life_condition → study_cgpa	0.447	0.000	Accepted	Better life conditions have a positive impact on CGPA and students spend more time on studies.
H4: recently_felt → life_condition	-0.564	0.000	Accepted	Negatively felt emotions decrease the life conditions of the students.
H5: sleep_social_interaction → life_condition	0.300	0.000	Accepted	Proper sleeping schedule and social interactions impact life conditions positively.
H6: stress_level → life_condition	0.103	0.092	Rejected	Higher stress does not impact student's life conditions.
H7: stress_level → study_cgpa	-0.473	0.000	Accepted	Stress level impacts study hours and CGPA of students negatively.

Table 5.2: Smart PLS (Exploratory Research) Results.

Chapter 6

Discussion

This study conducts a thorough investigation of the impact of extended gaming hours on academic CGPA and mental wellness among Bangladeshi undergraduate students. The important findings demonstrated that daily gaming time, daily study hours, sleep time, and amount of social engagement all have a substantial impact on students' mental well-being and their academic performance (CGPA). These findings are consistent with previous research, which suggests that extended gaming time is an important component in determining kids' psychological health and academic achievement.

6.1 SPSS Discussion

The SPSS analysis revealed significant relationships between gaming behaviors, stress levels, and academic performance among Bangladeshi undergraduate students. Key findings from the one-way ANOVA, two-way ANOVA, and independent sample t-tests are summarized below. The one-way ANOVA results demonstrated a statistically significant relationship between average daily gaming time and academic CGPA ($F = 200.992$, Sig. $= .000$). As gaming hours increased, CGPA declined sharply, reflecting the detrimental effect of excessive gaming on academic performance. These findings align with prior studies highlighting the negative impact of prolonged gaming on students' ability to focus and maintain high academic standards.[22]

Similarly, stress levels during gaming sessions were found to significantly influence CGPA ($F = 56.977$, Sig. $= .000$). While moderate stress correlated with slight improvements in academic performance, higher stress levels led to a noticeable decline in CGPA. This suggests that while gaming can serve as a recreational activity, excessive stress during gaming sessions disrupts academic focus and performance.[21]

The two-way ANOVA revealed significant independent effects of gender and time spent gaming on weekends on CGPA (Gender: $F = 8.781$, $p = 0.003$; Time Spent Gaming: $F = 29.396$, $p < 0.000$). However, their interaction was not statistically significant ($F = 2.438$, $p = 9.185$), indicating that gender and gaming time independently affect academic outcomes without any combined effect. These results highlight that male and female students experience distinct academic challenges related to gaming behaviors, consistent with existing gender-based educational research.[10]

Additionally, feeling upset or fatigued due to gaming-related stress significantly affected CGPA, with their interaction amplifying this impact ($F = 18.210$, $p = .000$). This suggests that gaming-related emotional distress compounds the adverse effects on academic performance, warranting targeted interventions to address mental health concerns among gamers.

Independent sample t-tests further highlighted gender-based differences in academic performance and gaming-related social challenges. Male students achieved higher mean CGPA than female students ($p = 0.003$), possibly reflecting differences in gaming habits or coping mechanisms. Conversely, females reported significantly more issues in relationships due to gaming ($p = .000$), underscoring the gendered dimensions of gaming's social impact. In summary, the SPSS findings demonstrate the multifaceted effects of gaming behaviors on academic and mental health outcomes. These results underscore the importance of developing gender-sensitive and holistic interventions to address gaming-related challenges while fostering academic success and mental well-being.[20]

6.2 SmartPLS Discussion

Students at undergraduate level of Bangladesh who play games for extensive hours report increased levels of stress. This suggests that with less gaming sessions, stress level is relatively lower, which aligns other studies that were done previously [26].

Spending more time playing games reduces time spent on studies, hence negatively impacts the CGPA of students of undergraduate level of Bangladesh. Some studies also suggest similar results in other countries as well.

Students who have better life conditions and satisfaction tend to spend more time on their studies and overall their academic performance is better. Inconvenience or poor life conditions is directly related to academic performance studies have shown [26].

Students' emotions are correlated with life conditions. Hence, negatively felt emotions by students of Bangladesh at undergraduate level decrease life condition and satisfaction.[25] Studies have shown that students and people in general who are not emotionally well are not happy and satisfied with their life .

Sleeping an appropriate amount of time has a positive effect on life conditions on students.[12] Analysis on other research has shown that people, more specifically students need the right amount of sleep to maintain a good life satisfaction .

High stress does not affect the life condition and satisfaction of students of Bangladesh at undergraduate level. Some analysis has shown that stress has nothing to do with a student's life condition, on average, most students have some level of stress yet living a satisfactory life.

Higher stress of students' lives impacts study hours and academic performance.[22] Students of Bangladesh who have less stress tend to perform better at undergraduate level. Many analyses have shown that stress has a significant effect on academic performance .

Chapter 7

Conclusion and Future Work

7.1 Conclusion

This thesis provides an in-depth analysis of how gaming habits impact the academic performance (CGPA) and mental health of Bangladeshi undergraduate students. The study utilized a robust mixed-methods approach, combining SPSS for confirmatory analyses and SmartPLS for exploratory analyses, to draw comprehensive insights.

Prolonged gaming hours negatively impact academic performance, with students who game extensively showing a significant decline in CGPA. High stress levels associated with gaming, particularly when excessive, correlate with reduced academic focus and performance. Male students generally achieve higher CGPA compared to females but report fewer gaming-related social interaction issues.

Better life conditions and sleep patterns positively influence academic performance and life satisfaction, while negative emotions diminish overall well-being.The study highlights multidimensional interdependencies between gaming behaviors, emotional well-being, social engagement, and academic outcomes. These findings align with existing literature, emphasizing the need for balanced gaming habits to optimize both academic and psychological outcomes.

7.2 Future Work

Future studies could include a broader demographic, such as students from colleges or varying socioeconomic backgrounds, to generalize findings across Bangladesh.Conducting longitudinal research would help track the long-term effects of gaming habits on academic and mental health outcomes. Develop and evaluate gender-sensitive interventions aimed at reducing the adverse effects of gaming on academic and mental health.

Explore the role of gamified learning tools to balance gaming habits with educational priorities, ensuring students remain engaged while minimizing negative impacts. Extend the research to compare Bangladeshi students with their counterparts in other countries to identify cultural influences on gaming and academic performance.

Investigate the physiological impacts of prolonged gaming, such as sleep disorders or musculoskeletal issues, in tandem with psychological outcomes.

Bibliography

[1] C. J. Ferguson, M. Coulson, and J. Barnett, "A meta-analysis of pathological gaming prevalence and comorbidity with mental health, academic and social problems," *Journal of Psychiatric Research*, vol. 45, no. 12, pp. 1573–1578, 2011. DOI: 10.1016/j.jpsychires.2011.09.005. [Online]. Available: https://doi.org/10.1016/j.jpsychires.2011.09.005.

[2] M. A. Islam and M. Z. Hossin, "Prevalence and risk factors of problematic internet use and the associated psychological distress among graduate students of bangladesh," *Asian Journal of Gambling Issues and Public Health*, vol. 6, no. 1, 2016. DOI: 10.1186/s40405-016-0020-1. [Online]. Available: https://doi.org/10.1186/s40405-016-0020-1.

[3] M. S. Uddin, A. A. Mamun, M. A. Iqbal, M. Nasrullah, M. Asaduzzaman, M. S. Sarwar, and M. S. Amran, "Internet addiction disorder and its pathogenicity to psychological distress and depression among university students: A cross-sectional pilot study in bangladesh," *Psychology*, vol. 7, no. 8, pp. 1126–1137, 2016. DOI: 10.4236/psych.2016.78113. [Online]. Available: https://doi.org/10.4236/psych.2016.78113.

[4] C. De Pasquale, C. Dinaro, and F. Sciacca, "Relationship of internet gaming disorder with dissociative experience in italian university students," *Annals of General Psychiatry*, vol. 17, no. 1, 2018. DOI: 10.1186/s12991-018-0198-y. [Online]. Available: https://doi.org/10.1186/s12991-018-0198-y.

[5] M. A. Mamun, M. S. Hossain, A. B. Siddique, M. T. Sikder, D. J. Kuss, and M. D. Griffiths, "Problematic internet use in bangladeshi students: The role of socio-demographic factors, depression, anxiety, and stress," *Asian Journal of Psychiatry*, vol. 44, pp. 48–54, 2019. DOI: 10.1016/j.ajp.2019.07.005. [Online]. Available: https://doi.org/10.1016/j.ajp.2019.07.005.

[6] D. X. Y. Chia, C. W. L. Ng, G. Kandasami, M. Y. L. Seow, C. C. Choo, P. K. H. Chew, C. Lee, and M. W. B. Zhang, "Prevalence of internet addiction and gaming disorders in southeast asia: A meta-analysis," *International Journal of Environmental Research and Public Health*, vol. 17, no. 7, p. 2582, 2020. DOI: 10.3390/ijerph17072582. [Online]. Available: https://doi.org/10.3390/ijerph17072582.

[7] C. De Pasquale, F. Sciacca, V. Martinelli, M. Chiappedi, C. Dinaro, and Z. Hichy, "Relationship of internet gaming disorder with psychopathology and social adaptation in italian young adults," *International Journal of Environmental Research and Public Health*, vol. 17, no. 21, p. 8201, 2020. DOI: 10.3390/ijerph17218201. [Online]. Available: https://doi.org/10.3390/ijerph17218201.

[8] A. Ferriz-Valero, O. Østerlie, S. García Martínez, and M. García-Jaén, "Gamification in physical education: Evaluation of impact on motivation and academic performance within higher education," *International Journal of Environmental Research and Public Health*, vol. 17, no. 12, p. 4465, 2020. DOI: 10.3390/ijerph17124465. [Online]. Available: https://doi.org/10.3390/ijerph17124465.

[9] L. Shi, Y. Wang, H. Yu, A. Wilson, S. Cook, Z. Duan, K. Peng, Z. Hu, J. Ou, S. Duan, Y. Yang, J. Ge, H. Wang, L. Chen, K. Zhao, and R. Chen, "The relationship between childhood trauma and internet gaming disorder among college students: A structural equation model," *Journal of Behavioral Addictions*, vol. 9, pp. 175–180, 2020.

[10] C. Stevens, E. Zhang, S. Cherkerzian, J. A. Chen, and C. H. Liu, "Problematic internet use/computer gaming among us college students: Prevalence and correlates with mental health symptoms," *Depression and Anxiety*, vol. 37, no. 11, 2020. DOI: 10.1002/da.23094. [Online]. Available: https://doi.org/10.1002/da.23094.

[11] Y. Sung, T.-H. Nam, and M. H. Hwang, "Attachment style, stressful events, and internet gaming addiction in korean university students," *Personality and Individual Differences*, vol. 154, p. 109 724, 2020. DOI: 10.1016/j.paid.2019.109724. [Online]. Available: https://doi.org/10.1016/j.paid.2019.109724.

[12] S. T. T'ng and K. Pau, "Identification of avatar mediates the associations between motivations of gaming and internet gaming disorder among the malaysian youth," *International Journal of Mental Health and Addiction*, 2020. DOI: 10.1007/s11469-020-00229-9. [Online]. Available: https://doi.org/10.1007/s11469-020-00229-9.

[13] Z. Teng, H. M. Pontes, Q. Nie, G. Xiang, M. D. Griffiths, and C. Guo, "Internet gaming disorder and psychosocial well-being: A longitudinal study of older-aged adolescents and emerging adults," *Addictive Behaviors*, vol. 110, p. 106 530, 2020. DOI: 10.1016/j.addbeh.2020.106530. [Online]. Available: https://doi.org/10.1016/j.addbeh.2020.106530.

[14] S. A. R. Bukhari, *Sample size determination using krejcie and morgan table*, Mohammad Ali Jinnah University, Feb. 2021.

[15] X. C. C. Fung, C. Kwok, P. Leung, and K. Poon, "The effects of internet gaming and social media use on physical activity, sleep, quality of life, and academic performance among university students in hong kong: A preliminary study," *Asian Journal of Social Health and Behavior*, vol. 4, no. 1, p. 36, 2021. DOI: 10.4103/shb.shb_81_20. [Online]. Available: https://doi.org/10.4103/shb.shb_81_20.

[16] Z. Islam, K. Hsan, S. Islam, D. Gozal, and M. Hossain, "Assessment of sleep quality and its association with problematic internet use among university students: A cross-sectional investigation in bangladesh," *Sleep Science*, vol. 14, no. nspe1, 2021. DOI: 10.5935/1984-0063.20200069. [Online]. Available: https://doi.org/10.5935/1984-0063.20200069.

[17] A. Sayeed, M. H. Rahman, M. N. Hassan, E. Christopher, S. Kundu, M. H. A. Banna, A.-R. Hasan, T. Mallick, A. E. Meem, and M. T. Hasan, "Children and youth services review," *Children and Youth Services Review*, vol. 120, p. 105 771, 2021. DOI: 10.1016/j.childyouth.2020.105771. [Online]. Available: https://doi.org/10.1016/j.childyouth.2020.105771.

[18] M. A. Sayeed, M. S. R. Rasel, A. A. Habibullah, and M. M. Hossain, "Prevalence and underlying factors of mobile game addiction among university students in bangladesh," *Global Mental Health*, vol. 8, 2021. DOI: 10.1017/gmh.2021.34. [Online]. Available: https://doi.org/10.1017/gmh.2021.34.

[19] T. Alshammari, S. Alseraye, A. Rogowska, N. Alrasheed, and M. Alshammari, "Examining the indirect effect of online gaming on depression via sleep inequality and anxiety—a serial and parallel mediation analysis," *Journal of Clinical Medicine*, vol. 11, no. 24, p. 7293, 2022. DOI: 10.3390/jcm11247293. [Online]. Available: https://doi.org/10.3390/jcm11247293.

[20] F. Liu, H. Deng, Q. Zhang, Q. Fang, B. Liu, D. Yang, X. Tian, and X. Wang, "Symptoms of internet gaming disorder among male college students in nanchong, china," *BMC Psychiatry*, vol. 22, no. 1, 2022. DOI: 10.1186/s12888-022-03778-6. [Online]. Available: https://doi.org/10.1186/s12888-022-03778-6.

[21] S. Y. A. Raouf, H. M. Gabr, O. Al-Wutayd, and M. A. Al-Batanony, "Video game disorder and mental wellbeing among university students: A cross-sectional study," *Pan African Medical Journal*, vol. 41, no. 1, 2022. [Online]. Available: https://www.ajol.info/index.php/pamj/article/view/237975.

[22] A. Fatima and R. Amin, "Academic performance and internet gaming disorder: A cross-sectional study," *Journal of Psychology and Psychiatry*, vol. 4, no. 4, pp. 531–544, 2023. DOI: 10.52053/jpap.v4i4.243. [Online]. Available: https://doi.org/10.52053/jpap.v4i4.243.

[23] W. W. Chin, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. London, UK: SAGE Publications Ltd, 2024. [Online]. Available: https://uk.sagepub.com/en-gb/eur/a-primer-on-partial-least-squares-structural-equation-modeling-pls-sem/book270548.

[24] E. Huang, Y. Xing, and X. Song, "Emotional analysis of multiplayer online battle arena games addiction," *Frontiers in Psychology*, vol. 15, 2024. DOI: 10.3389/fpsyg.2024.1347949. [Online]. Available: https://doi.org/10.3389/fpsyg.2024.1347949.

[25] E. A. Muriana, N. C. A. Lestari, N. Nurhayani, and Z. Zulhijriani, "Selfconcept, family roles, knowledge and information resource on dating violence prevention behaviors: A cross-sectional study using smart pls software," *GHMJ (Global Health Management Journal)*, vol. 7, no. 1, pp. 08–17, 2024. DOI: 10.35898/ghmj-71979.

[26] G. T. Zewude, D. G. Bereded, E. Abera, G. Tegegne, S. Goraw, and T. Segon, "The impact of internet addiction on mental health: Exploring the mediating effects of positive psychological capital in university students," *Adolescents*, vol. 4, no. 2, pp. 200–221, 2024. DOI: 10.3390/adolescents4020014. [Online]. Available: https://doi.org/10.3390/adolescents4020014.

[27] *The t-test*, https://www.jmp.com/en_dk/statistics-knowledge-portal/t-test.html, Accessed: 2024-10-17, n.d.

Appendix

Undergraduate Student's Gaming Habits and Mental Health Survey

1. **Which university are you from?**
   Mark only one oval.
   - Brac University
   - Other: _____
2. **Gender**
   Mark only one oval.
   - Male
   - Female
3. **Age:**
   Mark only one oval.
   - 18-20
   - 21-23
   - 24-26
   - 27 and above
4. **Undergraduate year:**
   Mark only one oval.
   - 1st year
   - 2nd year
   - 3rd year
   - 4th year
5. **Online or Offline games preference:**
   Mark only one oval.
   - Mostly online
   - Mostly offline
   - Both equally
   - I don't play games

6. **How many days per week games are played:**
   Mark only one oval.
   - 1-2 days
   - 3-4 days
   - 5-6 days
   - Every day
7. **Average daily time spent on gaming:**
   Mark only one oval.
   - Less than 1 hour
   - 1-2 hours
   - 3-4 hours
   - 5+ hours
8. **Time spent gaming on weekends:**
   Mark only one oval.
   - Less than 2 hours
   - 2-4 hours
   - 5-6 hours
   - More than 6 hours
9. **Sleep time on weekdays when gaming:**
   Mark only one oval.
   - Less than 4 hours
   - 4-6 hours
   - 7-8 hours
   - More than 8 hours
10. **Time spent on studies on weekdays:**
    Mark only one oval.
    - Less than 1 hour
    - 1-2 hours
    - 3-4 hours
    - More than 4 hours
11. **Time spent on studies during weekends:**
    Mark only one oval.
    - Less than 1 hour
    - 1-2 hours
    - 3-4 hours

- More than 4 hours

12. **Stress level during gaming sessions:**
Mark only one oval.

    - Not stressed at all
    - Slightly stressed
    - Moderately stressed
    - Highly stressed

13. **Stress level when not gaming:**
Mark only one oval.

    - Not stressed at all
    - Slightly stressed
    - Moderately stressed
    - Highly stressed

14. **Level of social interaction:**
Mark only one oval.

    - Very low
    - Low
    - Moderate
    - High

15. **Do you feel that playing video games is a way to escape from your problems?**
Mark only one oval.

    - Not at all
    - Slightly
    - Moderately
    - Strongly

16. **Do you skip responsibilities to game?**
Mark only one oval.

    - Never
    - Rarely
    - Sometimes
    - Often

17. **I have difficulty concentrating on my education/work because of my gaming addiction.**
Mark only one oval.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

18. **I feel anxious about my gaming addiction.**
Mark only one oval.

    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

19. **How much difficulty do you experience in sleeping due to concerns about your current situation?**
Mark only one oval.

    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

20. **How strongly do you agree or disagree with the following statements?**

    - In most ways, my life is close to my ideal.
    - The conditions of my life are excellent.
    - I am satisfied with my life.
    - So far, I have gotten the important things I want in life.
    - If I could live my life over, I would change almost nothing.

    Mark only one oval for each statement.

    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree