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Factors Influencing Gameplay Intention and Gaming Disorder in Online Games: An Extended UTAUT2 with the Moderating Effects of Game Genres, Media, and Gender

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Abstract

Digital games have become a central part of youth culture, offering entertainment, competition, and social connection, but frequent gaming among Chinese university students also raises concerns about internet gaming disorder (IGD). Current studies rarely integrate technology acceptance and behavioral health perspectives, leaving unclear how normal gameplay intention may evolve into excessive use. This study extends the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) to examine gameplay intention and IGD among Chinese university students. The model integrates five additional constructs, including flow experience, social interaction, emotion coping, attitude, and self-efficacy, and explores the moderating roles of game genre, media platform, and gender. A cross-sectional survey was conducted among university student gamers in China, and data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM), multi-group analysis, and Measurement Invariance of Composite Models (MICOM). The findings show that hedonic motivation and habit were the strongest predictors of gameplay intention, while performance expectancy and effort expectancy showed limited influence. The added constructs enhanced the model's ability to explain both engagement and potential IGD risk, and subgroup differences revealed that motivation patterns vary by context. The study contributes to theory by testing the boundaries of UTAUT2 in hedonic and emotionally driven environments and bridging user acceptance with behavioral addiction research. Practically, the findings support experience-centered game design, adaptive policy strategies, and digital wellness programs that promote autonomy, fairness, and self-regulation among student gamers.

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Abbreviations

ACT Action

ACA Action Adventure

ADV Adventure

ATT Attitude

AVE Average Variance Extracted

BI Behavioral Intention

CA Cronbach's Alpha

CB-SEM Covariance-Based Structural Equation Modeling

CBM Cognitive Behavior Model

R^2 Coefficient of Determination

CR Composite Reliability

CoLa Computer/Laptop

DSM-5 Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition

EC Emotion Coping

f^2 Effect Size

EE Effort Expectancy

ESC The Esports Consumption model

λ Factor loadings

FC Facilitating Conditions

FE Flow Experience

FPS First-Person Shooter

GDT Gaming Disorder Test

GI Gameplay Intention

HA Habit

HM Hedonic Motivation

HTMT Heterotrait-Monotrait Ratio

IGD Internet Gaming Disorder

IS Information System

MGA Multi-Group Analysis

MICOM Measurement Invariance of Composite Models

MIS Miscellaneous

MMOGs Massive Multiplayer Online Games

MMORPGs Massive Multiplayer Online Role-Playing Games

MOBA Multiplayer Online Battle Arena

MoTa Mobile phone/Tablet

MoTa_RS Mobile phone/Tablet_RS

MPOMGs Multiplayer Online Mobile Games

MSNG Mobile Social Network Game

NPT Non-parametric Permutation-based Test

OTG Omnibus Test of Group Differences

PE Performance Expectancy

PLS-MGA Partial Least Squares Multi-Group Analysis

PLS-SEM Partial Least Squares Structural Equation Model

Q^2 Predictive Relevance

PUZ Puzzle

PV Price Value

RAC Racing

RTS Real-Time Strategy

ROP Role-Playing

SCT Social Cognitive Theory

SEM Structural Equation Modeling

SEY Self-efficacy

SIF Social Influence

SIM Simulation

SIT Social Interaction

SPO Sports

STR Strategy

STR_RS Strategy_RS

SVGC Structural Video Game Characteristics

TAM Technology Acceptance Model

TPB Theory of Planned Behavior

TPS Third-Person Shooter

TRA Theory of Reasoned Action

Type 1 error Family-wise error

UB Use Behavior

UTAUT The Unified Theory of Acceptance and Use of Technology

UTAUT2 The Extended Unified Theory of Acceptance and Use of Technology

Chapter 1

Introduction

This chapter provides an overview of the background, purpose, and scope of the study. It introduces digital games as a hedonic information system and highlights growing concerns regarding internet gaming disorder, thereby establishing the research problem. Based on this context, the chapter presents the research questions and objectives, which aim to explain gameplay intention and its relationship with problematic gaming outcomes through an integrated theoretical perspective. The significance of the study is outlined in terms of its theoretical, methodological, and practical contributions. Finally, the structure of the thesis is briefly introduced to guide the reader through the subsequent chapters.

1.1 Background

1.1.1 History of Internet Gaming Disorder

Internet gaming disorder (IGD) has been a major worry for academics around the world for the past 30 years. Before 2012, scholars rarely used the term “disorder” to describe problematic or excessive gaming behavior, while preferring to define the social or emotional problems caused by excessive or compulsive use of video games as game addiction (Lemmens et al., 2009).

In 2012, the Substance Use Disorder Workgroup from the American Psychiatric Association (APA) reviewed the potential non-substance addictive behaviors, including gambling, internet gaming, internet use, work, shopping, sex, and exercise. Although IGD was the only activity being considered in the candidate list, there was still insufficient evidence to classify it as a mental disorder (Petry et al., 2015).

Since 2013, internet gaming disorder was first formally defined by the APA in the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5). DSM-5 states that individuals who have satisfied more than five of the nine criteria (preoccupation, withdrawal, tolerance, unsuccessful control, loss of interest, loss of relationship/opportunities, escape negative mood, continue despite problems, deception) in the past 12 months are diagnosed as game addiction.

The World Health Organization (WHO) has further confirmed IGD as a mental disease in the 11th Final Revision of the International Classification of Diseases (ICD-11) in 2018. ICD-11 defines that individuals who meet the following three criteria in the last 12 months are diagnosed with game addiction, which is impaired control over gaming, increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities, continuation or escalation of gaming despite the occurrence of negative consequences.

During the COVID-19 epidemic, people had more time to stay at home, especially in China, which takes isolation as one of the major countermeasures. As one of the main activities at home, excessive gaming behavior increases the probability of causing mental problems (Burkauskas et al., 2022; Pallavicini et al., 2022; Paschke et al., 2022; R. Zhou et al., 2023).

Moreover, research has shown that online games are used as a tool for coping with existing psychological problems and that addiction to online games leads to behavioral issues in adolescents, including displays of aggressive tendencies and decreased self-control (Choi et al., 2018). Many individuals, especially teenagers and young people, are overly obsessed with games, resulting in problematic behaviors and mental disorders (Chiu et al., 2021). Juveniles' addiction to online games is the main problem hindering the development of games and esports in China (J. Yi, 2018).

1.1.2 Development Issues of Esports in China

The commercialization of esports in China started later than in other countries, but its development has been significantly faster. Due to China's unique market economy system, game developers and sponsors have become the primary driving forces behind the growth of esports, while support from national and local governments has been relatively limited compared to other countries. Within less than a decade, China's esports market has grown into the largest in the world (He, Tang, et al., 2024). However, the rapid development of the esports market cannot conceal its inherent issues, such as stagnation in commercial standardization and legislative processes, the negative impact of gaming on physical health, and the potential risks of causing mental health problems among consumers (Chiu et al., 2021; J. Yi, 2018). These are the major challenges that the Chinese esports industry must address for long-term sustainable development, rather than focusing solely on economic benefits.

From the perspective of the economic market, as a comprehensive digital cultural industry, the primary issues facing China's esports market include the negative ideological outputs brought about by gaming's cultural and entertainment content, as well as the potential risks of addiction (Jiang, 2019; Lian & Huang, 2021; J. Yi, 2018). Teenagers lack self-control in addressing the negative impacts of games and lack proper guidance in gaming consumption (Z. Liu et al., 2021; X. Tang et al., 2020; Zhu & Xiao, 2019). Teenagers participating in esports often fail to adjust themselves in time in the face of practical setbacks such as lack of understanding, support, and game failure, resulting in dysfunction of the inhibition system and manifested in depression-like behaviors such as cognitive disorder and emotional control (Jin et al., 2021; J. Yi, 2018). Teenagers' cognitive impairment, personality deviation, attention deficit, ADHD, decreased willpower, and reduced frustration tolerance are all related to game addiction (W. Gao,

2021; Xi & Hu, 2022). Game addiction is the most significant mental health issue caused by esports games, particularly among younger individuals (Z. Liu et al., 2021).

The commercial legalization process of China's esports industry and the establishment of market regulatory institutions are still in their early stages (D. Chen, 2020; C. Yang & Qi, 2019). The laws and policies currently applied to the esports industry are primarily derived from those governing the gaming industry. Although esports content is largely sourced from gaming, its competitive nature, gameplay rules, networking methods, and profit models differ significantly from traditional online games (Bai & Li, 2021; Jiang, 2019). However, the Chinese government continues to treat esports games and traditional online games as the same, applying identical legal frameworks and regulatory provisions. This approach has, to some extent, hindered the normal development of the esports industry.

Presently, China's gaming regulations primarily focus on restricting underage gaming time, grading players based on age, enhancing investigations into game content, and rigorously controlling the quantity of game releases (Bai & Li, 2021; C. Yang & Qi, 2019). The underage anti-addiction system, as the primary regulatory measure for gaming consumption among minors, strictly limits gaming activities for those under 18. In October 2019, The Notice on Preventing Minors from Indulging in Online Games required players to use an actual identification number to sign up for an account . The period and duration of minors' gaming were strictly restricted to 1.5 hours per day on weekdays, 3 hours per day on weekends and legal holidays. No game service shall be provided for minors from 10 p.m. to 8 a.m. daily. The last is to standardize the provision of paid services to minors. In August 2021, The Notice on Further Strict Management and Practical Prevention to Minors from Indulging in Online Games strictly limits the time for providing online game services to minors . All online game enterprises can only provide services to minors from 8 p.m. to 9 p.m. every Friday to Sunday and legal holidays. However, this system conflicts with the prime age range of 18-23 for esports athletes, significantly impacting talent development systems and leading to a shortage of high-quality esports athletes (Zou et al., 2021). Therefore, it is imperative to differentiate the regulation of the esports industry from general online gaming, aligning with the current needs of China's socio-economic landscape (Guo, 2021; Qiu & Duan, 2024).

As digital gaming and esports consumption continue to expand rapidly, gameplay behaviors among young users have become increasingly diversified and

complex. In particular, university students are frequently exposed to competitive, social, and emotionally immersive gaming environments, making gameplay intention and problematic gaming behavior important concerns in both industry development and public health contexts.

1.2 Problem Statement

Although digital gaming or esports have become increasingly normalized forms of entertainment and social interaction, concerns regarding problematic gaming behavior and internet gaming disorder continue to increase. Existing studies mainly focus on either clinical addiction symptoms or general technology usage behavior, while the relationship between them remains insufficiently explained. In addition, current regulatory approaches in China primarily emphasize behavioral restriction rather than understanding the motivational and psychological mechanisms underlying gaming consumption. Therefore, there is a need for a more integrated framework to explain the relationship between normal gameplay intention and potential internet gaming disorder within contemporary gaming environments.

1.2.1 Distance Between Normal Gameplay Intention and IGD Research

Previous studies about IGD mainly focus on clinical addiction diagnosis and comorbid symptoms (Colasante et al., 2022; González-Bueso et al., 2018; Kuss et al., 2021; X. Liu et al., 2011; Z. Teng et al., 2021; H. R. Wang et al., 2018; Wong et al., 2020; Xi & Hu, 2022; X. Yi & Li, 2006). The factors leading to online game addiction may come from environmental or individual factors, which are mostly affected by the joint action of these factors. Environmental factors include family, school, and peers, while individual factors include impulsivity, self-control, aggression, emotional regulation, and stress response (Xi & Hu, 2022).

However, most existing research separates behavioral intention and addiction into two unrelated domains. Studies that use psychological models tend to focus on individual traits such as impulsivity or stress response, while studies in information systems focus on system-level predictors like ease of use or enjoyment. There is limited understanding of whether the same motivational constructs play a dual role in both encouraging gameplay and increasing addiction risk (Lee et al., 2021). Without such integration, the transition from frequent use to overuse remains poorly explained.

1.2.2 The Explanatory Gap of UTAUT2 in Problematic Gaming Behavior Research

Few previous studies talk about IGD from an information system aspect. Esports or internet games are run by media, such as computers, mobile, and consoles, which the research belongs to the information system (IS) area. The Extended Unified Theory of Acceptance and Use of Technology (UTAUT2) has been widely applied and extended in IS among consumer contexts, especially in hedonic systems where enjoyment, habit, and social influence play key roles (Venkatesh et al., 2012). The Esports Consumption model (ESC) is one of the UTAUT2 extensions and appears to be one of the recent technology adoption models for analyzing esports consumption (Jang & Byon, 2020a). The moderate effect of game genres and gender has been examined in the ESC model (Jang et al., 2021b). However, UTAUT2 and its derivative technologies have rarely been used to explore IGD, where Internet gaming disorder is regarded as problematic use, a kind of excessive gaming use (Griffiths, 2017; Kuss et al., 2016, 2017).

The assumption underlying UTAUT2 is that intention leads to usage, and usage reflects rational user evaluation of a system's value and experience. However, this logic may not apply in the case of addiction. Problematic use often results from emotional regulation needs, impaired self-control, or compulsive patterns that are not captured by traditional acceptance models (Brand et al., 2014; Chatterjee et al., 2022; Haagsma et al., 2013b; Hew et al., 2024). Current studies on IGD rely heavily on clinical diagnostics and rarely connect user intention with system interaction. It is unclear whether strong gameplay intention, typically seen as a positive outcome in UTAUT2, could also signal early signs of risk. Without examining its boundaries, the model cannot be relied upon to explain behavioral outcomes in settings where technology use may become maladaptive.

1.2.3 Lack of Contextual Understanding Across Different Gaming Conditions

The formation of gaming intention is unlikely to follow a uniform process across all game types, media platforms, and demographic groups (Jang et al., 2021b). In China, esports and traditional online games are still regulated under the same legal framework, even though their gameplay structures, interaction styles, and

revenue models differ significantly (Bai & Li, 2021; X. Jiang, 2019; Qiu & Duan, 2024). While action games often emphasize speed and stimulation, strategy games require long periods of planning and concentration. Similarly, mobile platforms may promote short, reward-driven sessions, while PC games offer longer and more complex engagements. Gender differences in gaming motivation, peer influence, and emotional response have also been observed, although these factors are often underexplored.

Despite these distinctions, most studies do not examine whether core predictors in models like UTAUT2 function differently across game genres, media platforms, or gender groups. While some extensions such as the Esports Consumption model have begun to consider genre and gender as moderators (Jang et al., 2021b), a more comprehensive analysis using the full UTAUT2 framework remains limited. This limits the understanding of how different gaming environments and user characteristics may shape gameplay intention and potential problematic gaming behavior.

1.2.4 Potential IGD Risk Among Chinese University Students

In China, gaming policies primarily focus on reducing minors' screen time and controlling the content of online games (Bai & Li, 2021; C. Yang & Qi, 2019). Strict limits are enforced on daily playtime, account registration, and in-game purchases. While these regulations address observable behaviors, they do not target the psychological mechanisms that lead users toward problematic use.

University students represent a distinct gaming population that is no longer protected by rigid time-based restrictions applied to minors, but is still frequently exposed to competitive, social, and emotionally immersive gaming environments. These students often engage with games for emotional release, personal challenge, or social belonging (Xi & Hu, 2022). Over time, such motivations may evolve into habitual or uncontrolled use, especially in the absence of support for emotional regulation or time management (Brand et al., 2014; Ouellette & Wood, 1998).

Current prevention systems rarely address such early-stage behavioral patterns. Without understanding the motivational and psychological mechanisms behind gaming consumption, regulators and educational institutions may miss a critical opportunity to identify potential risk before more serious symptoms emerge.

Therefore, there is a need to investigate the behavioral and psychological conditions associated with potential IGD risk among Chinese university students.

1.3 Research Questions (RQs)

Based on the theoretical, practical, and contextual issues identified in the previous section, this study proposes four research questions to guide the development and evaluation of the proposed research framework. The questions focus on the theoretical integration of dimensions that explain gameplay behavior, the predictive relationships among the model constructs, the moderating effects of different gaming conditions and demographic factors, and the interpretation of potential IGD risk patterns among Chinese university students. Together, these questions provide the foundation for examining gameplay intention and potential problematic gaming behavior within contemporary gaming environments.

RQ1: What theoretical dimensions can be integrated to develop an extended UTAUT2-based framework for explaining gameplay intention and potential internet gaming disorder?

Current studies on gaming behavior and IGD are often fragmented across information system research, hedonic technology studies, and clinical psychology literature. As a result, there is still limited theoretical integration between gameplay motivation and problematic gaming behavior. This question addresses the need for a broader conceptual foundation capable of explaining both gameplay intention and potential IGD-related behavior.

RQ2: How do the constructs in the extended UTAUT2-based framework directly influence gameplay intention and indirectly contribute to potential internet gaming disorder, including the proposed mediation mechanisms involving performance expectancy and effort expectancy?

Although UTAUT2 has been widely applied in consumer technology contexts, its applicability in problematic or excessive usage environments remains unclear. Existing research rarely examines whether technology acceptance constructs can explain both gameplay intention and potential IGD-related outcomes within the same framework. Therefore, this question focuses on how the proposed constructs influence gameplay intention and contribute to potential IGD risk through subsequent gaming behavior. In addition, the question considers the proposed mediation mechanisms involving performance expectancy and effort expectancy to further explore the roles of attitude and self-efficacy within the extended UTAUT2 framework.

RQ3: How do game genre, media platform, and gender moderate the relationships between the model constructs and gameplay intention?

Gameplay environments and user characteristics may influence how individuals respond to gaming motivations and experiences. Although several studies have examined moderating effects, existing findings remain fragmented and are often limited to selected constructs or specific gaming contexts. There is still limited understanding of how the broader UTAUT2 construct relationships may vary across different gaming conditions and demographic groups.

RQ4: What do the model results reveal about potential IGD-related risk patterns among Chinese university students?

Chinese university students are frequently exposed to competitive, social, and emotionally immersive gaming environments. Although problematic gaming behavior is commonly associated with excessive use, potential risk may also be reflected through underlying behavioral and motivational patterns identified within gaming activities. Existing prevention approaches mainly focus on observable gaming behaviors and time restrictions, while the behavioral conditions associated with potential disorder risk remain insufficiently understood. Therefore, this question focuses on how the model results may contribute to understanding potential risk patterns among university student gamers.

1.4 Research Objectives (ROs)

Based on the four research questions, this study pursues four main objectives that integrate theoretical, practical, and contextual investigations of gameplay intention and IGD among Chinese university students. Each objective corresponds directly to a research question.

RO1: To develop an extended UTAUT2-based conceptual framework for explaining gameplay intention and potential internet gaming disorder.

The first objective addresses the need to identify shared theoretical dimensions of gameplay intention and IGD by screening constructs from UTAUT2, information system acceptance and use models, hedonic information system research, and clinical psychology studies on IGD. Through this approach, the study seeks to build a comprehensive understanding of how motivational, emotional, and behavioral factors interact to shape both normal and problematic gaming use.

RO2: To examine the direct and indirect relationships among the model constructs, gameplay intention, and potential internet gaming disorder, including the proposed mediation mechanisms involving performance expectancy and effort expectancy.

The second objective focuses on empirically testing an extended version of the UTAUT2 model to evaluate its capacity to explain and predict gameplay intention and potential internet gaming disorder. By conducting a cross-sectional analysis and applying Partial Least Squares Structural Equation Modeling (PLS-SEM), the study aims to assess whether the integrated constructs within the proposed framework can explain excessive or maladaptive gaming behavior. Through this method, the research seeks to identify the path relationship among the model constructs, gameplay intention, and potential internet gaming disorder. The objective also examines the proposed mediation mechanisms involving performance expectancy and effort expectancy to evaluate the roles of attitude and self-efficacy within the extended framework.

RO3: To examine the moderating effects of game genre, media platform, and gender on the relationships between model constructs and gameplay intention.

The third objective investigates whether the relationships between model constructs and gameplay intention vary across different user contexts. Game genre, media platform, and gender are tested as moderating variables using

multi-group analysis. The aim is to determine how these contextual and demographic factors shape behavioral patterns and whether certain predictors function differently depending on the specific conditions of gameplay.

RO4: To interpret potential IGD risk patterns among Chinese university students based on the model results.

The last objective focuses on understanding the structure and intensity of gameplay intention among Chinese university students. By applying the proposed research framework, the study aims to identify intention patterns that may indicate early signs of risk for IGD, even when clinical symptoms are not yet present. The findings are intended to support early intervention efforts and more targeted policy and education strategies.

1.5 Significance of the Study

This study presents four key contributions aligned with four research questions and objectives. The first three contributions of this study are primarily theoretical. They focus on extending the conceptual applicability of UTAUT2, integrating dimensions from information system and IGD research, and improving the contextual understanding of gameplay behavior across different gaming conditions and demographic groups. Together, these contributions support the theoretical refinement of technology acceptance and gameplay behavior research within contemporary gaming environments. In contrast, the final contribution is primarily practical, as it focuses on understanding potential IGD risk patterns among Chinese university students and providing insights that may support more targeted educational, institutional, and policy-related strategies.

The first contribution focuses on testing the conceptual boundaries of the UTAUT2 model by applying it to a context involving problematic usage behavior. While the model was originally developed to explain rational and goal-oriented technology use, this study aims to explore its applicability in explaining excessive or emotionally driven gaming behavior. It particularly seeks to examine whether traditional constructs such as performance expectancy, effort expectancy, facilitating conditions, and price value retain their explanatory value in hedonic contexts. In addition, this study reintroduced attitude and self-efficacy, two constructs that previously appeared in the original UTAUT and have shown predictive value for internet gaming disorder in other fields. By repositioning the model within an environment shaped by emotional and experiential factors, the study contributes to the theoretical refinement of UTAUT2 and offers a basis for its adaptation in contexts involving hedonic use or behavioral addiction.

The second contribution lies in identifying motivational and psychological dimensions that simultaneously influence both gameplay intention and the risk of IGD. By synthesizing constructs from UTAUT2, information system acceptance and use models, hedonic information system, and clinical psychology, the study provides an integrated model that bridges technology acceptance and addiction research. In particular, this research extends the UTAUT2 by adding three dimensions: flow experience, social interaction, and emotion coping. This addition enhances the ability of the model to capture the emotional and experiential aspects of gaming behavior. The findings show that constructs such as habit, hedonic motivation, flow experience, and emotion coping play central roles in both encouraging gameplay and increasing addiction vulnerability. Practically, this

insight supports early risk detection based on motivational profiles, enabling preventive efforts before clinical symptoms emerge.

The third contribution lies in examining how behavioral mechanisms may change across different user groups and usage contexts. Specifically, the study focuses on three moderating variables: game genres, media and gender. These factors represent structural, technical, and demographic dimensions that may influence how users interpret and respond to key model constructs. To ensure the validity of subgroup comparisons, the study employs Partial Least Squares Multi-group Analysis (PLS-MGA) and applies the Measurement Invariance of Composite Models (MICOM) procedure to assess measurement model invariance. These methods strengthen the reliability of the findings and support a more context-sensitive interpretation of digital behavior. The results provide a foundation for adaptive strategies in system design, content development and policy targeting.

The last contribution focuses on the specific needs of Chinese university students, who represent a distinct user group within the gaming population. In the context of Chinese higher education, university students are no longer protected by rigid time-based restrictions applied to minors, yet they face high academic pressure, increased autonomy, and frequent exposure to digital content. These factors create a digitally immersive environment where behavioral motivation, emotional regulation, and peer influence are more likely to drive usage patterns. The study highlights that for this group, external motivation may be less effective than strategies that enhance internal awareness and self-regulation. Universities are encouraged to create programs that promote digital wellness and reflect the actual needs of students. These programs could include individual risk screening, feedback tools within gaming platforms, and peer support activities that guide students in monitoring and adjusting their gaming behavior. Such efforts would add value to existing psychological and academic services and offer a more integrated and education-focused way to address gaming-related concerns on campus.

1.6 Structure of the Study

This study is organized into six chapters, each serving a distinct function in addressing the research objectives and building a coherent analytical framework.

Chapter 1 introduces the research background, identifies the key problems, presents the research questions and objectives, and outlines the theoretical and practical significance of the study.

Chapter 2 reviews relevant literature across areas including UTAUT2, UTAUT-related technology acceptance models, hedonic information system, and IGD. It identifies theoretical gaps and constructs the proposed research framework that guides the empirical investigation.

Chapter 3 explains the research methodology. It outlines the research philosophy, research context, data collection design, data collection procedures, measurement instruments, and statistical techniques applied, including PLS-SEM and PLS-MGA.

Chapter 4 presents the results of the measurement model assessment and structural model analysis, including both the pilot test and the analysis of the main dataset. Based on pilot feedback and reliability analysis, several items are revised to enhance construct validity. The chapter then proceeds to evaluate the full model using PLS-SEM, and reports the outcomes of multi-group comparisons across game genre, media platform, and gender.

Chapter 5 discusses the theoretical and practical implications of the findings. It interprets the results in relation to the research questions and existing literature, and offers explanations for both expected and unexpected outcomes.

Chapter 6 concludes the study by summarizing the key contributions, addressing limitations, and suggesting directions for future research.

Chapter 2

Literature Review, Hypothesis, and the research framework

First, this chapter reviews the literature to sort out existing influence variables from the information system field related to gameplay intention, problematic game behavior, internet gaming disorder, and game addiction, and to gather the required factors for the research framework.

Second, based on the content of the literature review, this study identifies the predictors to be used and further clarifies the contributions to understanding the relationships between these predictors and gameplay intention, as well as internet gaming disorder, while generating hypotheses in the process.

Finally, this chapter presents the graphical representation of the research framework.

2.1 Search and Selection Strategy for the Literature Review

This study conducts a literature review to identify the key studies related to the research framework. This review employed the Web of Science as the primary database and explored four sets of articles that contribute to our model. To develop the motivation dimension, this review screened studies about gameplay intention and game addiction from not only the UTAUT2 related literature but also all the acceptance and use models which were used to establish UTAUT (Venkatesh et al., 2003, 2012). These models are the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Theory, the Theory of Planned Behavior (TPB), a model combining the TAM and TPB, the model of PC Utilization, the Innovation Diffusion Theory, and the Social Cognitive Theory (SCT) (Venkatesh et al., 2003). From the perspective of the dark side use in the field of information system (IS), this review used terms such as "game addiction," "internet gaming disorder," and "hedonic" to search for relevant models (Lee et al., 2021; Zhai et al., 2021).

After identifying the key terms, this review adapted the search string designed by Hamari & Keronen (2017). The query string used to search for needed materials, models, and constructs is as follows:

TS = ((“esports” OR” game” OR “game addiction” OR “Internet game” OR “internet game disorder”) AND (“Acceptance and use” OR “reasoned action” OR “technology acceptance” OR “motivational model” OR “planned behavior” OR “PC utilization” OR “innovation diffusion” OR “social cognitive” OR “Hedonic”))

The search returned 1299 results from 1982 to 2024. This manuscript was last revised in January 2025. Non-English literature and studies irrelevant to internet games, addiction, or behavioral disorders related to games and technology acceptance and use models were excluded, resulting in 64 articles from 2003 to 2024 being included in the literature review. This literature review conducted a preliminary classification, in which some articles cover several aspects simultaneously.

19 studies contribute to the relationship between UTAUT2 and gameplay intention. 23 studies apply technology acceptance and use models or related constructs, excluding UTAUT and UTAUT2, to explore the predictors of gameplay intention and use behavior. These include SCT, TRA, TAM, flow theory, TPB, social presence theory, diffusion theory, and motivational theory. 15 use

technology acceptance and use model or relevant constructs to study game addiction or problematic gaming behavior, including Cognitive Behavior Model (CBM), TPB, TAM, SCT, Motivational Theory, and Flow Theory. Seven studies explore the hedonic motivation predictors of gaming intention, with some also focusing on addiction.

This literature review conducted separate searches for supplementary materials on moderators, game genres, gaming media, and gender that contribute to the development of the hedonic model, including only highly cited literature.

When referring to game types, this study uses the specific game name if the article directly examines individual game types. If the research does not differentiate between game types but instead focuses on a broader category, such as all online games or all mobile games, this study uses general online games to represent all online game types without distinguishing between computer and mobile games, and general mobile games to represent all mobile games.

2.2 Literature Review of Information System Acceptance and Use Theory and Model Used on Internet Game Field

2.2.1 Information System Acceptance and Use Models Used in Usual Internet Gaming Behavior

A total of 23 studies covering 21 theories and models are presented in Table 2.1 from the perspective of usual internet gaming behavior. The table provides an overview of how previous studies have applied information system acceptance and use models that contributed to the development and extension of the UTAUT framework, including models such as TAM, TPB, TRA, and related derivatives. Rather than reviewing all theories and constructs in detail, Section 2.2.1 only discusses the constructs and theories that directly contribute to the research framework of the present study. Therefore, Table 2.1 serves as a screening and organizing tool, helping to show how relevant theories were compared and how the most applicable constructs were selected for further discussion.

Table 2.1 Past studies link IS acceptance and use models with gameplay intention

No.	Author	Theory or Model	Dimension
1	Hsu & Lu (2004)	An extended TAM	Perceived Ease of Use, Flow Experience, Attitude, Perceived Usefulness, Social Norms, Perceived Critical Mass, Intention
2	Lee & LaRose (2007)	SCT	Flow Experience (enjoyment, merge, concentration), Optimal Balance, Self-reactive Outcome Expectations, Deficient Self-regulation, Habit Strength, Video Game Usage
3	Koo (2009)	Motivational Theory	Concentration, Perceived Enjoyment, Escape, Epistemic Curiosity, Social Affiliation, Intention to Play, Externals locus of Control
4	P. Chen & Chang (2010)	An extended TAM	Social Norms, Perceived Attractiveness, Perceived Enjoyment, Service and Image, Intention to Play, Customer preference, Customer Royalty

No.	Author	Theory or Model	Dimension
5	Lee & Tsai (2010)	C-TAM-TPB, flow theory, interaction	Attitude, Perceived enjoyment, Perceived Ease of Use, Subjective Norms, Perceived Behavior Control, Flow Experience; Human-computer Interaction, Social Interaction, Continuance intention
6	Chang et al. (2014)	SCT, Flow Theory, TPB	Utilitarian Outcome Expectations, Hedonic Outcome Expectations, Peer Influence, External Influence, Critical Mass, Subjective Norms, Flow, Continuance Intention
7	L. Wang & Yan (2015)	TPB	Negative Attitude, Negative Subjective Norms, Perceived Behavioral Control, Anticipated Guilt, Quit Intention
8	S. Gao et al. (2016)	TAM, Flow Theory, Diffusion Theory	Technical Barriers, Perceived Ease of Use, Attitude, Perceived Usefulness, Flow Experience, Social Norms, Intention
9	Alzahrani et al. (2017)	An extended TPB	Flow Experience, Attitude, Social Interaction, Subjective Norms, Perceived Behavior Control, Playing
10	H. Chen et al. (2017)	An extended TAM	Altruism, Social Interaction, Use Context, Perceived Enjoyment, Perceived Usefulness, Perceived Ease of Use, Attitude Towards Using, Flow, Behavior Intention
11	Dindar (2018)	Flow Theory, Veblen (1994)'s Leisure class theory, Yee (2006)'s online gaming motivations framework	Social Motivation, Immersion motivation, Achievement Motivation, Status Seeking, Merge of Actions and Cognition, Control on Task, Loss of Self-consciousness, Distortion of Time, Autotelic Experience, Game loyalty, Daily Play Time, Levels Reached, Money Spent
12	L. Chen et al. (2018)	An extended SCT	Interpersonal Relations, Self-efficacy, Self-control, Expectation, Play Weekdays, Play Weekends
13	H. Yang & Lin (2019)	Motivational Theory, TAM	Perceived Ease of Use, Perceived Convenience, Perceived Playfulness, Social Influence, Flow Experience, Continuance Intention
14	Xiao (2020)	TRA, Use and Gratification Theory	Achievement, Knowledge, Aesthetics, Drama, Escapism, Social, Attitude, Normative, Subjective Norms, Behavior Intention

No.	Author	Theory or Model	Dimension
15	Ye et al. (2020)	TAM, Flow Theory, Theory of Scenarios, Customer Satisfaction Theory	Perceived Challenges, Perceived Enjoyment, Perceived Novelty, Perceived Cost, Perceived Mobility, Perceived security, Perceived Ease of Use, Continue to Use
16	H. Wang & Lee (2020)	TAM, Social Presence Theory, Flow Theory	Social Presence, Perceived Enjoyment, Concentration, Attitude, Sustainable use intention
17	Mulyawan & Rafdinal (2021)	TAM, TRA	Perceived Ease of Use, Perceived Usefulness, Game Features, Trust to the Game Developer, Attitude, Subjective Norms, Intention to Play Online Games
18	Hollebeek et al. (2022)	Hedonic Consumption Theory, TPB	Escapism, Fantasy, Role-Projection, Emotional Involvement, Enjoyment, Arousal, Sensory Experience, Attitude towards Videogame, Subjective Norms, Perceived Behavioral Control, Videogaming Intention, Videogaming Behavior
19	P. Chung et al. (2022)	An extended TPB	Positive Factors, Negative Factors, Significant others, Personal Conditions, Facilitators, Barriers, Policy, Attitude, Subjective Norms, Perceived Behavioral Control, Behavioral intention
20	Kostopoulos et al. (2022)	TAM	Perceived Fun, Perceived Ease of Use, Perceived Convenience, Attitude towards Mobile Gaming, Intention to Play, Loyalty towards Mobile Games, Intention to Play, Perceived Economic Value
21	C. I. Teng et al. (2022)	SCT, Goal Gradient Theory	Expectancy for Character Growth, Gaming Self-efficacy, Gaming Goal Proximity, Motivation to Attain Gaming Goals, Game Usage
22	Zhao et al. (2022)	TAM	Perceived Ease of Use, Perceived Risk, Preventive Regulatory Focus, Perceived Usefulness, Behavioral Intentions to eSports, Attitude toward eSports
23	M. Ting & Min (2024)	Stimulus-Organism-Response Theory, TAM	Subjective Norms, System Quality, Service Quality, Game Design, Brand Image, Learning Objectives, Entertainment Experience, Perceived Usefulness, Perceived Ease of Use, User Churn

2.2.1.1 Functional and Rational Evaluation Factors

This section categorizes prevalent functional and rational evaluation factors, primarily derived from the widely adopted TAM, including perceived ease of use and perceived usefulness. Attitude is frequently combined with TAM and TPB, as it originates from the TRA framework. In the model, it primarily serves as a mediating variable, guiding the influence of other independent variables on gameplay intention.

2.2.1.1.1 Perceived Ease of Use

Perceived ease of use is well-defined as the degree to which a person believes that using an information system would be free of effort (Kostopoulos et al., 2022; Venkatesh et al., 2003; H. Yang & Lin, 2019). Perceived ease of use shows good predictability for gameplay intention through the mediated effect of attitude (H. Chen et al., 2017; S. Gao et al., 2016; Hsu & Lu, 2004; Kostopoulos et al., 2022; Lee & Tsai, 2010; M. Ting & Min, 2024; H. Yang & Lin, 2019; Ye et al., 2020; Zhao et al., 2022).

However, Mulyawan & Rafdinal (2021) showed an insignificant result in the study of mobile games. One of the questionnaire items they used to measure perceived ease of use is different from other studies. The item is "It is easy for me to master the rules of the games", whereas other studies use phrases like "easy to become skillful" and "learning to play is easy" to describe the degree to which consumers believe that playing a game would be effortless (H. Chen et al., 2017; Mulyawan & Rafdinal, 2021).

Mulyawan & Rafdinal (2021) sourced this item from H. Chen et al. (2017), whose study primarily focused on mobile social games, while Mulyawan & Rafdinal (2021) applied it to analyse general mobile games. The rules of general games, like MMORPG, MOBA, or FPS, is much more complicated than social games, which can be a possible reason for the insignificant result (Lee & Tsai, 2010; Zhao et al., 2022).

2.2.1.1.2 Perceived Usefulness

Perceived usefulness is another key construct in the TAM, but its definition in studies on games is divided into two schools of thought. Some researchers believe it means the degree to which users believe playing enables them to reach hedonic purposes (S. Gao et al., 2016; Hsu & Lu, 2004), while others define it as

the degree to which users believe games would improve their life experience (H. Chen et al., 2017; Mulyawan & Rafdinal, 2021; M. Ting & Min, 2024; H. Yang & Lin, 2019; Zhao et al., 2022). In these studies, the impact of perceived usefulness on attitude and gameplay intention is inconsistent. These fluctuations in significance may stem from differences in its definition. However, this study suggests that the variation in results primarily arises from the different game types examined in these articles.

The influence of perceived usefulness on attitude and gameplay intention may fluctuate due to differences in gaming devices and game genres (H. Chen et al., 2017; S. Gao et al., 2016; M. Ting & Min, 2024; H. Yang & Lin, 2019; Zhao et al., 2022). Mulyawan & Rafdinal (2021) and H. Chen et al. (2017), although using the same scale, presented different results when analysing the influence of perceived usefulness on attitude. Mulyawan & Rafdinal (2021) found significant results when studying general mobile games. In contrast, H. Chen et al. (2017) reported an insignificant result among groups using mobile social games.

Furthermore, perceived usefulness has a significant positive effect on attitude but shows no significant effect on gameplay intention in both computer games and mobile games when using the same questionnaire (S. Gao et al., 2016; Hsu & Lu, 2004). However, H. Yang & Lin (2019) and H. Chen et al. (2017) demonstrated a significant direct effect of perceived usefulness on gameplay intention, using different measurement items within the contexts of general mobile games and mobile social games.

Jang & Byon (2020a) removed perceived usefulness from the ESC model as it is more suitable for analysing utilitarian information systems, while games are hedonic technologies. Using perceived usefulness to predict gameplay intention is challenging, but the present model can still consider this construct under the moderating effect of game genres, as it significantly affects gameplay intention within the contexts of mobile social games, general mobile games, and serious games (Baabdullah, 2018, 2020; H. Chen et al., 2017; M. Ting & Min, 2024; H. Yang & Lin, 2019).

2.2.1.1.3 Attitude

Attitude toward behavior, often abbreviated as attitude, describes an individual's positive or negative feelings toward engaging in specific behavior (P. Chung et al., 2022; Venkatesh et al., 2003). It was first introduced in the TRA and was later widely used in combination with other theories as a mediating variable

(Venkatesh et al., 2003). Attitude plays a significant role in studies on gaming intentions and behaviors. Attitude has a significant direct effect on gameplay intention (Alzahrani et al., 2017; P. Chung et al., 2022; Hollebeek et al., 2022; Hsu & Lu, 2004; Kostopoulos et al., 2022; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; H. Wang & Lee, 2020; L. Wang & Yan, 2015; Xiao, 2020; Zhao et al., 2022).

This study uses UTAUT2 as the foundation to develop an extended model. Attitude is not included as a dimension in extensions of both UTAUT and UTAUT2. Venkatesh et al. (2003) emphasized that attitude has neither a direct nor an indirect significant influence on behavior intention due to the interactive mediation effect from performance expectancy (PE) and effort expectancy (EE). The direct significant effect of attitude on gameplay intention is only observed in models without the inclusion of PE and EE.

In the beginning, UTAUT was designed to analyse utilitarian technology and UTAUT2 was designed to analyse consumer information technology (Venkatesh et al., 2003, 2008). The constructs within UTAUT may have varying effects when predicting different information systems, which represents a form of contextualized effect (Venkatesh et al., 2016). The influence of PE and EE on attitude may also change in the context of strong hedonic information systems, such as games. However, although the role of attitude in gaming intention is highly significant, the influence of PE and EE on attitude has not been empirically validated.

Currently, in the gaming field, the latest ESC model developed based on UTAUT2 has opted to exclude PE but has not examined the potential role of attitude (Jang & Byon, 2020a). This study argues that it is necessary to follow the procedure adopted by Venkatesh et al. (2003) to re-examine the impact of PE and EE on attitude in the current context. This is to determine whether attitude should be given greater emphasis after the removal, or whether the role of attitude can be effectively replaced when PE and EE are included in the model.

2.2.1.2 Social Factors

Among the social factors influencing gameplay intention, this section identifies existing social-related factors, such as social motivation (Dindar, 2018), social interaction (Alzahrani et al., 2017; H. Chen et al., 2017; Lee & Tsai, 2010; Xiao, 2020), social presence (H. Wang & Lee, 2020), social affiliation (Koo, 2009), social influence (H. Yang & Lin, 2019), social norms (P. Chen & Chang, 2010; S.

Gao et al., 2016; Hsu & Lu, 2004), and subjective norms (Alzahrani et al., 2017; Chang et al., 2014; P.-K. Chung et al., 2022; Hollebeek et al., 2022; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; M. Ting & Min, 2024; L. Wang & Yan, 2015; Xiao, 2020) from models and theories including the TAM, SCT, Motivational Theory, TPB, Social Norms Theory, TRA, Social Presence Theory.

Social motivation refers to players' desire to enhance their relationships with other players (Dindar, 2018). Social presence refers to a kind of social interaction state that reflects specific perceived feeling during user-to-user interaction (Alzahrani et al., 2017; Animesh et al., 2011; H. Wang & Lee, 2020). Social affiliation refers to the degree of enjoyment gained from interacting with others during gaming activities, which is also a perception related to enjoyment within social presence (Koo, 2009; H. Wang & Lee, 2020). Social influence, social norms and, subjective norms are conceptually equivalent (S. Gao et al., 2016; M. Ting & Min, 2024; H. Yang & Lin, 2019). P. Chen & Chang (2010) extended the concept of social norms from the user-to-user aspect to the user-to-developer aspect, referring to the developers’ design of game fairness and rules that will influence players' participation.

Based on the definitions of these factors, this study categorizes the social factors identified in previous studies into two groups: social interaction and social influence. Social motivation, social presence, and social affiliation are classified as social interaction factors, while social norms, subjective norms, and social influence are classified as social influence factors.

2.2.1.2.1 Social Interaction (SIT)

Based on the interrelationship among these social factors, this study constructs two dimensions of the research framework. First, social interaction (SIT), an in-game user-to-user interaction, refers to the interactions among two or more players within a game (Lee & Tsai, 2010; Xiao, 2020). Games are a kind of social platform (H. Chen et al., 2017; H. Wang & Lee, 2020). Social interaction describes how players can communicate with each other to enhance virtual or real-life friendships and share game experiences, such as knowledge, strategies, and resources (Lee & Tsai, 2010; Xiao, 2020). It can be viewed as a composite of other constructs related to interactive socialization. Social motivation, social presence, and social affiliation all describe the needs that players aim to fulfill through social activities in games, but each focuses on different aspects (Dindar, 2018; Koo, 2009; H. Wang & Lee, 2020).

Social interaction has a significant positive effect on increasing gameplay time (Dindar, 2018). It has also been shown to positively influence attitude, flow experience, and perceived enjoyment, which contribute to gameplay intention and actual behavior (Alzahrani et al., 2017; H. Chen et al., 2017; Lee & Tsai, 2010; Xiao, 2020). Social presence has a significant positive effect on perceived enjoyment, contributing to gameplay intention (H. Wang & Lee, 2020). Social affiliation also has a significant positive effect on gameplay intention (Koo, 2009). The need for social interaction in games has become a primary factor driving players' gaming behavior. This study incorporates the SIT construct into the research framework to enhance UTAUT2's analytical capability regarding the social dimension.

2.2.1.2.2 Social Influence (SIF)

Social influence, social norms, and subjective norms are conceptually equivalent (S. Gao et al., 2016; M. Ting & Min, 2024; H. Yang & Lin, 2019). They are rooted in Fishbein & Ajzen (1975, p. 302)'s description: "the person's perception that others who are important to he/she think he/she should or should not perform the behavior." All articles in Table 2.1 that include the constructs of subjective norms, social norms, and social influence have highly similar questionnaire measurement items, except for P. Chen & Chang (2010).

Subjective norms significantly affect gameplay intention or gaming behavior (Alzahrani et al., 2017; Chang et al., 2014; P. Chung et al., 2022; Hollebeek et al., 2022; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021). Xiao (2020), in the study on esports games, showed an indirect effect of subjective norms on gameplay intention through attitude. L. Wang & Yan (2015), in a study on general online games, confirmed that the effect of subjective norms on gameplay intention can be mediated by anticipated guilt. Subjective norms are also important factors in stabilizing customer loyalty among serious game players (M. Ting & Min, 2024).

Social influence has a significant direct positive effect on gameplay intention within mobile games (H. Yang & Lin, 2019). Under general online games, social norms have a significant direct impact on gameplay intention (Hsu & Lu, 2004). Social norms are essential factors in predicting gameplay intention within the context of social game (P. Chen & Chang, 2010). However, social norms have very limited direct impact on play intention among mobile game users but show significance in the path mediated by attitude (S. Gao et al., 2016). This suggests that the insignificant result maybe primarily due to the game types collected

relying less on interpersonal social transmission during dissemination and more on in-game system notifications (S. Gao et al., 2016). As a result, the importance of social factors in the analysis is diminished. Differences in game genres demonstrate an impact on the predictive power of social norms.

2.2.1.3 Perceived Enjoyment and Flow Theory

This section discusses perceived enjoyment and Flow Theory used to study gameplay intention. While perceived enjoyment is usually considered a distinct construct in model analyses, some studies include it as part of flow experience.

2.2.1.3.1 Perceived Enjoyment

Perceived enjoyment is one of the most important constructs within hedonic motivation and the key variable in predicting gameplay intention and use behavior (Jang & Byon, 2020a; Venkatesh et al., 2012). Perceived enjoyment has a significant direct positive effect on gameplay intention and an indirect effect through attitude (H. Chen et al., 2017; P. Chen & Chang, 2010; Hollebeek et al., 2022; Koo, 2009; Lee & Tsai, 2010; H. Wang & Lee, 2020; Ye et al., 2020). Some articles did not treat perceived enjoyment as a separate construct but instead incorporated it into the flow experience to produce a significant impact on gameplay intention and game usage (S. Gao et al., 2016; Lee & LaRose, 2007). In the gaming domain, the impact of perceived enjoyment on gameplay intention and actual behavior is relatively consistent and appears to be less sensitive to game genre in existing studies.

2.2.1.3.2 Flow Experience

Flow experience usually refers to the sense of involvement or psychological state in an activity (Alzahrani et al., 2017; Lee & LaRose, 2007). However, when applied in a model, the types of feelings it encompasses can vary, depending on the researcher’s decisions. As discussed above, enjoyment can be one of these aspects (S. Gao et al., 2016; Lee & LaRose, 2007). Lee & LaRose (2007) additionally included merging and concentration in the flow experience, while S. Gao et al. (2016) included immersion in their questionnaire. Lee & Tsai (2010) incorporated loss of time, curiosity, and immersion to construct flow experience. Chang et al. (2014) focused only on the immersion perspective. H. Chen et al. (2017) focused on curiosity only. H. Yang & Lin (2019) included immersion and

loss of self-control. Both Hsu & Lu (2004) and Alzahrani et al. (2017) primarily emphasized entering the flow state within the flow experience. All these analyses suggest the significant impact of flow experience on gameplay intention and game usage.

2.2.1.4 Self-efficacy from Social Cognitive Theory

Self-efficacy is an individual's belief in their ability to organize and execute actions to achieve specific goals, including confidence in effectively using technology (Bandura et al., 1999; Venkatesh et al., 2003). Self-efficacy plays a significant role in enhancing players' intention to engage in gaming (L. Chen et al., 2018; Lee & LaRose, 2007; C. I. Teng et al., 2022). The achievements players gain through gaming reinforce their recognition of their own abilities, continuously encouraging them to engage in further gameplay (Lee & LaRose, 2007). Moreover, the sustained gaming behavior driven by this positive feedback can be regulated as players encounter increasingly challenging tasks. L. Chen et al. (2018) found that student players with low self-efficacy tend to spend more time gaming, whereas those who effectively derive self-affirmation from games tend to play for shorter durations. Additionally, they discovered that self-efficacy plays a significant role in mitigating gaming addiction. Self-efficacy is essential for players' confidence in completing in-game tasks (C. I. Teng et al., 2022). Players with high self-efficacy are more likely to seek out greater challenges to further enhance their sense of competence (L. Chen et al., 2018). Due to their higher self-efficacy, they can also complete tasks in less time compared to those with lower self-efficacy. Therefore, self-efficacy is an important predictor of players' gameplay intention and behavior, as well as a key factor in regulating their gaming time and frequency.

Beyond its direct influence in gaming, evidence from technology adoption research suggests that the relationship between self-efficacy and behavioral intention can be mediated by perceived ease of use (Kulviwat et al., 2014; Venkatesh, 2000). Consistent with Social Cognitive Theory, individuals with greater confidence in their capabilities are more likely to perceive technology-related tasks as manageable and less effortful. This enhanced perception of ease of use subsequently strengthens behavioral intention, indicating that perceived ease of use serves as a mediator through which self-efficacy influences technology-related intentions. However, this mediation mechanism has received limited attention in gaming-related research.

2.2.2 Literature on the Acceptance and Use of Hedonic Information Systems

Rather than being designed for productive purposes, hedonic information systems are designed to provide users with tools to create value, emphasize the enjoyment of use, and promote continued engagement (van der Heijden, 2004). Games are classic examples of such systems (P. Ramírez-Correa et al., 2019; L. Wang & Yan, 2015). Different from Section 2.2.1, which focuses on information system acceptance and use models that contributed to the development of the UTAUT framework, Section 2.2.2 focuses on hedonic information system studies developed outside this theoretical lineage. Table 2.2 summarizes seven studies, encompassing 11 theories and models, as well as one meta-analysis study. The research frameworks of these articles primarily focus on integrating different theories and models to explain hedonic system use and gameplay behavior. Although some selected theories and models include functional evaluation factors, they further incorporate hedonic motivation, enjoyment, flow, and other experiential factors to enhance the analytical capability for studying gamers.

Table 2.2 Past Studies on Acceptance and Use of Hedonic Information System within Game

No.	Author	Theory or Model	Dimensions
1	Z. Wang (2011)	TAM, Hedonic Theory, Flow Theory	Perceived Ease of Use, Attitude, Imaginal Response, Role Projection, Escapism, Pleasure, Flow Experience, Behavioral Intention
2	Lowry et al. (2013)	An extended TAM, Hedonic-motivation System Adoption Model, Flow-based Cognitive Absorption	Perceived Ease of Use, Perceived Usefulness, Curiosity, Joy, Control, Immersion, Cognitive Asorption, Behavioral Intention to Use
3	J. Wu & Holsapple (2014)	Marketing Theory of Hedonic Consumption	Fantasy, Escapism, Role Projection, Emotional Involvement, Enjoyment, Arousal, Subjective Norms, Playfulness, Ease of Use, Usefulness, Behavioral Intention, Usage

No.	Author	Theory or Model	Dimensions
4	H. Li et al. (2015)	Hedonic Information System Continuance Model, Use and Gratifications Theory	Enjoyment, Fantasy, Escapism, Social Interaction, Social Presence, Achievement, Self-Presentation, Continuous Intention
5	X. Wang et al. (2016)	An integrative structural model	Perceived Output Quality, Perceived Aesthetic Experience, Perceived Usefulness, Attitude, Intention to Play
6	Hamari & Keronen (2017)	A Meta-analysis	Perceived Ease of Use, Perceived Usefulness, Attitude, Enjoyment, Play intention
7	Liao et al. (2020)	A conceptual framework based on consistency principle	Gaming Habits, Perceived Price Fairness, Motivation to Attain Gaming Goals, Attain Gaming Goals, Online Gamer Loyalty

Perceived ease of use (Hamari & Keronen, 2017; Lowry et al., 2013; Z. Wang, 2011; J. Wu & Holsapple, 2014), perceived usefulness (Hamari & Keronen, 2017; Lowry et al., 2013; X. Wang et al., 2016; J. Wu & Holsapple, 2014), attitude (Hamari & Keronen, 2017; X. Wang et al., 2016; Z. Wang, 2011), and enjoyment (Hamari & Keronen, 2017; Li et al., 2015; J. Wu & Holsapple, 2014), remain the most commonly used constructs amongy researchers for studying hedonic information systems. The various influencing factors in flow experience have been examined in greater detail (Li et al., 2015; Lowry et al., 2013; Z. Wang, 2011; J. Wu & Holsapple, 2014). Social factors have also been further validated (Li et al., 2015; J. Wu & Holsapple, 2014). The remaining constructs are primarily extensions introduced by researchers to enhance the model's ability to analyse hedonic information systems.

2.2.2.1 Perceived Ease of Use

Perceived ease of use still has a direct impact on gameplay intention, as well as an indirect impact mediated by attitude (Hamari & Keronen, 2017; J. Wu & Holsapple, 2014). However, these effects may be influenced by the game's design orientation toward either utilitarian or hedonic functions. In games with stronger hedonic functions, the influence of perceived ease of use on gameplay intention is noticeably stronger (Hamari & Keronen, 2017; Lowry et al., 2013). Gamers are highly sensitive to the difficulty of using a game; if it is too hard to get started, it can create a barrier for players (M. Ting & Min, 2024). However, for experienced players, the difficulty of the game is no longer a primary concern (Z. Wang, 2011). When using perceived ease of use to study gameplay intention, it is important to distinguish between game types and player characteristics.

2.2.2.2 Perceived Usefulness

The influence of perceived usefulness on gameplay intention also varies noticeably across these articles. As discussed in Section 2.2.1.1 that the design of perceived usefulness scales may be a potential reason for the differences in significance. The articles in this section further support this point.

When the scale items for perceived usefulness are phrased similarly to their design for studying utilitarian information systems, their direct influence on gameplay intention is weakened and becomes highly dependent on the mediating effect of attitude (S. Gao et al., 2016; Hsu & Lu, 2004; X. Wang et al., 2016; J. Wu & Holsapple, 2014). When the scale is designed to show that playing the game can enhance a specific positive state in a player's life, it demonstrates a stronger influence (Hamari & Keronen, 2017; Lowry et al., 2013; Mulyawan & Rafdinal, 2021; H. Yang & Lin, 2019). The scope and number of these positive states are determined by researchers based on their specific needs, primarily focusing on various psychological states. This design allows perceived usefulness to be conceptually inclusive, directly encompassing certain constructs. However, it also creates a significant deviation from its original conceptual design.

2.2.2.3 Flow Experience

Z. Wang (2011) included the psychological states of enjoyment, concentration, and time distortion in the flow experience, forming a single construct that significantly influences attitude. In contrast, role-projection and escapism were

treated as separate constructs, with their effects on attitude mediated by the flow experience (Z. Wang, 2011). Subsequent studies confirmed that escapism, as an independent construct, significantly influences gameplay intention (Li et al., 2015; J. Wu & Holsapple, 2014).

Lowry et al. (2013) initially treated curiosity, joy, immersion, and control as separate constructs to examine their effects on gameplay intention. The results showed that curiosity and joy had a significant impact on gameplay intention, whereas immersion and control did not. Subsequently, Lowry et al. (2013) integrated control, curiosity, joy, focused immersion, and temporal dissociation into the construct of cognitive absorption, which was found to be a significant predictor of gameplay intention.

In the study on Massive Multiplayer Online Role-Playing Games (MMORPGs), J. Wu & Holsapple (2014) found that escapism, enjoyment, and arousal significantly influence gameplay intention, while fantasy, role projection, and emotional involvement have a limited impact. This may be because MMORPGs do not primarily rely on these experiences to attract players. In contrast, among players of social network games, fantasy has a significant influence on gameplay intention (H. Li et al., 2015). In virtual games, players can accomplish grand achievements that are impossible in real life. This ability to fulfill large-scale fantasies about reality is one of the key characteristics of social network games.

2.2.2.4 Social Factors

H. Li et al. (2015) demonstrated that social presence and social interaction have a significant positive impact on gameplay intention in social network games. J. Wu & Holsapple (2014) found that subjective norms do not significantly influence gameplay intention in MMORPGs. This result may be because the study participants were experienced players with several years of gaming experience, making them less concerned about others' opinions. Moreover, more experienced gamers may exhibit greater indifference when confronted with opposition to gaming from others (Jang et al., 2021a). When selecting a player group, researchers should consider that the distinction between beginner and experienced gamers may influence the research findings (Venkatesh et al., 2016).

2.2.3 Information Systems Acceptance and Use Models Used for Problematic Gaming Behavior

This study identifies 15 studies on problematic gaming behavior within the field of IS acceptance and use, which are presented in Table 2.3. These articles incorporate theories and models such as the TPB, TAM, SCT, CBM, Motivational Theory, and Flow Theory. The primary approach involves integrating these IS acceptance and use models with other theoretical frameworks to examine their effectiveness in studying problematic gaming behavior. This section primarily focuses on the predictive capability of variables from IS acceptance and use models and theories in relation to problematic gaming behavior.

Table 2.3 Past Studies Link IS Acceptance and Uses Model and Problematic Gaming Behavior

No.	Author	Theory or Model	Dimension
1	M. Liu & Peng (2009)	Cognitive and psychological factors	Psychological dependency on MMOG, preference for a virtual life, social control skills, loneliness, depression, physical problems, personal life problems, Academic/Professional problems
2	Haagsma et al. (2013a)	CBM	Preference for Online Social Interaction, Mood Regulation, Deficient Self-regulation, Negative Outcome, Cognitive Preoccupation, Compulsive Game Use
3	Haagsma et al. (2013b)	TPB	Descriptive Norm, Social Pressure, Attitude, Subjective Norm, Perceived Behavioral Control, Intention to Play Too Much, Playing Time, Problematic Game Use
4	Dong & Potenza (2014)	CBM	Decision Making: Immediate reward, long-term negative consequences; Stress Relief: trauma, recent/current stressors; Reward Sensation: reward sensitivity, cognitive bias to internet; Executive Control: response inhibition, error monitoring, executive function; Seeking Motivation; Behavior

No.	Author	Theory or Model	Dimension
5	Brand et al. (2014)	A new theoretical model underlying cognitive mechanisms	Psychopathological aspects: Depression, Social Anxiety; Personality aspects: Self-esteem, Self-efficacy, Stress; Social aspects: Loneliness Emotion, Social Support; Dysfunctional coping: Suppression, Maladaptive Problem Solving, Avoidance; Internet use expectancies: Positive Expectancies, Avoidance Expectancies; General Internet Addiction: Loss of Control/Time Management, Craving/Social Problems.
6	Lee et al. (2014)	Positive-negative Reinforcement Perspective	Perceived Enjoyment, Withdrawal, Positive Affect, Negative Affect, Excessive Use of MMOGs
7	King & Delfabbro (2014)	CBM, SLR	Maladaptive and inflexible rules about gaming: Sunk Cost Bias, Behavior Completion, Procrastination/Prioritization Rule-setting; Gaming-based Self-esteem: Gaming Self-esteem, Positive/Negative Expectancy; Gaming as a means of gaining social acceptance: Control, Vulnerability, Achievement, Social Relatedness, Competition Social Avoidance, Sense of Acceptance and Belonging.
8	Park et al. (2016)	Personal characteristics	Self-esteem, Impulsivity, Comorbidity, Social Interaction Status, Cognitive Function, Game Genres
9	Wei et al. (2017)	The Theory of Consumption Value, CBM	Social Migration, Offline Social Value, Maladaptive Cognitions, Online Game Loyalty, Online Game Addiction
10	C. Chen et al. (2019)	SCT	Intention to Decrease, Thought Suppression; Intrusive Thought, Impulsive Playing, Ubiquity, Perceived Difficult, Perceived Deficient Self-efficacy, Decreased Playing Behavior
11	X. Yang et al. (2021)	Socio-demographic, Anthropometric, Cognitive factors	Body Esteem, Self-esteem, Preference for Online Social Interaction, Player-avatar Identification

No.	Author	Theory or Model	Dimension
12	Lee et al. (2021)	Hedonic Management Model, technology affordance perspective	Achievement Affordance; Social Affordance; Immersion Affordance; Perceived Positive Mood Enhancement; Perceived Negative Mood Reduction; MMORPG Addiction
13	L. Wang et al. (2022)	CBM, Social Development Model	Perceived Discrimination, Deviant Peer Affiliation, Maladaptive Cognitions, Internet Gaming Addiction
14	Chatterjee et al. (2022)	Social Exchange Theory, Social Networking Theory, Motivational Theory, TAM	Shared Identity, Social Interaction, Social Norm, Hedonic Attitude, Utilitarian Attitude, Behavioral Intention to Play Mobile Games, Actual Playing of Mobile Games, Addiction to Mobile Games.
15	Hew et al. (2024)	Stimulus-Organism-Response Theory, Flow Theory, Rational Addiction Theory	Immediacy, Social Interaction, Competition, Flow (Heightened Enjoyment, Temporal Dissociation, Focused Immersion), Online Game Addiction, Subjective Happiness

CBM emphasizes that personal cognition plays a key role in shaping an individual's emotions and behavior when responding to environmental situations, while SCT focuses on the reciprocal interaction between individual cognition or behavior and the environmental situation (Carillo, 2010; González-Bueso et al., 2018; Kalodner & Powers, 2016). Learning theory, which serves as the foundation of SCT, is also one of the key theoretical orientations of CBM, acting as a bridge that links SCT and CBM (Bandura, 1986; González-Bueso et al., 2018). This is also one of the theoretical justifications for integrating CBM into the development of UTAUT2 in this study.

The research on gameplay intention based on SCT usually examines an individual's belief that playing a game can solve some emotional and cognitive situations influenced by the environment, thereby leading to the intention to play games (C. Chen et al., 2019). CBM-based research focuses on which individual emotions or behaviors affected by the environment will potentially lead to a certain degree of problematic game behavior (King & Delfabbro, 2014). This section, based on UTAUT's adoption of SCT, selects and discusses constructs primarily from CBM that are beneficial to the research framework of this study. Other theories and models that involve related constructs are also included as part of the theoretical support. By integrating commonalities, the goal is to enhance the research framework 's predictive capability for gameplay intention and IGD.

2.2.3.1 Social-related Factors

In research on problematic gaming behavior, social-related factors within broader cognitive frameworks have received widespread attention. Social interaction is highly correlated with problematic gaming behavior (Chatterjee et al., 2022; Haagsma et al., 2013a; Hew et al., 2024; Park et al., 2016; X. Yang et al., 2021). Players with addictive tendencies are more likely to engage in social interactions online rather than face-to-face communication in real life (Chatterjee et al., 2022; Haagsma et al., 2013a; Hew et al., 2024; X. Yang et al., 2021). These players often exhibit a certain degree of avoidance toward real-life social interactions, along with social anxiety, social pressure, and depressive emotions (Brand et al., 2014; Haagsma et al., 2013b; King & Delfabbro, 2014; M. Liu & Peng, 2009; Park et al., 2016). To cope with emotional distress and fulfill their social needs, interacting with in-game players becomes the primary strategy. The positive reinforcement of meeting social needs through gaming also leads players to invest more time, effort, and money, further deepening their immersion in the game (Chatterjee et al., 2022).

Moreover, a lack of social skills and competence in real-life interactions can drive individuals to seek social engagement online (King & Delfabbro, 2014; M. Liu & Peng, 2009). Games provide a supportive social environment where players can interact more easily and form groups (Lee et al., 2021). The achievements gained in the game and the sense of belonging within gaming communities can also extend to real-life social interactions (King & Delfabbro, 2014; Wei et al., 2017). Players often form groups with friends who play the same games in real life, encouraging and reinforcing further gaming behavior (Chatterjee et al., 2022;

Haagsma et al., 2013b; Wei et al., 2017). Games effectively fulfill players' social needs in both virtual and real-life contexts, making them a highly efficient social tool. However, these social interactions also encourage prolonged gaming behavior, potentially contributing to problematic gaming tendencies.

2.2.3.2 Self-efficacy

Low self-efficacy has been shown to play an important role in increasing the risk of problematic gaming behavior (Brand et al., 2014; C. Chen et al., 2019). This result is also consistent with the study in Section 2.2.1.4, which found that self-efficacy has a directly significant negative effect on time spent playing computer games (L. Chen et al., 2018). Self-efficacy is derived from the personality trait, related to outcome expectation, and has been widely applied within SCT (Brand et al., 2014; Carillo, 2010; Compeau & Higgins, 1995; King & Delfabbro, 2014). Venkatesh (2000) and Venkatesh et al. (2003) incorporated self-efficacy and personal outcome expectation into model estimation and showed that the significant direct effect of self-efficacy on use intention can be fully mediated by perceived ease of use, which is contained in effort expectancy. Meanwhile, the mediating effect of perceived ease of use has been examined within utilitarian information system; whether it will have the same mediate effect in hedonic information systems needs further examination.

2.3 Mainstream Mental Health Problem Associated with Internet Gaming Disorder

2.3.1 Internet Gaming Disorder Symptoms and Risks

IGD is an abnormal gaming behavior resulting from excessive gameplay and excessive fulfillment of psychological needs (X. Liu et al., 2011). Individuals with IGD often regulate and express negative emotions through gaming, using it as a coping mechanism (Blasi et al., 2019). IGD arises from both individual and environmental factors, often influenced by the combined effects of these factors. Environmental factors include family, school, early life experiences, and peers, while individual factors include personality traits, motivational factors, and comorbid psychopathology (Király et al., 2023; Xi & Hu, 2022). Király et al. (2023) concluded that personal factors are key determinants in the development and persistence of IGD, while environmental factors serve as the primary driving force.

From the perspective of personal traits, X. Yi & Li (2006) found that IGD is associated with sensation seeking, loneliness, and social communication anxiety. González-Bueso et al. (2018) stated that IGD is strongly associated with anxiety, attention-deficit/hyperactivity disorder (ADHD), social phobia, and obsessive-compulsive symptoms. Depressive symptoms and anxiety are associated with long-term IGD (Z. Teng et al., 2021). Adams et al. (2018) provided evidence that higher anxiety is associated with increased IGD symptoms both cross-sectionally and longitudinally.

In terms of environmental factors, among players with high anxiety, those with strong family cohesion are less likely to develop IGD (Adams et al., 2018). However, when family cohesion reaches a certain threshold, its protective effect diminishes. Supportive family environments, lower national economic inequality, and higher fiscal spending on families and children may be associated with reduced levels of adolescent problematic game behavior (Colasante et al., 2022). Parents' excessive interference, the level of communication with parents, and academic stress all have a significant impact on IGD (Jeong et al., 2019). Cultural environments also influence the prevalence of IGD, with Asian countries reporting higher IGD rates compared to other regions (Stevens et al., 2021). The impact of school and peers on IGD mainly stems from social factors. The qualities,

interests, gaming habits, and social interactions of those around an individual can all influence their gaming behavior (Király et al., 2023).

Players may develop IGD due to various environmental or individual factors. However, continued IGD can also exacerbate existing negative psychological conditions or lead to new ones. Playing games may lead to more negative consequences when individuals use gaming as a coping strategy for psychological distress (Lewinson et al., 2023). Excessive gaming can enhance emotional distress, leading to worsening IGD symptoms and life difficulties (Wong et al., 2020). Depression and aggression are both major risk factors for IGD and potential outcomes of IGD (Çınar Özbay et al., 2024; T. Gao et al., 2023; Tomska et al., 2022; Zhou et al., 2023). Depression is a common comorbid condition of IGD and can significantly increase psychological distress (H. R. Wang et al., 2018). IGD is also comorbid with suicidality, anxiety, impulsivity, attention-deficit/hyperactivity disorder (ADHD), harm avoidance, and procrastination (Kuss et al., 2021). Sleep disorders, loneliness, depression, anxiety, and stress are all highly correlated with IGD (Alimoradi et al., 2024). The co-occurrence of IGD and psychological issues remains a major focus in clinical psychology research.

Game genres exert differential effects on IGD and are a key concern in IGD clinical research. Impulsivity has been identified as a predictor of IGD among first-person shooter (FPS) games, real-time strategy (RTS) games, and sports games players, while poor self-control serves as a predictor for RTS and MMORPG players (Na et al., 2017). FPS players with IGD tend to have higher impulsivity levels (Metcalf & Pammer, 2013; Mun, 2023). RTS players exhibit a higher need for self-esteem, which is significantly positively correlated with IGD (Park et al., 2016). MMORPG players often experience high social anxiety, which is positively correlated with IGD, whereas RTS players tend to have lower social anxiety levels (Park et al., 2016). Depression and anxiety appear to have a relatively minor effect on the relationship between Multiplayer Online Battle Arena (MOBA) players and IGD (Bonnaire & Baptista, 2019). However, the need for escapism among MOBA players plays a key role in increased playing time and poor mental health (Goh et al., 2019). The relationship between IGD and various psychological issues manifests differently across game genres, which is a key focus in the field of clinical psychology.

2.3.2 Key Components of Emotion Coping in the Current Context

An individual who plays games for emotional coping may be at risk of addction (Lewinson et al., 2023). Emotion coping refers to the extent to which individuals experiencing emotional stressors tend to use games as a means of recovery (Lazarus & Folkman, 1987; Reinecke, 2009). Self-recovery through gaming is primarily used to cope with emotional problems (Reinecke, 2009; Yeh & Chen, 2024). Even though emotion-focused coping may not directly address stress-inducing difficulties, it can still enhance an individual's problem-solving abilities by alleviating stress-related emotional distress (Reinecke, 2009). However, this coping strategy can be risky. Long-term stress may worsen if the underlying issue remains unresolved, leading the player to continue using games (Lewinson et al., 2023; Reinecke, 2009). This suggests that using games as an emotional coping mechanism may lead to more serious problems in the long run (Lewinson et al., 2023).

Based on research in clinical psychology, this study identifies three key components of emotion coping in the current context: depression, anxiety, and impulsivity. These components are selected as the primary emotional issues under the emotion coping construct. Systematic literature reviews have highlighted that among the many psychological issues associated with gaming addiction, depression, anxiety, and impulsivity are particularly significant (González-Bueso et al., 2018; Király et al., 2023; Kuss et al., 2021). When multiple emotional issues coexist, players face a higher risk of addiction (González-Bueso et al., 2018). Attention to depression, anxiety, and impulsivity in the field of internet gaming addiction has been increasing, as addicted gamers tend to rely more on gaming to relieve emotional stress compared to non-addicted gamers (Bonnaire & Baptista, 2019; Kuss et al., 2021).

Players tend to engage in impulsive gaming behavior when experiencing emotional stress (Kuss et al., 2021; Lee et al., 2019; Schreiber et al., 2012). When faced with sudden emotional difficulties, they often prioritize gaming to relieve stress. Impulsive players require substantial self-control to regulate their gaming behavior, yet a key characteristic of addicted gamers is the loss of self-control (C. Chen et al., 2019; Schreiber et al., 2012).

During the COVID-19 pandemic, the risk of gaming addiction among adolescents increased significantly due to heightened depression and anxiety (Alimoradi et

al., 2024; Brand et al., 2014; Lewinson et al., 2023; Pallavicini et al., 2022; Z. Teng et al., 2021). Prolonged confinement indoors led to emotional fluctuations, making it more difficult for gamers to regulate their emotions. Online games gained wider attention as a means of maintaining extensive interaction with the outside world without leaving home, providing players with relief from negative psychological and emotional stress (Z. Teng et al., 2021).

This study extends the analytical scope of UTAUT2 to examine users' attitudes toward using games as a means of managing emotional stress and identify potential factors contributing to addiction risk. Emotion coping, including depression, anxiety, and impulsivity, is analysed as a predictive construct for gameplay intention and IGD in the research framework.

2.4 The Theoretical Foundation of Applying UTAUT2 in the Gaming Context

Understanding people's intention to use information technology and subsequent usage behavior is important in the field of information systems research. The Unified Theory of Acceptance and Use of Technology (UTAUT), as shown in Figure 2.1, is a theoretical framework that integrates eight technology acceptance and use models. It was originally developed to examine the factors influencing employees' intention to adopt new information technology in the workplace (Venkatesh et al., 2003). UTAUT was originally designed to study utilitarian information systems. Utilitarian information systems are intended for productive purposes and for enhancing user performance and efficiency. As a result, one major strategy adopted by developers is to align system functionality with task requirements while minimizing disruptions to assist users in completing their tasks (van der Heijden, 2004; Venkatesh et al., 2003).

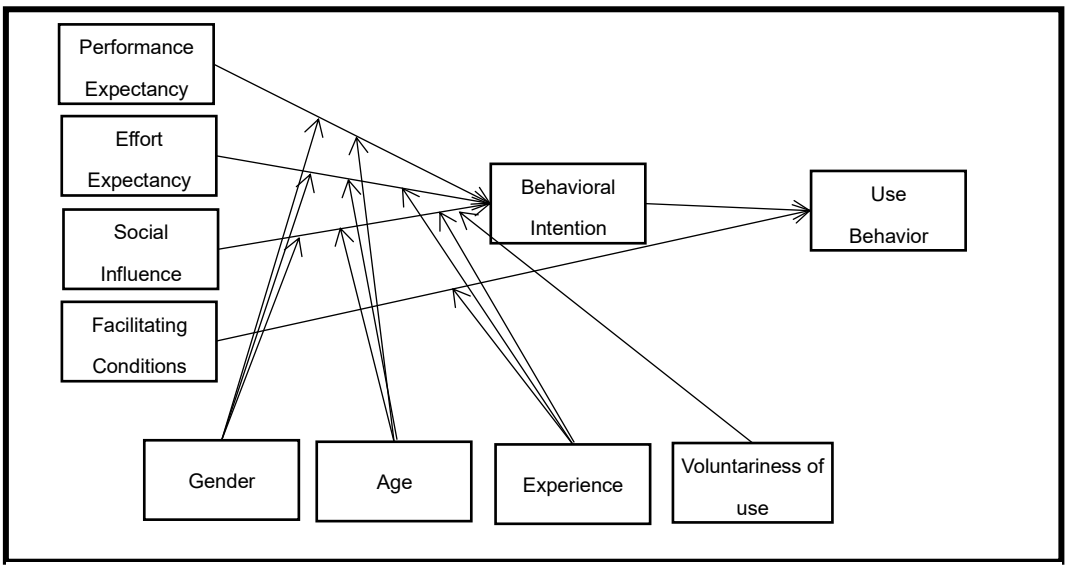


Figure 2.1 The Unified Theory of Acceptance and Use of Technology

UTAUT2, as shown in Figure 2.2, extends UTAUT to a consumer perspective, with hedonic motivation, price value, and habit added as new constructs, as consumer technologies are commonly used for leisure (Venkatesh et al., 2012). UTAUT2 has also been used to study the factors affecting the acceptance and use of online games. In Table 2.4, this section lists 16 existing studies that use UTAUT2 to examine issues related to online games, and three additional studies

that discuss development of UTAUT and UTAUT2 (due to space limitations, the table is placed at the end of this section).

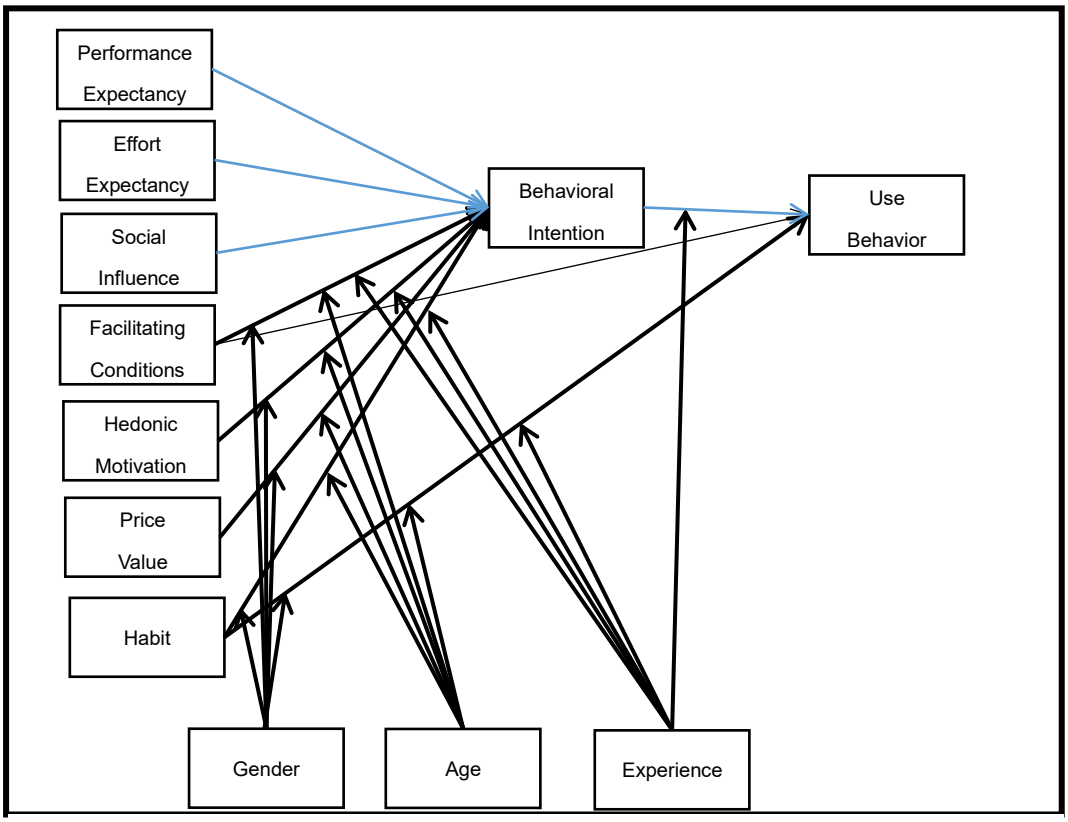


Figure 2.2 The Extended Unified Theory of Acceptance and Use of Technology

This study selects UTAUT2 as the theoretical basis mainly because of its comprehensive dimensions and high degree of extensibility (Venkatesh et al., 2016). The goal of UTAUT2 is to help designers design products that align with the values that consumers seek to fulfill (Venkatesh et al., 2012). UTAUT2 analyses information technology by considering both its utilitarian and hedonic perspectives. Although performance expectancy, effort expectancy, social influence, and facilitating conditions were originally designed for utilitarian information systems, Venkatesh et al. (2012) adapted their definitions in UTAUT2 to make these constructs more applicable to the study of consumer technology adoption. Although games are often considered a form of information technology primarily used for entertainment, some games can also be beneficial for work or daily life (Baabdullah, 2018, 2020). A comprehensive model can help this research better compare the differences in game design and how they offer varied experiences and functionalities to consumers (Mestre-Bach et al., 2022).

Table 2.4 Past studies link UTAUT2 and Gameplay intention

No.	Author	Description	Constructs
1	Venkatesh et al. (2003)	A unified model, known as the Unified Theory of Acceptance and Use of Technology (UTAUT), was developed with four core determinants of intention and usage, along with up to four moderators, from an organizational perspective.	Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SIF), Facilitating Conditions (FC); Gender, Age, Experience, Voluntariness of Use; Behavioral Intention (BI), Use Behavior (UB).
2	Venkatesh et al. (2008)	Building on UTAUT's two main predictors of individual-level system use, this study introduces behavior expectation as a new predictor to enhance the understanding of information system use.	BI, FC, Behavioral Expectation; Use Duration, Use Frequency, Use Intensity; Gender, Age, Experience.
3	Venkatesh et al. (2012)	UTAUT2, a model focused on the consumer aspect of information technology acceptance and use, extends UTAUT.	PE, EE, SI, FC, Hedonic motivation (HM), Price Value (PV), Habit (HA); BI, UB; Age, Gender, Experience.
4	X. Xu (2014)	Applied UTAUT2 to identify the key predictors of social network game players' continuance play intention, with moderate effect of individual characters.	Achievement, SIF, Perceived Enjoyment, Fantasy, Price Value, Habit; Age, Gender, Experience.
5	Harborth & Pape (2017)	Investigate the technology acceptance factors of Pokémon Go using a PLS-SEM approach based on UTAUT2.	PE, EE, SI, FC, HM, PV, HA; BI, UB
6	Baabdullah (2018)	Identify the various factors that may influence the intention to use mobile social network games among potential Saudi users, based on UTAUT2 and the additional factor of trust.	PE, EE, FC, SI, PV, HM, Trust; BI
7	Brigido et al. (2019)	Analyze the acceptance and use of mobile online games using PLS path modeling based on an adjusted UTAUT2.	PE, EE, SI, FC, PV, HM, HA; BI, UB

No.	Author	Description	Constructs
8	P. Ramírez-Correa et al. (2019)	Analyze the acceptance of mobile online games using UTAUT2.	PE, EE, SI, FC, HM, PV, HA; BI, UB
9	Baabdullah (2020)	Investigate the factors influencing the adoption of mobile social network games in Saudi Arabia, based on UTAUT2 and the additional factor of awareness.	PE, EE, SI, FC, HM, PV, Awareness; BI
10	Harborth & Pape (2020)	Incorporate nostalgic feelings into UTAUT2 to analyze the intention to play Pokémon Go.	Childhood Brand Nostalgia; HA, PE, EE, SI, HM, PV, FC; BI, UB
11	Jang & Byon (2020a)	Examine the antecedents and consequences of esports gameplay by proposing the Esports Consumption Model (ESC), an extension of UTAUT2.	EE, SI, HM, PV, HA, Flow; Esports Gameplay Intention, Esports Gameplay Behavior, Media Consumption of Esports Events; Player Identification, Team Identification, Gender.
12	Jang & Byon (2020b)	Identify three categories of esports game genres and examine their impact on the relationship between antecedents and consumers' esports gameplay intention	HM, HA, PV, EE, SI, Flow; Esports Gameplay Intention; Gender. Moderators: Imagination, Physical Enactment, Sport Simulation.
13	Jang & Byon (2021)	Examined the gender differences in the Esports Consumption Model.	EE, SIF, PV, HM, HA, Flow
14	Jang et al., (2021b)	Examine the interaction effects of gender and game genre on the relationship between esports gameplay intention and its drivers.	EE, SI, HM, PV, HA, Flow; Esports Gameplay Intention; Moderators: Imagination, Physical Enactment, Sport Simulation; Male, Female.

No.	Author	Description	Constructs
15	Jang et al., (2021a)	Examine the impact of prior esports gameplay experience on its antecedents and consequences.	HM, HA, PV, EE, SI, Flow; Esports Gameplay Intention; Live Esports Streaming Content. Moderators: High Frequency of Esports Gameplay, Low Frequency of Esports Gameplay.
16	Ong et al. (2023)	Explore the factors affecting the behavioral intention to play Mobile Legends: Bang Bang by combining UTAUT2 with the System Usability Scale	HM, HA, EE, PE, FC, Perceived Usefulness, Perceived Usability, Security, SIF; BI, System Usability Scale.
17	Kesuma & Princes (2024)	Propose an extended model for mobile Gacha game acceptance, derived from UTAUT2 and incorporating structural video game characteristics and psychological factors.	EE, HM, HA, Presentation Features, Narrative & Social Features, Reward Features, Punishment Features, Control/Manipulation Features, Trust to Game Development; Perceived Enjoyment, Continuance Gaming Intention.
18	Hattingh et al. (2024)	Identify the factors influencing Generation Y amateur gamers' ongoing eSports gameplay intentions using UTAUT2 as its framework.	FC, HM, EE, Flow, SIF, PV, HA; BI
19	Adiputra & Arief (2024)	Investigated the factors influencing the adoption of mobile eSports games in Indonesian, based on the Esports Consumption Model	EE, SIF, HA, Flow

Games, as a form of information technology, require users to make initial choices before engaging in gameplay to assess whether a game could meet their needs. After making a choice, the consumer starts playing the game to evaluate whether it satisfies their needs. If

their needs are met, game consumption behavior is likely to be sustained. Game designers and manufacturers compete by continuously developing new games to attract consumers. Consumers continuously engage in choosing, trying, and playing new games. A well-designed game can consistently attract consumers to invest their resources and time (Tobon et al., 2020). Therefore, consumers and market regulators need to assess whether a game has the potential to cause excessive usage or even lead to addiction. UTAUT2 can examine the phases of technology adoption: initial adoption, early usage, and post-adoptive use (Venkatesh et al., 2016). Compared to other technology acceptance models, UTAUT2 more effectively explains consumer behavior from initial choice to sustained engagement (Jang & Byon, 2020a).

UTAUT2's design allows researchers to modify the model by adding or removing moderators as needed. In different contexts, introducing a new moderating mechanism contributes to the contextualization of UTAUT (Venkatesh et al., 2016). Based on UTAUT2, the ESC model incorporates hedonic motivation, habit, price value, effort expectancy, social influence, and flow as predictors for gameplay intention and media consumption (Jang & Byon, 2020a). The ESC model extends UTAUT2 by introducing game genres as a new moderator (Jang & Byon, 2020b). It explores the motivations behind consumers' choices and their use of hardware and software in gaming. The effectiveness of using game genres as a moderator in UTAUT2 has been tested, demonstrating differences between game types in attracting and satisfying consumer needs (Jang et al., 2021b; Jang & Byon, 2020b). This study also employs game genres as a moderator but utilizes different categorization criteria compared to previous studies. UTAUT2's flexible design allows researchers to better apply its analytical capabilities across different fields.

2.4.1 The Relationship between Gameplay Intention and Use Behavior

From a motivational psychological perspective, behavioral intention refers to consumers' purpose or urge to consume prior to actual behavior (Ajzen, 1991). Behavioral intention can be a reliable indicator of future customer behavior (Ajzen, 1991; Morwitz, 2014). Consumers accumulate knowledge about information technology, which contributes to the formation of consumption intentions. The stronger the intention, the more likely it is to lead to actual consumption behavior. Venkatesh et al. (2008) extended the concept of use behavior to include frequency, duration, and intensity. These three dimensions allow use behavior to be redefined as ongoing rather than a one-time event at a specific point in time (Straub et al., 1995; Venkatesh & Morris, 2000). In the research framework, the use behavior construct adopts the concept of behavior as a ongoing state, rather than referring to whether the behavior has actually occurred.

Gameplay intention is important in generating actual gaming behavior (Jang & Byon, 2020a). This section collects and analyses the formation of gameplay intention within UTAUT2. Players evaluate whether a game satisfies their needs before forming consumption intentions, which are then transformed into actual behavior (Brigido et al., 2019). Seven studies have applied UTAUT2 to examine the intentions and actual behaviors of gamers playing games such as Pokémon Go (Harborth & Pape, 2017, 2020), Mobile Legends: Bang Bang (Ong et al., 2023), mobile online games (Brigido et al., 2019; P. Ramírez-Correa et al., 2019), and esports games (Jang et al., 2021a; Jang & Byon, 2020a).

The intention to try a game is a significant factor in producing the actual behavior of playing. Most articles primarily analyse general actual gameplay behavior, while some focus on other specific game-related extended behaviors. Jang & Byon (2020a) evaluated how esports gameplay intention affects the frequency of actual gameplay behavior over six months and concluded that it also influences media consumption of esports events in the final stage. Jang et al., (2021a) further found that esports gameplay intention had a significant positive correlation with viewing live esports streaming content among players with low gaming frequency. Ong et al. (2023) introduced the System Usability Scale into the actual behavior construct to study the effect of gameplay intention on the sustainability of the esports business. In addition, six studies using the UTAUT2 framework did not cover the use behavior construct and only examined the effects of motivation

predictors on use intention (Baabdullah, 2018, 2020; Hattingh et al., 2024; Jang et al., 2021b; Jang & Byon, 2020b; Kesuma & Princes, 2024).

UTAUT2 has been used to study both computer-based and mobile-based games, demonstrating a strong ability to predict gameplay intention and use behavior. However, the number of UTAUT2 applications in the gaming field remains limited, and there is a lack of comprehensive studies comparing different game types. Future research may seek to integrate computer and mobile gaming to evaluate UTAUT2's effectiveness in the gaming industry from a broader comparative perspective (Jang & Byon, 2020a; Ramírez-Correa et al., 2019). Additionally, applying UTAUT2 to new topics in the gaming field is recommended. For instance, future studies could explore how different game designs appeal to consumers, how game addiction influences game design, or how UTAUT2 can be applied to research on adolescents and young adults (Hattingh et al., 2024; Kesuma & Princes, 2024; P. Ramírez-Correa et al., 2019).

2.4.2 The Relationship between Performance Expectancy and Gameplay Intention

Performance expectancy (PE) is defined as the extent to which using technology in daily life provides benefits for individuals in specific activities (P. Ramírez-Correa et al., 2019; Venkatesh et al., 2012). In particular, using information technology in daily life can enhance a user's performance in other activities (Venkatesh et al., 2012). If information technology does not help users achieve their goals or improve their experience in other activities, they will not choose it, even if it performs its tasks well (Davis, 1989; Venkatesh et al., 2003).

Performance expectancy was first used to demonstrate that using an information system can enhance employee performance in jobs or tasks (Venkatesh et al., 2003). In the consumption context, performance expectancy explains how consumers' use of information technology can enhance their performance in various activities beyond work (Venkatesh et al., 2012). Information technology in the consumer context is designed to attract users, with the developer's primary goal being profit rather than improving work performance. However, in the context of gaming, the effect of performance expectancy on gameplay intention is relatively limited.

A game is a type of information technology designed to encourage players to frequently spend both time and money (Asadi & Hemadi, 2018). Consumers primarily use games for entertainment rather than for accomplishing other tasks, leading researchers to argue that performance expectancy is not a suitable predictor of gameplay intention (Jang & Byon, 2020a; Ong et al., 2023). Several studies eliminate performance expectancy from UTAUT2 directly (Hattingh et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Kesuma & Princes, 2024). In the study on Mobile Legends: Bang Bang, Ong et al. (2023) demonstrated that performance expectancy had no significant effect on gameplay intention. Both P. Ramírez-Correa et al. (2019) and Brigido et al. (2019) demonstrated similarly insignificant results in their studies on general mobile online games. Players are more motivated by relaxation rather than using the game to enhance their academic or work performance (Ong et al., 2023; P. Ramírez-Correa et al., 2019).

However, some games that support social factors have shown that performance expectancy significantly predicts gameplay intention. Mobile social network games that foster closer relationships by enabling users to connect and share

online or support an online workplace have been shown to enhance user productivity and quality of life (Baabdullah, 2018, 2020). Research shows that playing Pokémon Go can improve social connections, health, and interpersonal collaboration (Harborth & Pape, 2017, 2020). These games can help users in their personal lives and even at work. In Jang & Byon's (2020b) study, despite eliminating performance expectancy, they found that players of sports simulation games improved their real-life physical activity due to their in-game experiences. This demonstrates how playing sports-related online games can increase a player's willingness to exercise or engage in physical activity directly through the game. These studies guide future research, suggesting that performance expectancy may perform poorly for the overall game category but may still show strong predictive power in certain life-enhancing games.

2.4.3 The Relationship between Effort Expectancy and Gameplay Intention

Effort expectancy (EE) is defined as the degree of ease with which consumers use a technology (Jang & Byon, 2020a; Venkatesh et al., 2012). When people encounter information technology, they are likely to refuse to use it if they find it difficult to start or operate (Venkatesh et al., 2003). Information technology can present barriers to entry in terms of operability and practicality for new users (Jang & Byon, 2020a; Kesuma & Princes, 2024). Balancing functionality and ease of use is often a challenge for information technology, requiring designers to prioritize ease of use to attract user adoption and consumption (Venkatesh et al., 2012). Technology that improves efficiency in one context may be easy to use for that context but difficult to apply in others (Venkatesh et al., 2003). Designers need to manage the difficulty level of the technology to ensure it meets user expectations.

In the context of games, game genres can vary significantly in their user interface, gameplay mechanics, and background design (Jang et al., 2021b; Jang & Byon, 2020b). Players may perceive varying levels of difficulty across different game categories, influencing their intention to play and their future gaming behavior (Jang & Byon, 2020b). Prior studies suggest that effort expectancy is a key indicator of a player's perceived ease of use of games. Effort expectancy within UTAUT2 has been widely used to study players' perceptions of game difficulty in both mobile and computer gaming (Jang & Byon, 2020a; P. Ramírez-Correa et al., 2019).

Computer games place high physical and mental demands on players during gameplay (Jang & Byon, 2020a). Playing computer games requires one hand for mouse control and the other for keyboard input, involving a large number of keys. Certain games, such as physical enactment games, demand higher reaction speeds from players (Jang & Byon, 2020b). These speeds involve faster visual perception, brain processing, and hand coordination than other types of games (Hallmann & Giel, 2018). However, mobile game players perceive the ease of operation less strongly than computer game players (Adiputra & Arief, 2024; Brigido et al., 2019; Ramírez-Correa et al., 2019). Mobile games require less equipment than computer games, as players only need to click and touch on a screen to complete all operations. Prior studies indicate that the role of effort expectancy in gameplay intention varies across media types. However, there is

still a lack of comparative studies in the UTAUT2 field addressing differences across media types.

Moreover, game genres significantly influence how effort expectancy affects gameplay intention (Jang et al., 2021b; Jang & Byon, 2020b). Jang & Byon (2020b) indicated that the imagination game category, which includes real-time strategy (RTS) and multiplayer online battle arena (MOBA) games, showed a weak effect of effort expectancy on gameplay intention. Additionally, in more leisure and relaxing games with minimal operational difficulty, the role of effort expectancy is also relatively weakened (Kesuma & Princes, 2024; Ong et al., 2023; P. Ramírez-Correa et al., 2019). Therefore, more detailed categorization of games is needed when studying effort expectancy.

Another possible explanation is that the survey was conducted among experienced players, who tend to have a less pronounced perception of the game's difficulty (Jang et al., 2021a; Jang & Byon, 2020b). Many mainstream imagination games have been around for a long time and have a large base of long-term players, which, in turn, creates a barrier to entry for new players (Jang et al., 2021b; Jang & Byon, 2020b). If the survey includes a higher proportion of experienced players, it may partially reduce the role of effort expectancy (M. Ting & Min, 2024; Z. Wang, 2011). It is also important to consider whether respondents have extensive experience with the game in question.

2.4.4 The Relationship between Social Influence and Gameplay Intention

Social influence (SIF) is defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2012, p. 159). Individuals' actions are influenced by how they believe others will perceive them when using technology (Venkatesh et al., 2003). In the workplace, the use of new technology to enhance productivity is usually mandated by the company superiors. Failure to use the technology may lead to punishment from superiors or a lack of cooperation from coworkers. Social influence can come from peer pressure, orders from a leader, or persuasion from a salesperson, demonstrating how others can shape or change a person's behavior (Eckhardt et al., 2009).

From a consumption perspective, consumers' intentions to adopt information technology can be influenced by the perceptions of important people around them (Venkatesh et al., 2012). In gaming, social influence helps explain how usage intentions and behaviors are shaped by those around the player. Consumers may be more eager to play a game if they want to join their friends (Jang & Byon, 2020a). A common marketing strategy for new games is to pay a recognizable game host to live-stream their gameplay for a set period, showcasing the game to their fans (Jang et al., 2021a; Jang & Byon, 2020a). Using a gaming streamer to market a new game can persuade fans to invest more time and money in a game (Friedkin, 1998; Jang et al., 2021a). Social influence plays an important role in shaping play intentions and play behaviors towards a game.

Social influence shows a strong capacity to predict gaming intentions and behaviors in both computer and mobile gaming (Baabdullah, 2018, 2020; Brigido et al., 2019; Jang et al., 2021b; Ong et al., 2023; Ramírez-Correa et al., 2019; Xu, 2014). Players' behavior is influenced by those around them and admired figures, as well as broader social cognition.

However, the effect of social influence tends to be weaker when the investigation targets experienced players rather than new ones (Jang et al., 2021a). Experienced players are less sensitive to external opinions that might alter their intentions or behaviors. Research on Pokémon Go has further shown the limited effect of social influence to impact consumption intentions and behaviors in games that lack player-to-player communication mechanisms (Harborth & Pape,

2017, 2020). Future research narrowing user groups and categorizes games more precisely can better explore the role of social influence.

2.4.5 The Relationship between Facilitating Conditions and Gameplay Intention

The present research defines facilitating conditions (FC) as "consumers' perceptions of the resources and support available to perform a behavior" (Venkatesh et al., 2012, p. 159). Originally, facilitating conditions referred to the degree to which a person believes that an organization or tech company provides the resources and support necessary to use an information system (Venkatesh et al., 2003). When encountering new technology, users evaluate whether they have the necessary physical resources and capabilities to support its operation (Venkatesh et al., 2003). Designers need to consider not only whether the technology is user-friendly, but also whether users can effectively operate the necessary equipment (Isabelle & Sandrine, 2009). Before introducing new technologies to improve productivity, organizations often train staff to enhance their proficiency with the new system.

From a consumption perspective, individuals assess whether they have sufficient equipment, skills, or external support to facilitate their use of the technology (Venkatesh et al., 2012). For instance, when software is used on a mobile phone, users must perceive their ability to having and operate the phone and assess the likelihood of obtaining help if needed (Baabdullah, 2018).

In the research framework, facilitating conditions for gaming include computer or mobile device configurations and gaming skills and knowledge. Gaming is a form of information technology that can be run on devices such as computers, tablets, mobile phones, consoles, and VR headsets (Jang & Byon, 2020a; Ramírez-Correa et al., 2019; Zhai et al., 2021). Users must perceive whether these devices can run the game smoothly and evaluate their own ability to operate both the devices and the game itself (Baabdullah, 2018; Jang & Byon, 2020b). These perceptions can influence individuals' intentions to play and their future gaming behaviors (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020; Hattingh et al., 2024; Ong et al., 2023). This helps explain why device manufacturers continually upgrade hardware chips to enhance gaming performance. When individuals perceive that they have access to a device capable of running a game smoothly, they are more likely to want to play the game (Hattingh et al., 2024). Overall, facilitating conditions play an important role in understanding consumers' gaming intentions and behaviors.

However, in UTAUT2-related research, the application of facilitating conditions in the gaming field does not appear to be particularly effective. The ESC model, a UTAUT2 extension, removes facilitating conditions from its predictive dimensions (Jang & Byon, 2020a). It argues that since a reliable device is a prerequisite for a game to be classified as an esports game, device support is no longer a concern when discussing esports (Brigido et al., 2019; Jang & Byon, 2020a). Similarly, P. Ramírez-Correa et al. (2019) found that facilitating conditions are not a significant factor in mobile online gameplay intention or use behavior. Mobile game players generally do not experience pressure to acquire a mobile phone and often find both the phone's system and the games easy to use.

Facilitating conditions do not seem to have a determining influence when applied to the general game category. However, they have shown predictive power when studied in the context of specific game groups. For example, studies on Pokémon Go have demonstrated that players need comprehensive tutorials to understand game mechanics and character attributes, and Pokémon Go meets this need (Harborth & Pape, 2017, 2020). Players perceive that the Pokémon Go design team provides strong guidance and assistance, which enhances their intention to play the game.

Further research into mobile social network games suggests that players have high expectations regarding the functionality and gameplay settings of these games, which influences their intention to choose and play them (Baabdullah, 2018, 2020). The primary purpose of consuming mobile social network games is often social interaction, and whether these games fulfill players' socializing or dating preferences becomes a critical factor in game selection.

Additionally, in studies targeting underdeveloped regions, the importance of facilitating conditions has been further validated (Hattingh et al., 2024). Although Jang & Byon (2020a) suggested that gaming equipment and technology are not issues in the esports industry, recent research indicates that if the country or region developing the esports industry is not technologically advanced, it can still impact the use and dissemination of games (Hattingh et al., 2024). Ong et al. (2023) also found that the technological environment affects the dissemination of mobile games.

In summary, while facilitating conditions have demonstrated predictive power in several specific game types, they show limited influence when applied to broader game categories. Future research may benefit from breaking down different game types for comparative analysis to better understand the specific role of

facilitating conditions in predicting gameplay intention. In addition, it should be noted that the specific regional characteristics targeted by the study may influence facilitating conditions.

2.4.6 The Relationship between Price Value and Gameplay Intention

Price value (PV) is defined as "consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them" (Venkatesh et al., 2012, p. 161). UTAUT2 uses price value to study the use intention and behavior of consumption technology because the cost of using such technology is usually covered by the consumer, whereas utilitarian technology is usually covered by the company or organization (Venkatesh et al., 2003, 2012). Therefore, when faced with this type of technology, consumers will carefully consider their spending power and determine whether the benefits of the technology are worth the cost of acquiring the technology. Regarding gaming, players consider whether the benefits, mental or monetary, gained from paying for access to a game or purchasing a product within a game exceed the cost of consumption (Jang & Byon, 2020a).

There are multiple ways in which players spend money on games. Some games require players to purchase to gain permanent or time-limited access to the game, also known as passes, such as games offered on platforms like Steam and Storm Entertainment (Jang & Byon, 2020a). In some games, although the pass is free, some in-game items that players use to enhance their own experience in the game require players to spend money to purchase, such as enhancement of character attributes and beautification (Harborth & Pape, 2020; Hattingh et al., 2024; Jang & Byon, 2020a). There are also games that are free to enter, but players who want access to the full features of the game will need to pay for a membership to bypass the layers of restrictions (Baabdullah, 2018, 2020).

Despite some free-to-use mechanics in the game, the game's designers and manufacturers' primary purpose is to make a profit, and they will include various paid items in the gaming experience. A player's intention to engage in a game is influenced by their perception of the benefit that can be generated from these paid content (Jang & Byon, 2020b). Information technology designers need clever pricing strategies to get consumers on board (Venkatesh et al., 2012).

In UTAUT2 studies related to games, price value serves as a strong indicator of consumer attitudes toward the cost of a game when making purchasing decisions. For games that offer consumable products, players are particularly sensitive to how price value affects their intentions to play (Jang & Byon, 2020b).

Mobile social network games often feature tiered membership levels, where higher spending provides players with easier and more convenient ways to interact with desired individuals (Baabdullah, 2018, 2020; Xu, 2014). Studies on esports games have shown that price value has strong predictive power for gameplay intentions (Hattingh et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b).

New or inexperienced players tend to be more sensitive to the price of games and in-game items (Jang et al., 2021a). New players often believe that spending money will enhance their overall gaming experience. Experienced players are typically skilled enough that spending money has minimal impact on their in-game performance.

In both computer games and specific mobile games, price value is regarded as a key predictor of gameplay intention. However, price value shows limited predictive power for gameplay intentions in general mobile games and Pokémon Go (Brigido et al., 2019; Harborth & Pape, 2017, 2020; P. Ramírez-Correa et al., 2019). Most mobile games are free to join or exit, and they primarily generate revenue through the sale of enhancement products (P. Ramírez-Correa et al., 2019). These products typically do not impact gameplay performance but are instead designed to enhance the visual experience. Pokémon Go is a fully free mobile game that does not sell items to enhance players' power or improve their gameplay experience (Harborth & Pape, 2017, 2020). Price value tends to lose its predictive power in certain free-to-enter games (Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang & Byon, 2020b; Ramírez-Correa et al., 2019). Future research is recommended to further differentiate game genres in order to better understand the role of price value in predicting gameplay intentions.

2.4.7 The Relationship between Hedonic Motivation and Gameplay Intention

Hedonic motivation (HM) refers to "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012, p. 161). From the perspective of consumer information technology, hedonic motivation is considered a key factor in predicting gameplay intention (van der Heijden, 2004; Venkatesh et al., 2012). Unlike utilitarian technologies, which are primarily used for work, consumption technologies are designed to satisfy users' self-fulfillment needs (Thong et al., 2006; van der Heijden, 2004). Using consumption technologies allows users to experience pleasure, relaxation, and satisfaction. The more people anticipate pleasure from a consumption technology before using it, the more likely they are to adopt it to meet their leisure requirements.

Games, as a form of hedonic information technology, are highly effective at delivering pleasure to users (Hamari & Keronen, 2017; Jang & Byon, 2020a; Lee et al., 2014; H. Li et al., 2015). Studies applying UTAUT2 to games have consistently shown that hedonic motivation is a strong predictor of gameplay intention (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Kesuma & Princes, 2024; Ong et al., 2023; Ramírez-Correa et al., 2019). The pleasure derived from gaming is not fleeting but can be sustained over extended periods. People generally recognize that games offer significant opportunities for fun and enjoyment, even among experienced players (Jang et al., 2021a). However, Hattingh et al. (2024) suggest that when hedonic motivation and flow experience are used together, it is essential to distinguish their content. Flow experience has the potential to mask the impact of hedonic motivation (Hattingh et al., 2024; Jang et al., 2021b; Jang & Byon, 2020b).

2.4.8 The Relationship between Habit and Gameplay Intention

Habit (HA) is defined as “the extent to which people tend to perform behaviors automatically because of learning” (Venkatesh et al., 2012, p. 161). In UTAUT2, habit has been identified as a reliable predictor of information system use intentions (Venkatesh et al., 2012). When individuals use technology, their behavior can become spontaneous and automatic after repeated exposure and experience.

In both computer and mobile games, daily tasks, rewards, and activities are designed to encourage consistent participation (Hattingh et al., 2024; P. Ramírez-Correa et al., 2019). As players become more familiar with a game's mechanics, their use of the game becomes easier and more habitual. Over time, this familiarity can transform gameplay into part of the player’s daily routine (Ong et al., 2023; Venkatesh et al., 2012).

Research using UTAUT2 to study gameplay intention consistently demonstrates that habit is a significant predictor of gameplay intention and behavior (Brigido et al., 2019; Harborth & Pape, 2017, 2020; Hattingh et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020b; Kesuma & Princes, 2024; Ong et al., 2023; Ramírez-Correa et al., 2019). Notably, Jang & Byon (2020a) made the first attempt to remove addiction-related items from the habit section of a questionnaire scale, replacing them with two items that, while related, did not explicitly describe addiction. This modification weakened the ability of habit to predict gameplay intention (Jang & Byon, 2020a). Subsequent studies made further adjustments to the selection of habit items, leading to the restoration of habit's predictive ability for gameplay intention, despite the absence of items describing addiction (Jang et al., 2021a, 2021b; Jang & Byon, 2020b; Kesuma & Princes, 2024).

Other studies using UTAUT2 retained the original addiction-related items, highlighting the importance of carefully designing habit-related questions when addressing addiction-related topics in future research.

2.4.9 Extension Factors related to Gameplay Intention

This section reviews previous studies that extended the UTAUT2 framework by incorporating additional factors in gaming contexts. Table 2.4 summarizes the selected studies and highlights the additional constructs introduced by previous researchers. This section focuses on identifying commonly adopted extension factors and describing how these factors have been used to explain gameplay intention, gaming behavior, and related user outcomes.

2.4.9.1 Flow Experience

Jang & Byon (2020a) extended UTAUT2 to incorporate the ESC model, integrating the concept of flow, which is defined as "the mental state of operation in which the person is fully immersed in what he or she is doing and is characterized by a feeling of energized focus, full involvement, and success in the process of the activity" (Shin & Shin, 2011, p. 855). Flow theory has been extensively applied to studies on the acceptance and use of consumer information technologies. Several studies exploring the role of flow experience in gaming are discussed in Section 2.2.1.3 and Section 2.2.2. Jang & Byon (2020a) focused specifically on the immersion dimension, emphasizing how players become deeply captivated by a game and feel transported into a virtual world.

When players face challenging, time-consuming tasks with unclear rewards, they often maintain a high level of focus and commitment while being largely unaware of external stressors and risks (Lee & Tsai, 2010). During gameplay, players may experience pleasure, psychological motivation, and enjoyment, even in competitive or manipulative situations where material rewards are absent (Jang & Byon, 2020a). This mental satisfaction and temporary detachment from the real world can foster a consistent desire to engage in gaming behavior. The immersion-based flow experience has been shown to play a significant role in predicting game intentions and behaviors (Chang et al., 2014; S. Gao et al., 2016; Lee & Tsai, 2010; Lowry et al., 2013; H. Yang & Lin, 2019). However, it is important to note that some players may use video games as a means of escaping real-world pressures and challenges, seeking to lose themselves in the virtual environment (Koo, 2009). Future research should carefully consider potential risks associated with immersive gameplay experiences.

2.4.9.2 Trust and Awareness

Baabdullah (2018) introduced trust, a new independent variable, into UTAUT2, demonstrating its significant positive effect on behavioral intention. Trust is defined as "a set of specific beliefs dealing directly with the integrity, benevolence, and the ability of another party" (Baabdullah, 2018, p. 95). Kesuma & Princes (2024) adopted the trust construct, demonstrating its significant predictive power for gameplay intention among Gacha game players.

Baabdullah (2020) added "Awareness" as an independent variable in UTAUT2, showing its significant positive effect on performance expectancy and behavioral intention. Awareness is defined as "knowledge about a technology, its benefits, and risks that are key factors in the voluntary use of a system" (Alsheikh & Bojei, 2014, p. 212).

2.4.9.3 Integration of UTAUT2 with Other Models

Kesuma & Princes (2024) integrated structural video game characteristics (SVGC) and several psychological factors into the UTAUT2 framework, retaining only EE, HM, and HA from UTAUT2. The selected SVGC included presentation features, narrative and social features, reward features, punishment features, and control/manipulation features. For psychological factors, the trust and perceived enjoyment constructs were used. The influence of SVGC on gameplay intention was primarily mediated by perceived enjoyment.

Ong et al. (2023), in a study on Mobile Legends: Bang Bang players, integrated UTAUT2 constructs with perceived usefulness, perceived usability, and security. The study also extended the System Usability Scale as the new use behavior construct. From UTAUT2, only HM, HA, EE, PE, FC, and SIF were selected.

2.4.10 Moderators

2.4.10.1 The Potential Moderating Effects within UTAUT2 Application

Jang & Byon (2020b) introduced the game genre as a new moderator for the relationship between all independent variables and gameplay intention. They categorized games into three groups: imagination games, physical enactment games, and sports simulation games, as shown in Table 2.5. Jang et al., (2021a) indicated that some games, like Overwatch or PUBG, may share characteristics of both FPS and MOBA genres. Clearly distinguishing these games under traditional categories can be challenging. Narrowing numerous game classifications down to three genres can significantly reduce the complexity of data analysis. However, this classification has relatively low popularity in current research, which reduces its comparability with other studies.

Table 2.5 Game Genres from ESC Model (Jang & Byon, 2020b)

Resource	Media	Game Genres	Sub-types
Jang & Byon (2020b)	Computer	Imagination	MOBA, RTS, Online Digital Collectible Card Game, Hero-Shooting, MMORPG
		Physical Enactment	FPS, Action games, Fighting games
		Action	Soccer, American football, basketball

In a subsequent study, Jang & Byon (2021) conducted a multi-group analysis based on gender, revealing significant differences in the effects of HM, HA, and SIF on gameplay intention. Jang et al., (2021b) further analysed the moderating effect of the interaction between gender and game genre, examining how these combined factors influence gameplay intention.

Jang et al., (2021a) expanded on their previous research by introducing prior experience as another moderator in the relationship between all independent variables and gameplay intention. They defined prior experience as varying levels of gameplay frequency, distinguishing between high and low-frequency esports players.

X. Xu (2014) integrated selected constructs from UTAUT2 with other theoretical frameworks to study social network games and employed age, gender, and experience as moderators. Among the effects of SIF, perceived enjoyment, and PV on gameplay intention, only gender demonstrated a significant difference.

Harborth & Pape (2017) applied UTAUT2 to explore gameplay intentions for Pokémon Go, using gender, age, and experience as moderators, following the original UTAUT2 framework. Their findings revealed that gender only had a significant moderating effect on the relationship between habit and gameplay intention.

2.4.10.2 Moderators of the research framework

2.4.10.2.1 Game Genres and Media

In clinical psychology research related to gaming, the classification system provided by Gamefaqs.com serves as a primary reference (Elliott et al., 2012b; Lemmens & Hendriks, 2016). Table 2.6 presents all game types and media classifications. This website shares this classification with many other game-related websites[1]. The primary function of Gamefaqs.com is to establish a classification directory, with each game categorized into a specific, fixed classification. The vast majority of global game classification directory websites have adopted the system from Gamefaqs.com.

Table 2.6 Game Genres and Media from gamefaqs.com

Resource	Media	Game Genres	
Gamefaqs.com	Computer/ Laptop & Mobile phone/Table	Action	Arcade, Beat-'Em-Up, Fighting, General, Pinball, Platformer, Rhythm, Shooter
		Action Adventure	General, Linear, Open-World, Sandbox, Survival
		Adventure	3D, General, Point-and-Click, Text, Visual Novel
		Miscellaneous	Application, Board/Card Game, Compilation, Demo Disc, Edutainment, Exercise/Fitness, Gambling, General, Party/Minigame, Trivia/Game Show
		Puzzle	Action, General, Hidden Object, Logic, Matching, Stacking
		Racing	Arcade, General, Simulation
		Role-Playing	Action RPG, General, Japanese-Style, Massively Multiplayer, Roguelike, Trainer, Western-Style
		Simulation	Flight, General, Marine, Space, Vehicle, Virtual
		Sports	General, Individual, Team
		Strategy	General, Management, Real-time, Turn-Based

[1] Gamespot.com; giantbomb.com; metacritic.com; fandom.com; fanatical.com.

Column 3 in Table 2.6 represents the main categories, while Column 4 represents the subcategories. Subcategories are frequently used in research that focuses on more fundamental or specific classifications and thus appear more commonly in academic studies. For example, MMORPG originates from the "Role-Playing" category under "Massively Multiplayer," RTS stems from the "Strategy" category under "Real-time," and both FPS and Third-Person Shooter (TPS) are derived from the "Shooter" subcategory under "Action."

The moderator game genres in this study use the main categories from Column 3, consistent with other articles that utilize this list. This classification is more practical for comparative analysis with other studies due to its alignment with mainstream categories. To identify specific patterns, this study conducts a more thorough and detailed horizontal analysis of each game genre.

Media serves as a higher-level classification of game genres, categorizing them into two types: computer/laptop and mobile phone/tablet. This distinction is based on the operating system and hardware used to play the game. Games played on desktop computers or laptops typically use a mouse and keyboard and run on Windows or macOS operating systems. In contrast, games played on mobile phones or tablets generally use the Android or iOS operating systems, with players interacting by tapping the screen with their fingers. This study differentiates these two media types and examines their moderating effect on the relationship between the determinants and endogenous variables.

2.4.10.2.2 Gender

Another fundamental moderator considered in this study is gender. From a psychological standpoint, previous studies have primarily focused on the male population, as research has shown that men are more likely to be at risk of developing problematic gaming behaviors (Cui et al., 2018; Şalvarlı & Griffiths, 2021; Yen et al., 2009). Historically, games were predominantly designed for male players. Game developers often catered more to male preferences, whether in terms of competition, social interaction, or emotional needs, while female gamers received less attention to their specific gaming requirements (Lucas & Sherry, 2004).

Male gamers, particularly adolescents, are more inclined to play games as a means of coping with emotional problems, impulse control, antisocial behaviors, self-esteem issues, and anxiety related to parental relationships (Wartberg et al., 2019). These factors increase male gamers' susceptibility to gaming addiction

(González-Bueso et al., 2018). However, as gaming companies have expanded their focus on the female market in recent years, female gamers have also faced an increased risk of addiction (Jang et al., 2021b; H. R. Wang et al., 2018). In particular, gaming as a coping mechanism for depression has become a significant factor contributing to addiction among female gamers (H. R. Wang et al., 2018).

While both male and female gamers are exposed to the risk of gaming addiction for psychological reasons, men still represent the majority in terms of the overall player base (F. Liu et al., 2022; Morcos et al., 2019). Despite efforts by game developers to broaden their appeal to female players, the primary consumer base for gaming remains predominantly male[2]. Given these differences, it is recommended that gender be considered a critical risk factor for problematic gaming behavior to better understand the mechanisms behind game consumption (Jang et al., 2021b; Männikkö et al., 2020).

In the UTAUT2 model, gender is recognized as a fundamental moderator (Harborth & Pape, 2017, 2020; Jang et al., 2021b; Jang & Byon, 2021; Xu, 2014). X. Xu (2014) selected only certain constructs from UTAUT2 and found that, in the relationship between social influence and continuance intention, the male group exhibited a significantly stronger path effect. Conversely, in the relationship between price value and continuance intention, the female group demonstrated a significantly stronger influence.

Harborth & Pape (2017) and Harborth & Pape (2020) studied gender differences within the Pokémon Go player community using the UTAUT2 framework. The results indicated that, although the significance of the path relationships varied between male and female players, there was a lack of statistically significant differences when comparing the paths between the two groups. Only the direct effect of habit on use behavior was significantly influenced by gender differences.

In their multi-group analysis focusing on gender, Jang & Byon (2021) found that three paths exhibited significant gender differences, while another three paths did not. The male group demonstrated a stronger influence in the relationships between social influence and gameplay intention and between hedonic motivation and gameplay intention. Conversely, the female group showed a stronger influence in the relationship between habit and gameplay intention. No

[2] Global Esports & Live Streaming Market Report 2022. https://newzoo.com/resources/trend-reports/newzoo-global-esports-live-streaming-market-report-2022-free-version.

significant gender differences were observed in the effects of effort expectancy, price value, and flow experience on gameplay intention.

Jang et al., (2021b) explored the interaction effects of gender and game genres on the relationship between UTAUT2 determinants and gameplay intention. The results indicated that significant gender differences were observed only in the direct path relationship between SIF and gameplay intention within the physical enactment category.

Existing research remains insufficient to fully understand gender differences in gaming motivations and needs. Therefore, this study aims to treat gender as a key moderator to provide a more comprehensive understanding of its influence on the relationship between predictors and gameplay intention.

2.5 Hypothesis Development

This chapter defines each variable of the research model and each hypothesis of the path relationships. The model consists of 12 exogenous variables: performance expectancy (PE), effort expectancy (EE), social interaction (SIT), social influence (SIF), facilitating conditions (FC), price value (PV), hedonic motivation (HM), habit (HA), flow experience (FE), attitude (ATT), self-efficacy (SEY), and emotion coping (EC). It also includes two endogenous variables, which are gameplay intention (GI) and internet gaming disorder (IGD), as well as three moderators: game genres, gender, and media. All hypotheses are listed in Table 2.7 at the end of this chapter.

Aligning with the theoretical contribution, the constructs of ATT and SEY are primarily used to reexamine the mediating effects of PE and EE. This helps to mitigate potential issues for future model extensions within hedonic information system. After the analysis of the mediated effects of PE and EE in the overall model, ATT and SEY are removed from the subsequent analysis of the model.

This study applies UTAUT2 to the field of internet gaming disorder, positioning IGD as the new endogenous variable in place of use behavior within the UTAUT2 framework. Additionally, to enhance UTAUT2's analytical capability in examining gaming behavior, this study incorporates research from clinical psychology on gaming behavior and addiction. SIT, FE, and EC are introduced as new exogenous variables into the UTAUT2 framework.

The moderators, game genres and gender, are further examined within the UTAUT2 framework. This study introduces a new classification for game genres and incorporates media as a new moderator. The analysis of the moderating effects is conducted using PLS-MGA to provide a more detailed observation of group differences.

2.5.1 Hypothesis of the Influence of Gameplay Intention (GI) on Internet Gaming Disorder (IGD)

The WHO classified IGD as a mental disorder in the 11th and final revision of the International Classification of Diseases (ICD-11) in 2018. The definition of IGD in our model is derived from ICD-11. According to ICD-11, individuals are diagnosed with IGD if they meet the following three criteria within the past 12 months: impaired control over gaming, increasing priority given to gaming to the extent that it takes precedence over other life interests and daily activities, and continuation or escalation of gaming despite negative consequences.

Most research on IGD primarily comes from the field of clinical psychology. From the perspective of information system acceptance and use, the TPB, SCT, TAM, flow theory, and motivational theory have been applied to study IGD, emphasizing the applicability of these theories to technology acceptance and use in the context of IGD (Chatterjee et al., 2022; C. Chen et al., 2019; Haagsma et al., 2013b; Hew et al., 2024). Cognitive behavioral theory shares the same theoretical foundation as social cognitive theory, and it is widely used to study how personal cognition influences problematic gaming behavior (Bandura, 1986; Brand et al., 2014; Dong & Potenza, 2014; González-Bueso et al., 2018; Haagsma et al., 2013a; King & Delfabbro, 2014; M. Liu & Peng, 2009; L. Wang et al., 2022; Wei et al., 2017; X. Yang et al., 2021). The goal of IGD research based on SCT is often to determine whether individuals believe that playing games can help them resolve emotional or cognitive issues caused by their environment. In contrast, CBT-based studies focus on how an individual's emotions or behaviors, influenced by their environment, may lead to problematic gaming behavior. IGD has been demonstrated to serve as a construct for studying usage behavior in the field of information technology.

The duration, frequency, and intensity of use are key endogenous variables in the extended conceptualization of information system acceptance and use (Venkatesh et al., 2008). Excessive time spent playing games can be considered problematic in terms of duration, frequency, and intensity, and it has been well-established that addicted players often exhibit problematic behaviors they cannot control over any significant length of time (Hellström et al., 2012; Hussain et al., 2012; Kuss et al., 2012). One of the primary indicators of addicted players is uncontrolled play time and the inability to stop gaming behavior (Kuss et al., 2012; Pontes et al., 2021). Persistent use despite known risks or harms is a diagnostic criterion in both the DSM-5 and ICD-11 (King et al., 2020).

Gameplay intention (GI) is defined as the intention to play a game (Jang & Byon, 2020a). Behavioral intention functions as a mediator between independent predictors and user behavior, playing a critical role in determining actual future use (Venkatesh et al., 2012). It has a significant impact on use duration, frequency, and intensity (Venkatesh et al., 2008). Excessive time spent playing video games, characterized by problematic duration, frequency, and intensity, may lead to IGD (Hellström et al., 2012; Hussain et al., 2012; Kuss et al., 2012).

Therefore, in the research model, GI is an endogenous variable and serves as an independent variable for IGD. IGD is the final dependent variable in the model, representing problematic, excessive gameplay duration, frequency, and intensity. It is directly influenced by gameplay intention and indirectly affected by all predictors. This study aims to explore whether normal daily gameplay may potentially lead to IGD.

H_{13}: Higher gameplay intention will contribute to generate internet gaming disorder.

2.5.2 Hypothesis of the Gameplay Intention Predictors

2.5.2.1 Performance Expectancy (PE) and Gameplay Intention

This study defines PE as the degree to which players believe the game will help them achieve their intended purpose (S. Gao et al., 2016; Hsu & Lu, 2004; H. Yang & Lin, 2019). PE was originally introduced as a utilitarian indicator in UTAUT, reflecting the extent to which using technology in daily life benefits individuals in specific activities (P. Ramírez-Correa et al., 2019; Venkatesh et al., 2003). It was later expanded into UTAUT2 to study hedonic information technology consumption (Venkatesh et al., 2012).

However, its application remains inconsistent. The ESC model, a predictive model for game consumption behavior based on UTAUT2, excludes PE (Jang & Byon, 2020a). Jang & Byon (2020a) argued that PE's strong focus on utility is unsuitable for hedonic technologies like games. Nevertheless, this exclusion has not been justified through detailed quantitative analysis. To support their perspective, this study conducts an in-depth analysis of the role of PE in GI.

The ability of PE to predict GI is particularly useful for studying specific game genres on mobile phones (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020). However, there is a lack of research on the use of PE for computer games. Perceived usefulness, the theoretical foundation of PE, has been widely applied in studying GI and play behavior. Perceived usefulness shows positive but limited predictive power for general computer GI (Hsu & Lu, 2004; J. Wu & Holsapple, 2014). Playing computer games can help players familiarize themselves with the use of computers and equipment, while doing little to improve their quality of life or productivity. This finding supports Jang & Byon's (2020a) perspective.

PE does, however, have some predictive power in Pokémon Go and mobile social network games, which are played on mobile devices (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020). This phenomenon was also observed in studies related to perceived usefulness (H. Chen et al., 2017). Pokémon Go's collection mechanic requires players to navigate city streets in search of in-game creatures, a play mechanic that some players believe motivates them to go outside and exercise (Harborth & Pape, 2017). Mobile social network games enhance interpersonal connections and interactions, directly improving community life and facilitating more efficient collaboration with colleagues (Baabdullah, 2018). These studies highlight the importance of further exploring the role of PE in this study, using two moderators: game genres and media.

H1: Higher performance expectations will increase gameplay intention, contributing to gaming disorder development.

2.5.2.2 Effort Expectancy (EE) and Gameplay Intention

EE is defined as the degree of ease with which consumers play a game, and it is one of the essential predictors of GI (Jang & Byon, 2020a; Venkatesh et al., 2012). Games that are easy to play are more attractive to new consumers, making them easier to adopt. Conversely, complex and challenging game mechanics can discourage new players from joining and make it more likely for new players to quit.

This section draws evidence from UTAUT2 and information system research to show that EE can predict players' intention to play computer or mobile games. Existing studies using UTAUT2 to predict GI have validated the inclusion of EE as a fundamental dimension and demonstrated its significance. In general information system acceptance and use research, perceived ease of use, the theoretical foundation of effort expectancy, has been tested and shown to play a critical role in predicting gameplay intention and use (H. Chen et al., 2017; S. Gao et al., 2016; Kostopoulos et al., 2022; M. Ting & Min, 2024; H. Yang & Lin, 2019; Ye et al., 2020; Zhao et al., 2022). Without distinguishing between game types, perceived ease of use has shown strong predictability for GI (Hsu & Lu, 2004; Lee & Tsai, 2010).

Perceived ease of use is also essential in analysing gameplay intention and use in hedonic information systems. Since games are primarily designed for hedonic purposes, players place a high value on ease of use (Hamari & Keronen, 2017; Lowry et al., 2013; Ting & Min, 2024; J. Wu & Holsapple, 2014). Players typically prefer games that are not so challenging as to hinder their enjoyment.

The second hypothesis is that EE has significant predictive power in general gameplay intention. However, the extent of this predictive power may vary with the inclusion of moderators (Jang et al., 2021b; Jang & Byon, 2020b). Existing research lacks systematic studies and discussions on the moderating effects of game genres, media, and gender. This study further explores the impact of these moderators, addressing this knowledge gap in the later section.

H2: Higher effort expectancy will increase gameplay intention, contributing to gaming disorder development.

2.5.2.3 Social Influence (SIF) and Gameplay Intention

SIF is defined as the extent to which an individual perceives that important others believe they should play games (Fishbein & Ajzen, 1975; Venkatesh et al., 2012). In information system research, several similar terms, such as social norms and subjective norms, are used interchangeably with SIF. In UTAUT2, SIF refers to social norms (S. Gao et al., 2016; Jang & Byon, 2020a; Venkatesh et al., 2003; H. Yang & Lin, 2019).

Social norms and subjective norms both reflect the belief that "the person's perception that others who are important to them think they should or should not perform the behavior" (Fishbein & Ajzen, 1975, p. 302). For instance, people are more likely to play the same game as their friends and may also encourage others to join the game they are playing (Jang & Byon, 2020a). The idea that other people's opinions influence gaming behavior is common to SIF, social norms, and subjective norms, and each has varying degrees of predictive power for GI.

The research framework analyses how SIF influences players' game choices across different contexts to better understand the role of SIF. Previous UTAUT2 studies have not comprehensively observed all game genres. Jang & Byon (2020a) focused on personal computer games, while other UTAUT2 studies examined mobile games. Research on general information system acceptance and use provides additional insights. Hsu & Lu (2004) found that social norm had a significant positive effect on GI in general online games, and Chang et al. (2014) and Alzahrani et al. (2017) demonstrated that subjective norm also significantly influences GI in online games.

Thus, the third hypothesis proposes that SIF will have significant predictive power across all game types. However, this predictive power may vary or even become insignificant in certain cases due to the moderating effects of game genres, media, and gender. This study later explores how these moderators influence the relationship between SIF and GI.

H3: Higher social influence will increase gameplay intention, contributing to gaming disorder development.

2.5.2.4 Facilitating Conditions (FC) and Gameplay Intention

FC is defined as users' perceptions of the resources and support available for playing games (Lee & Tsai, 2010; Venkatesh et al., 2012). For gaming, FC refers to the configuration of computer or mobile device and the player's knowledge of gaming skills. This study examines the role of FC across different game genres and how various moderators influence GI.

The application of FC as a predictor in UTAUT2 remains inconsistent. The ESC model omits FC, arguing that a reliable device is a prerequisite for a game to be classified as an esports game (Jang & Byon, 2020a). Esports, as a form of competitive sport, requires high-performance equipment to function, meaning consumers typically do not need to worry about the equipment required for participation. Therefore, device support is considered irrelevant in discussions about esports games. Consequently, FC is perceived as irrelevant in the context of esports games.

However, this study argues that this interpretation of facilitating conditions is too narrow and can lead to misconceptions regarding FC. Instead of focusing solely on the equipment necessary for running the technology, FC emphasizes whether consumers perceive they have the resources or equipment to support their engagement, which depends on the stage of technology adoption (Baabdullah, 2018, 2020; Venkatesh et al., 2012). Jang & Byon (2020a) explored consumers' intention to consume esports events and highlights that consumers must consider whether they have devices for online viewing or transportation resources for attending live events. While consumers may not need to worry about the equipment needed to conduct the event itself, this idealized scenario overlooks potential hardware, gaming system, or internet broadcast issues. Errors frequently occur during esports tournaments, disrupting live streams, events, or even leading to rematches. Such disruptions can significantly impact the viewer experience. Therefore, it is still worthwhile to study the impact of FC on GI.

In other UTAUT2-related studies, FC has been shown to have a significant effect in certain contexts (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020; Hattingh et al., 2024; Ong et al., 2023). Perceived behavioral control, which underlies the concept of FC, has demonstrated a significant positive effect on GI in general online games (Alzahrani et al., 2017; Lee & Tsai, 2010; L. Wang & Yan, 2015). This study predicts that FC has a significant positive effect on GI. However, this relationship is also influenced by moderators such as game genres and media, which are discussed in detail in the later section.

H4: Higher facilitating conditions will increase gameplay intention, contributing to gaming disorder development.

2.5.2.5 Price Value (PV) and Gameplay Intention

PV is defined as the degree of perceived value that players attribute to the monetary cost of playing games (Jang & Byon, 2020a; Venkatesh et al., 2012). This perceived value can include the cost of a play license, which may be purchased either as a one-time permanent entry or for a limited duration. Additionally, character and tool skins, limited-time or limited-usage packages that enhance the gameplay experience or provide in-game currency, and interactive in-game goods can all be exchanged for real money. The price of the game itself or the cost of in-game items influences both players' game choices and their future spending behavior.

In studies using UTAUT2, the application of PV to both computer and mobile games has consistently demonstrated a significant effect (Baabdullah, 2018, 2020; Hattingh et al., 2024; Jang & Byon, 2020b, 2020a). Therefore, the hypothesis proposes that PV has a significant positive effect on GI across all game genres.

However, pricing strategies, product offerings, and product diversity often vary significantly across different game genres. As a result, players may perceive value differently depending on the type of game. This phenomenon has been observed in UTAUT2-related studies (Jang et al., 2021b; Jang & Byon, 2020b). However, little research explicitly compares and contrasts these variations. Players also exhibit different preferences when engaging with different game types and media, and value perceptions can vary between male and female players. The discussion of these moderators is addressed in the later section.

H5: Higher price value will increase gameplay intention, contributing to gaming disorder development.

2.5.2.6 Hedonic Motivation (HM) and Gameplay Intention

HM is defined as the fun or pleasure derived from playing a game (Jang & Byon, 2020a; Venkatesh et al., 2012). Games are generally considered hedonic information systems, with playing for fun being the primary purpose for most users (L. Wang & Yan, 2015). The significant positive effect of HM on GI has been consistently observed across various studies. In UTAUT2 and other information system acceptance and use studies, HM is often associated with concepts such as perceived enjoyment (Alzahrani et al., 2017; H. Chen et al., 2017; P. Chen & Chang, 2010; Jang & Byon, 2020a; Lee & Tsai, 2010; Lee et al., 2014; Venkatesh et al., 2012; H. Wang & Lee, 2020), enjoyment (Hamari & Keronen, 2017; Li et al., 2015; J. Wu & Holsapple, 2014), joy (Lowry et al., 2013), and pleasure (Z. Wang, 2011). These dimensions have consistently shown convergent results.

However, the UTAUT2 framework has not yet explored the effect of HM across both computer and mobile games. Therefore, the hypothesis proposes that HM has a significant positive effect on GI across all game types.

Additionally, this study argues that it is worthwhile to include game genres as a moderator in the analysis. Players experience pleasure differently depending on the game genre, with sports games being a notable example (Jang et al., 2021b; Jang & Byon, 2020b). For these games, enjoyment often stems from physical exercise and dopamine release, which is markedly different from the experience of playing typical sedentary games (Jang & Byon, 2020b). A more detailed discussion is provided in the later section.

H6: Higher hedonic motivation will increase gameplay intention, contributing to gaming disorder development.

2.5.2.7 Habit (HA) and Gameplay Intention

HA is defined as the extent to which players perceive playing a game as a routine activity (Harborth & Pape, 2017; Jang & Byon, 2020a). UTAUT2 defines HA as "the extent to which people tend to perform behaviors automatically because of learning" (Venkatesh et al., 2012, p.161). Most current games incorporate daily and weekly task mechanisms, making players' gaming behavior a recurring event. Systems such as punch cards, tasks, and rankings require significant time and effort to maintain game progress, leading to gaming becoming a habitual part of daily life.

In UTAUT2-related studies, the dimension of HA originally included items such as "I am addicted to using the games" in questionnaires. These studies, which primarily focused on specific mobile games, have consistently found a significant positive effect of HA on GI (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; P. Ramírez-Correa et al., 2019). However, since this study explores IGD, items related to addiction are classified under the IGD dimension to avoid problematic high correlations between habit and IGD. The ESC model examined the removal of these items and found no significant influence of HA on GI (Jang & Byon, 2020a).

This study seeks to determine whether HA, excluding addiction-related items, still has strong predictive power. In certain game type analyses, the ESC model has produced notable results, although HA does not perform well in the general computer game category (Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b). Furthermore, very few studies have examined HA’s influence on GI across all game types. Therefore, this study hypothesizes that HA significantly affects gameplay intention across all game genres.

Game genres influence the strength of the relationship between HA and GI, and gender differences are also observed (Jang et al., 2021b; Jang & Byon, 2020b). However, differences between media types are less pronounced. Consequently, this study focuses on the moderating effects of gender and game genres on habit, with a more detailed discussion to follow in the later section.

H7: Higher habit will increase gameplay intention, contributing to gaming disorder development.

2.5.2.8 Flow Experience (FE) and Gameplay Intention

FE is defined as the extent to which an individual is fully immersed or absorbed in the virtual world of a game (Jang et al., 2021a, 2021b; Jang & Byon, 2020b, 2020a). The definition can vary, often referring to a state of psychological engagement or involvement in an activity (Alzahrani et al., 2017; Lee & LaRose, 2007). After reviewing research related to FE, this study summarizes key dimensions, including the taste or feeling, or experience of flow (Alzahrani et al., 2017; Chang et al., 2014; S. Gao et al., 2016; Hsu & Lu, 2004; Lee & LaRose, 2007), merge and concentration (Lee & LaRose, 2007), immersion (Chang et al., 2014; S. Gao et al., 2016; Lee & Tsai, 2010; H. Yang & Lin, 2019), loss of self-control (H. Yang & Lin, 2019), loss of time and curiosity (Lee & Tsai, 2010), and enjoyment (S. Gao et al., 2016; Lee & LaRose, 2007). The effects of these dimensions have been thoroughly tested in prior studies.

FE reveals users' psychological engagement with game involvement, a critical dimension for analysing game acceptance and use. It was first added to UTAUT2 by the ESC model (Jang & Byon, 2020a). This study follows the ESC framework, focusing solely on immersion as a key aspect of FE and examining the influence of all moderators. Although few UTAUT2 studies incorporate FE into the model, the ESC model has demonstrated its significance in analysing computer games (Jang & Byon, 2020a). Immersion has also been shown to occur in mobile gaming, where players can experience deep engagement (S. Gao et al., 2016; H. Yang & Lin, 2019). Therefore, the FE construct adopted in this study is applicable across different game types.

Jang & Byon (2020b)'s research on game genres as moderators found fluctuating results for FE. Gender also plays a role in how FE influences gameplay intention (Jang et al., 2021b). These moderating effects are discussed in more detail later.

H8: Higher flow experience will increase gameplay intention, contributing to gaming disorder development.

2.5.2.9 Attitude (ATT) and Gameplay Intention

ATT is defined as the extent to which playing a game is positively or negatively valued by the player (Davis, 1989). It has been shown to have a significant direct effect in predicting GI (P. Chen & Chang, 2010; S. Gao et al., 2016; Hamari & Keronen, 2017; Hsu & Lu, 2004; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; H. Wang & Lee, 2020; X. Wang et al., 2016; Z. Wang, 2011). ATT originates from the TAM, one of the most widely used models for studying GI. In TAM, perceived ease of use and perceived usefulness are critical determinants of GI, with ATT acting as the key mediator between these constructs and play intention (Alzahrani et al., 2017; H. Chen et al., 2017; S. Gao et al., 2016; Hsu & Lu, 2004; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; H. Wang & Lee, 2020; L. Wang & Yan, 2015).

However, ATT is absent from UTAUT2-related research. In the original UTAUT model, Venkatesh et al. (2003) argued that ATT does not have a significant direct or interactive influence on behavioral intention due to the interactive mediation effects from PE and EE. As a result, ATT was excluded from UTAUT and its extended models. This condition is only relevant when PE and EE are explicitly included in the model. If either is removed, it is essential to reassess the potential impact of attitude (Venkatesh et al., 2003). Jang & Byon (2020a) did not conduct such an assessment when removing PE from the ESC model.

Furthermore, UTAUT and UTAUT2 were initially developed to analyse utilitarian technologies, meaning the role of attitude in predicting gameplay intention may differ when applied to hedonic information systems. In Venkatesh et al. (2003), which primarily focused on utilitarian systems, ATT showed little direct impact on use intention. However, several TAM-based studies on GI have demonstrated a significant relationship (Alzahrani et al., 2017; H. Chen et al., 2017; S. Gao et al., 2016; Hsu & Lu, 2004; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; H. Wang & Lee, 2020; L. Wang & Yan, 2015). This study assesses whether the direct effect of ATT on GI is fully mediated by the joint effect of PE and EE. The following hypothesis is proposed:

H9: The effect of attitude on gameplay intention will be fully mediated by performance expectancy and effort expectancy.

2.5.2.10 Self-efficacy (SEY) and Gameplay Intention

SEY is defined as the belief or self-confidence in one’s ability to play a game (C. Chen et al., 2019). SEY plays a significant role in enhancing players' intention to engage in gaming (L. Chen et al., 2018; Lee & LaRose, 2007; C. I. Teng et al., 2022). New players with higher levels of SEY are generally more motivated to participate in games (Hong & Chan, 2018; Sharma et al., 2022). Conversely, regular players often exhibit lower SEY (S. J. Chung et al., 2020). In studies on problematic gaming behavior, SEY has been shown to have a negative relationship with gaming behavior, where players with low SEY are more dependent on the game, sometimes leading to addiction (Brand et al., 2014; C. Chen et al., 2019; S. J. Chung et al., 2020). Given these findings, this study incorporates SEY as a key factor.

The direct effect of SEY on use intention can be fully mediated by perceived ease of use, which is incorporated into EE in the UTAUT model (Kulviwat et al., 2014; Venkatesh et al., 2003; Venkatesh & Morris, 2000). While the mediating role of EE in the relationship between SEY and use intention has been studied extensively in utilitarian information system contexts, further exploration is necessary when applying it to hedonic systems such as gaming. Therefore, this study follows the UTAUT framework to reassess the mediating role of EE in this relationship.

H10: The effect of self-efficacy on gameplay intention will be fully mediated by effort expectancy.

2.5.2.11 Social Interaction (SIT) and Gameplay Intention

Social-related factors play a critical role in contributing to problematic game use (Haagsma et al., 2013a; Haagsma et al., 2013b; King & Delfabbro, 2014). Upon reviewing IS technology acceptance and use models, it becomes evident that UTAUT2 only addresses SIF through social norms and neglects social interaction. SIT refers to in-game user-to-user interactions among two or more players (Alzahrani et al., 2017; H. Chen et al., 2017; Dindar, 2018; Lee & Tsai, 2010). Players can communicate with each other to enhance virtual or real-life friendships and share game experiences like knowledge, strategies, and resources.

Individuals who experience a lack of social support offline, loneliness, or social anxiety are at greater risk of addiction (Brand et al., 2014; M. Liu & Peng, 2009; Park et al., 2016). These individuals often feel undervalued in real life, struggle with normal social interactions, and may avoid contact with others. They tend to find validation and self-worth in virtual activities, which can lead to a growing dependence on these interactions. Games with social features often offer these individuals an escape from their real-life struggles (Liu & Peng, 2009). Once a social network is established within the game, disengagement can be challenging, and the game may become central to their social existence.

SIT is a key predictor of both GI and IGD, with particularly strong predictive power in general online games and an even greater influence in social games (H. Chen et al., 2017; Lee & Tsai, 2010; H. Li et al., 2015; H. Wang & Lee, 2020). In this study, SIT is an essential component of the research framework, with its effects varying based on different moderating factors.

H11: Higher social interaction will increase gameplay intention, contributing to gaming disorder development.

2.5.2.12 Emotion Coping (EC) and Gameplay Intention

An individual who plays a game for emotional coping may have a higher risk of developing addiction (Burleigh et al., 2022a, 2022b; Maroney et al., 2019; Schneider et al., 2018). Emotion coping refers to the extent to which individuals experiencing emotional stressors tend to use games as a means of recovery (Lazarus & Folkman, 1987; Reinecke, 2009). Playing games to manage negative emotions is one of the primary ways individuals cope with emotional challenges (Maroney et al., 2019; Reinecke, 2009; Schneider et al., 2018). Although emotion-focused coping may not directly address the underlying stressors, it can still improve a person's problem-solving abilities by alleviating emotional distress related to the stress (Reinecke, 2009). However, this approach can be risky. If the source of stress is not addressed and the individual continues to use gaming as an emotional escape, it may lead to prolonged stress and more serious problems over time (Burleigh et al., 2022a; Schneider et al., 2018).

After reviewing representative studies on IGD from both clinical psychology and information system acceptance perspectives, this study identifies depression (Compare et al., 2014), impulsivity (C. Chen et al., 2019; Kuss et al., 2021; Metcalf & Pammer, 2013; Na et al., 2017), and anxiety (Amstadter, 2008; Cisler & Olatunji, 2012) as the major emotional stressors. These stressors are used as measurement items for emotional coping. All of these factors positively influence the intention to play games or actual gaming behavior and, in some cases, are strongly associated with gaming disorder.

H12: Higher emotion coping will increase gameplay intention, contributing to gaming disorder development.

2.5.3 Hypothesis of the Moderating Effect

2.5.3.1 Hypothesis of the Moderating Effect of Game Genres and Media

2.5.3.1.1 Performance Expectancy and Gameplay Intention

PE has been shown to significantly affect gameplay intention, but its impact varies across different game types and can even yield negative results (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; P. Ramírez-Correa et al., 2019). Perceived usefulness has been shown to have no significant effect on gameplay intention in general computer games and mobile games (S. Gao et al., 2016; Hsu & Lu, 2004; J. Wu & Holsapple, 2014). When analysing games at an aggregate level, PE tends to play a minimal role.

In mobile social network games, however, both PE and perceived usefulness have been shown to positively and significantly influence GI (Baabdullah, 2018, 2020; H. Chen et al., 2017). Players of these games often perceive them as providing practical benefits in daily life. This pattern is also evident in studies on the mobile role-playing game Pokémon Go (Harborth & Pape, 2017, 2020). While PE shows some predictive power in specific mobile games, it remains weak for most other game types.

This variability highlights the need to consider game genres as a moderator to better capture the influence of PE on gameplay intention. Given that significant effects are primarily observed in mobile games, this study uses media as a moderator to explore whether mobile games provide more utility for daily life compared to computer games.

H1a: Game genres will moderate the effect of performance expectancy on gameplay intention, such that the effect will vary within different types of games.

H1b: Media will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the mobile group.

2.5.3.1.2 Effort Expectancy and Gameplay Intention

Under the influence of game genres, EE follows a similar pattern to PE in predicting GI. Within UTAUT2 research on general mobile games, EE generally does not significantly influence gameplay intention or use (Brigido et al., 2019; P. Ramírez-Correa et al., 2019). However, studies examining Pokémon Go and mobile social network games show varying degrees of significant positive

relationships between EE and GI (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020).

In contrast, existing studies on esports games indicate that EE is not a key motivator for GI in most computer games (Jang et al., 2021b; Jang & Byon, 2020b). EE significantly influences GI only in physical enactment games (Jang & Byon, 2020b). This finding may be attributed to the high cognitive demands, quick reaction times, and vigilant monitoring required for playing such games (Jang et al., 2021b). Compared to mobile games, computer games often require more complex movements. Therefore, both game genres and media play critical roles in shaping the influence of EE on GI.

H2a: Game genres will moderate the effect of effort expectancy on gameplay intention, such that the effect will vary within different types of games.

H2b: Media will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the computer group.

2.5.3.1.3 Social Influence and Gameplay Intention

SIF plays a role in predicting GI, but its impact varies across different contexts. UTAUT2-related studies on mobile social network games reveal a significantly positive effect of SIF on GI (Baabdullah, 2018, 2020). Similarly, SIF significantly affects GI in general mobile online games, likely due to the strong social aspects of mobile gaming (Brigido et al., 2019; P. Ramírez-Correa et al., 2019). Players are often motivated to play games that their friends enjoy and may encourage others to join as well.

However, research on Pokémon Go shows an insignificant effect of SIF on GI (Harborth & Pape, 2017, 2020). Despite being a player-versus-player (PvP) mobile game, Pokémon Go involves minimal player-to-player interaction, which limits the influence of social networks. Similarly, the ESC model examined SIF in general computer online games and found an insignificant effect on GI (Jang & Byon, 2020a). Jang & Byon (2020b) further confirmed this insignificance when accounting for the moderating effect of game genres.

Computer game players tend to display spontaneous gaming behaviors and are less influenced by their social surroundings (Jang et al., 2021a; Jang & Byon, 2020a). Although some current tournament-style computer games incorporate significant social elements, many computer games do not rely on SIF to attract

players (Jang & Byon, 2020b). Therefore, game genres and media are crucial factors in shaping how SIF affects gameplay intention and behavior.

H3a: Game genres will moderate the effect of social influence on gameplay intention, such that the effect will vary within different types of games.

H3b: Media will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the mobile group.

2.5.3.1.4 Facilitating Conditions and Gameplay Intention

FC impacts GI, but its influence differs across various game types. In general mobile online games, FC does not significantly affect GI (Brigido et al., 2019; P. Ramírez-Correa et al., 2019). However, in specific game types such as mobile social network games and Pokémon Go, FC significantly enhances GI (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020).

Players of mobile social network games often rely on well-designed and functional systems to ensure a good gaming experience. They do not want to spend a fortune on fees and still not reach the desired demographic. Similarly, Pokémon Go players require location-based functionalities to collect in-game characters, with character appearances linked to players' real-world locations.

In comparison, computer games generally involve higher costs, more extensive gaming knowledge, additional equipment requirements, and location-based constraints. As a result, FC plays a more significant role in influencing GI for computer game players (Alzahrani et al., 2017; L. Wang & Yan, 2015). These differences in media highlight the varying predictive power of facilitating conditions on gameplay intention across different game types and platforms.

H4a: Game genres will moderate the effect of facilitating conditions on gameplay intention, such that the effect will vary within different types of games.

H4b: Media will moderate the effect of facilitating conditions on gameplay intention, such that the effect will be stronger in the computer group.

2.5.3.1.5 Price Value and Gameplay Intention

PV can predict GI or user behavior, but the strength of this relationship varies across different studies. In general mobile games, the positive relationship between PV and GI is insignificant (Brigido et al., 2019; P. Ramírez-Correa et al., 2019). Most online mobile or esports games are free to enter and leave, with paid

options typically including full-access game items and speed boosts for progression (Harborth & Pape, 2017, 2020; Jang & Byon, 2020a). For players who are simply enjoying the game without seeking additional experience or advantages, price is not a significant constraint.

However, the relationship is significant in certain types of mobile and computer games (Jang & Byon, 2020a). PV shows a significant positive effect specifically in imagination games, likely because role-playing and first-person shooter games often require players to purchase better or additional equipment (Jang & Byon, 2020b). In these games, items frequently carry collectible potential and added value. MMORPGs may even charge players for gaming time. Mobile social network games often involve entry fees or paid access mechanisms, leading players to carefully consider their use (Baabdullah, 2018, 2020). Players who spend money on games usually seek enhanced value and services from the platform. Therefore, a strong pricing strategy and high product quality are essential for attracting and retaining players.

H5a: Game genres will moderate the effect of price value on gameplay intention, such that the effect will vary within different types of games.

H5b: Media will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the computer group.

2.5.3.1.6 Hedonic Motivation and Gameplay Intention

Although there is a generally strong positive relationship between HM and GI or use behavior, the strength of this association varies across different game genres. Sports simulation games show the highest coefficient, followed by imagination and physical enactment games (Jang et al., 2021b; Jang & Byon, 2020b). Sports games tend to provide more enjoyable feedback during gameplay than other game types. A specialized categorization model, rather than one of the more widely known game classification models, helps explain the power of game genres in this relationship (Jang et al., 2021b; Jang & Byon, 2020b). Although some variation exists in how this categorization influences GI, it is too broad to conduct in-depth comparisons that would accurately assess the relative contributions of different game genres. The model in this study uses a more comprehensive categorization model to better understand how various games provide different pleasures to players, despite the increased workload.

The difference between computer and mobile games is not substantial in this regard. The effect of HM on GI remains consistently strong across both types of games (Brigido et al., 2019; Jang & Byon, 2020b; Ramírez-Correa et al., 2019). Playing for enjoyment is one of the most fundamental needs for all gamers, regardless of the device they use. Therefore, the media factor is not included in this part of the study.

H6a: Game genres will moderate the effect of hedonic motivation on gameplay intention, such that the effect will vary within different types of games.

2.5.3.1.7 Habit and Gameplay Intention

Most UTAUT2 research on gameplay intention or behavior indicates that HA has a significant effect across various game genres (Harborth & Pape, 2017, 2020; Jang et al., 2021b; ang & Byon, 2020b; Ramírez-Correa et al., 2019). Among these genres, the imagination game group exhibits the highest HA coefficient, followed by the sports simulation and physical enactment groups (Jang & Byon, 2020b). In this relationship, HA faces challenges similar to those observed with HM. This study explores whether HA yields distinct and comparable results across a more detailed categorization of game genres.

There is no significant difference in the effect of HA on GI between computer and mobile gamers (Brigido et al., 2019; Jang et al., 2021b; Jang & Byon, 2020b; Ramírez-Correa et al., 2019). Both groups demonstrate a comparable level of self-awareness in their gaming behaviors. Accordingly, media is not included as a moderator in this relationship.

H7a: Game genres will moderate the effect of habit on gameplay intention, such that the effect will vary within different types of games.

2.5.3.1.8 Flow Experience and Gameplay Intention

Jang & Byon (2020a) identified a significantly positive effects of FE on GI without considering the moderating effect of game genres. However, incorporating game genres into the analysis rendered this relationship insignificant across all combinations (Jang & Byon, 2020b). They attributed this insignificance to potential misconstruction of the questionnaire items. Despite this, their research still highlights that FE impacts GI differently depending on the game genre.

Imagination games exhibit the strongest influence, followed by sports simulation and physical enactment games (Jang & Byon, 2020b). Imagination games, with their deep storytelling, expansive worldviews, and rich mechanic design, allow players to immerse themselves more than other genres. Many imagination games even feature artwork inspired by anime or movies. Notably, Blizzard Entertainment's World of Warcraft and Warcraft III, which once captivated global audiences, drew heavily from Tolkien’s trilogy. This genre provides a heightened sense of FE compared to other game types, making it essential to investigate the effect of FE on GI across various game genres.

In both computer and mobile games, FE significantly influences GI, as players can immerse themselves deeply regardless of the device used (S. Gao et al., 2016; Jang & Byon, 2020a; H. Yang & Lin, 2019). Since both platforms provide positive experiential feedback, this study does not consider the moderating effect of media in this relationship.

H8a: Game genres will moderate the effect of flow experience on gameplay intention, such that the effect will vary within different types of games.

2.5.3.1.9 Social Interaction and Gameplay Intention

The influence of game genres on SIT has not been directly explored in UTAUT2 but has been addressed in other research on game acceptance, usage, and psychological studies. MOBA and MMORPG players exhibit higher social motivations, with MMORPG players displaying a particularly strong need for SIT (Laconi et al., 2017; Park et al., 2016). In general computer games, SIT is significantly and positively related to use intention, either directly or through other determinants (Lee & Tsai, 2010; H. Li et al., 2015). Mobile social games, examined through flow theory and an extended TAM, produce similar results to computer games (H. Chen et al., 2017; H. Wang & Lee, 2020). These findings indicate that social motivation can predict GI in both mobile and computer games.

While this study does not aim to analyse the moderating effect of media on SIT, certain social games demonstrate significantly enhanced predictive power of SIT. Conversely, episodic, single-player role-playing games often lack community mechanics, making SIT a negligible factor. Therefore, this study incorporates game genres to examine variations in the predictive power of SIT across different types of games.

H11a: Game genres will moderate the effect of social interaction on gameplay intention, such that the effect will vary within different types of games.

2.5.3.1.10 Emotion Coping and Gameplay Intention

EC encompasses major stressors including depression, impulsivity, and anxiety. Arcade games, sports online games, and casual games are more effective at helping players relax from depression, whereas MMORPG, RTS, and FPS games tend to be more complex and require greater volition, energy, and concentration (Park et al., 2016). People with depression often turn to games for stress coping, but their preferences for MMORPG and FPS games differ slightly (Maroney et al., 2019). Coping with depression generally has a significantly positive effect on gameplay intention and behavior, though the extent of the effect varies across different game genres (Maroney et al., 2019).

Impulsivity has become a key factor linked to IGD (Hyun et al., 2015). In smartphone games, impulsive players exhibit a stronger intention to play (C. Chen et al., 2019). Players of MMORPG, RTS, FPS, and sports games who struggle with impulsivity also show a heightened need to play and are at higher risk of developing problematic gaming behaviors (Na et al., 2017). While impulsivity's predictive power varies across game types, it remains a strong predictor of GI.

In standard computer games, higher anxiety levels are associated with an increased risk of gameplay desire and IGD (Adams et al., 2018; González-Bueso et al., 2018; Hyun et al., 2015). MMORPG players have higher anxiety risk scores than MOBA players (Bonnaire & Baptista, 2019). Among anxious players, MMORPG gamers are the most at risk for gaming addiction, followed by FPS, sports, and RTS players (Na et al., 2017). Although anxiety's predictive strength varies slightly by game type, it remains a significant factor.

Overall, depression, impulsivity, and anxiety have similar capacities to drive gameplay behavior across both computer and mobile platforms (Ryu et al., 2019). Both media are highly effective at helping players manage emotional issues, with little difference in their effectiveness.

H12a: Game genres will moderate the effect of emotion coping on gameplay intention, such that the effect will vary within different types of games.

2.5.3.2 Hypothesis of the Moderating Effect of Gender

2.5.3.2.1 Performance Expectancy and Gameplay Intention

In populations with a higher proportion of males, the influence of perceived usefulness, which forms the foundation of PE, on GI tends to be minor (Hsu & Lu, 2004; J. Wu & Holsapple, 2014). This suggests that male players may place less emphasis on the usefulness of games in daily activities. Understanding the role of gender in the relationship between PE and GI is crucial for this research, as female players may strengthen the effect of PE on GI.

H1c: Gender will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the female group.

2.5.3.2.2 Effort Expectancy and Gameplay Intention

EE tends to be more valued among female players. When gender is added as a moderator in the analysis, the ESC model indicates that EE significantly affects GI only within the female group (Jang et al., 2021b). EE is theoretically grounded in perceived ease of use. For instance, two studies on general mobile games with a large proportion of male participants found no significant effect of perceived ease of use on GI (Mulyawan & Rafdinal, 2021; H. Yang & Lin, 2019). Articles with a higher proportion of female participants have shown a significant positive effect of perceived ease of use on GI (S. Gao et al., 2016). Research that exclusively surveyed female participants demonstrated a particularly strong influence of perceived ease of use (Ye et al., 2020). Female players are generally more sensitive to the ease of use in games (Jang et al., 2021b; Ye et al., 2020). Therefore, this study focuses on examining this relationship within the female group.

H2c: Gender will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the female group.

2.5.3.2.3 Social Influence and Gameplay Intention

In general computer online game contexts, the ESC model's analysis of the effect of SIF on GI produced insignificant results (Jang & Byon, 2020a). However, when gender was introduced as a moderator, the impact of SIF on GI increased, but the significant effect was observed only within the male group (Jang et al., 2021b; Jang & Byon, 2021). Moreover, gender differences have a significant impact on

this relationship within the player group of physical enactment games (Jang et al., 2021b).

In other studies on IS related to SIF, social norms were highlighted as having a significant positive impact on GI in general online games (Hsu & Lu, 2004). However, this effect became insignificant when a larger proportion of the population was female, even within the mobile game group, which had previously shown a significant effect of SIF on GI (Brigido et al., 2019; S. Gao et al., 2016; P. Ramírez-Correa et al., 2019). When the proportion of male respondents increased, the relationship regained significance (H. Yang & Lin, 2019). Therefore, the male group is the primary focus of the analysis on SIF.

H3c: Gender will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the male group.

2.5.3.2.4 Facilitating Conditions and Gameplay Intention

The moderating effect of gender on the relationship between FC and GI is not significant. Harborth & Pape (2017) and Harborth & Pape (2020) applied PLS-MGA and found no gender group difference in the path from FC to GI, despite the fact that the path was significant for the female group but not for the male group.

Most of the studies mentioned in the previous section included a slightly larger proportion of female respondents. However, Lee & Tsai (2010) found a significant positive result with a higher proportion of male respondents, while Alzahrani et al. (2017) reported the same result with a higher proportion of female respondents. There is minimal cognitive difference between male and female gamers regarding the equipment and skills needed to play games. Therefore, the influence of gender in this context is minimal and is not considered.

2.5.3.2.5 Price Value and Gameplay Intention

Female players are more sensitive to PV compared to male players (Jang et al., 2021b). They are often more cautious when purchasing games or making in-game investments to ensure their expectations are met. Historically, gaming has been more focused on male audiences, and only in recent years has the female market begun to be explored. This shift has led to the development of more games aimed at appealing to female players (Harborth & Pape, 2017, 2020). When evaluating whether spending money on games brings the same level of happiness as other entertainment options like movies or music, female players

tend to be more cautious (Jang et al., 2021b). Therefore, studying the role of gender in the influence of price value is worthwhile.

H5c: Gender will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the female group.

2.5.3.2.6 Hedonic Motivation and Gameplay Intention

The moderating effect of gender on the relationship between HM and GI is significant (Jang & Byon, 2021; X. Xu, 2014). In the study of social network games, X. Xu (2014) found that perceived enjoyment had a statistically significant stronger influence on gameplay intention in the female group. In contrast, Jang & Byon (2021) demonstrated that, in the context of e-sports games, hedonic motivation (HM) exerted a stronger influence on gameplay intention in the male group.

However, when examined across studies or within broader comparative analyses, adding gender to the analysis did not substantially alter the significant moderating result (Harborth & Pape, 2017, 2020; Jang et al., 2021b). Male and female gamers share similar desires for enjoyment in gaming.

The moderating effect of gender on the relationship between hedonic motivation (HM) and gameplay intention (GI) has shown considerable variation across different game types and demographic contexts. X. Xu (2014) analysed 3,919 valid responses from the social network game market in China. Harborth & Pape (2017) and Harborth & Pape (2020) conducted two studies on Pokémon Go in Germany, with sample sizes of 895 and 683, respectively. Jang & Byon (2021) and Jang et al., (2021b) carried out multiple surveys among e-sports game players in the United States, with sample sizes of 498 and 1,194, respectively.

Although the findings from X. Xu (2014) are based on a large sample and thus appear to be more persuasive, the questionnaire design for perceived enjoyment in her study differs substantially from the measurement of hedonic motivation (HM) used in the UTAUT2 or ESC models. Moreover, her study did not include an assessment of measurement invariance. In contrast, Jang et al., (2021b) applied the HM scale from UTAUT2 in a large-sample analysis and confirmed measurement invariance across groups, yet did not find significant moderating effects of gender. Additionally, the game products included in the present study largely overlap with those analysed in Jang et al., (2021b), and the analysis is conducted within a large sample group. Based on these considerations, this

study argues that investigating the moderating effect of gender on the relationship between hedonic motivation and gameplay intention may have limited practical and theoretical significance.

2.5.3.2.7 Habit and Gameplay Intention

In prior empirical studies, HA was significant for both male and female players, except in two specific groups: males playing sports simulation games and females playing physical enactment games (Jang et al., 2021b). Male players of sports simulation games often prefer to participate in the same sports in real life and are more accustomed to showcasing their competitive skills in physical sports. Physical enactment games are typically 3D games played from a first-person or third-person perspective. These games require advanced keyboard and mouse skills, quick reflexes, and strong visual processing abilities. Female players tend to invest more energy in these games compared to male players, making it more difficult for them to form habitual gaming behaviors. Moreover, in the player group of Pokémon Go, there are significant gender differences between male and female players in their actual game usage habits (Harborth & Pape, 2017, 2020). Female players exhibited a stronger influence of HA on GI. Jang & Byon (2021) further confirmed the presence of gender differences in their study of e-sports games, showing that habit had a significantly stronger influence on gameplay intention in the female group. Therefore, this study estimates that female players' gameplay intention and behavior are more dependent on the influence of HA compared to male players.

H7c: Gender will moderate the effect of habit on gameplay intention, s such that the effect will be stronger in the female group.

2.5.3.2.8 Flow Experience and Gameplay Intention

The female group exhibited a stronger influence of FE on GI (Jang et al., 2021b). Female players are more sensitive to changes in challenges and overall gameplay experiences compared to male players. For male players, the level of difficulty and competition has minimal impact on their need for FE. In contrast, female gamers often need to consider whether a chosen game will satisfy their FE needs. Operational challenges and complex storylines can be obstacles for female players.

In recent years, the gaming industry has increased its attention on female consumers. However, there is still a lack of research on GI that examines the differences in the demand for FE across genders. Therefore, this study focuses on the influence of FE in the female group to better understand female consumers.

H8c: Gender will moderate the effect of flow experience on gameplay intention, such that the effect will be stronger in the female group.

2.5.3.2.9 Social Interaction and Gameplay Intention

Among the determinants of emotional factors, gender differences influence how these factors affect gaming behavior. Gender differences have been found to moderately impact the relationship between SIT and social network GI (H. Li et al., 2015). Male gamers are more focused on whether a game meets their social needs, while female gamers are more likely to receive responses in social network games. For instance, women are more likely to play games to foster friendships, while men prefer games that emphasize competitiveness (Hyun et al., 2015; Laconi et al., 2017). Since the game genres cover a wide range of games with a reduced proportion of social games, the influence of SIT on GI among the male group in general games will diminish. Therefore, this study places greater emphasis on the influence within the female group.

H11c: Gender will moderate the effect of social interaction on gameplay intention, such that the effect will be stronger in the female group.

2.5.3.2.10 Emotion Coping and Gameplay Intention

Male gamers also tend to exhibit higher levels of depression, impulsivity, and anxiety associated with IGD (Bonnaire & Baptista, 2019; Hyun et al., 2015). Male players are more vulnerable to the psychological impacts of excessive gaming, potentially increasing their risk of developing maladaptive behaviors (Kuss et al., 2021; Maroney et al., 2019; Na et al., 2017; Park et al., 2016). Their heightened impulsivity may lead to difficulty in controlling gaming time, while elevated anxiety and depression could further reinforce their reliance on gaming as a coping mechanism. Understanding these psychological tendencies is essential for developing targeted interventions and preventive measures aimed at reducing IGD risk, especially in male-dominated gaming communities.

H12c: Gender will moderate the effect of emotion coping on gameplay intention, such that the effect will be stronger in the male group

Table 2.7 Hypotheses List

Construct	Hypothesis
Performance Expectancy (PE)	**H1**: Higher performance expectations will increase gameplay intention, contributing to gaming disorder development. **H1a**: Game genres will moderate the effect of performance expectancy on gameplay intention, such that the effect will vary within different types of games. **H1b**: Media will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the mobile group. **H1c**: Gender will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the female group.
Effort Expectancy (EE)	**H2**: Higher effort expectancy will increase gameplay intention, contributing to gaming disorder development. **H2a**: Game genres will moderate the effect of effort expectancy on gameplay intention, such that the effect will vary within different types of games. **H2b**: Media will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the computer group. **H2c**: Gender will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the female group.
Social Influence (SIF)	**H3**: Higher social influence will increase gameplay intention, contributing to gaming disorder development. **H3a**: Game genres will moderate the effect of social influence on gameplay intention, such that the effect will vary within different types of games. **H3b**: Media will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the mobile group. **H3c**: Gender will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the male group.
Facilitating	**H4**: Higher facilitating conditions will increase gameplay intention, contributing to gaming disorder development.

Construct	Hypothesis
Conditions (FC)	**H4a**: Game genres will moderate the effect of facilitating conditions on gameplay intention, such that the effect will vary within different types of games.
	H4b: Media will moderate the effect of facilitating conditions on gameplay intention, such that the effect will be stronger in the computer group.
Price Value (PV)	**H5**: Higher price value will increase gameplay intention, contributing to gaming disorder development.
	H5a: Game genres will moderate the effect of price value on gameplay intention, such that the effect will vary within different types of games.
	H5b: Media will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the computer group.
	H5c: Gender will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the female group
Hedonic Motivation (HM)	**H6**: Higher hedonic motivation will increase gameplay intention, contributing to gaming disorder development.
	H6a: Game genres will moderate the effect of hedonic motivation on gameplay intention, such that the effect will vary within different types of games.
Habit (HA)	**H7**: Higher habit will increase gameplay intention, contributing to gaming disorder development.
	H7a: Game genres will moderate the effect of habit on gameplay intention, such that the effect will vary within different types of games.
	H7c: Gender will moderate the effect of habit on gameplay intention, s such that the effect will be stronger in the female group.
Flow Experience (FE)	**H8**: Higher flow experience will increase gameplay intention, contributing to gaming disorder development.
	H8a: Game genres will moderate the effect of flow experience on gameplay intention, such that the effect will vary within different types of games.
	H8c: Gender will moderate the effect of flow experience on gameplay intention, such that the effect will be stronger in the female group.

Construct	Hypothesis
Attitude (ATT)	**H9**: The effect of attitude on gameplay intention will be fully mediated by performance expectancy and effort expectancy.
Self-efficacy (SEY)	**H10**: The effect of self-efficacy on gameplay intention will be fully mediated by effort expectancy.
Social Interaction (SIT)	**H11**: Higher social interaction will increase gameplay intention, contributing to gaming disorder development. **H11a**: Game genres will moderate the effect of social interaction on gameplay intention, such that the effect will vary within different types of games. **H11c**: Gender will moderate the effect of social interaction on gameplay intention, such that the effect will be stronger in the female group.
Emotion Coping (EC)	**H12**: Higher emotion coping will increase gameplay intention, contributing to gaming disorder development. **H12a**: Game genres will moderate the effect of emotion coping on gameplay intention, such that the effect will vary within different types of games. **H12c**: Gender will moderate the effect of emotion coping on gameplay intention, such that the effect will be stronger in the male group.
Gameplay Intention (GI)	**H_{13}**: Higher gameplay intention will contribute to generate internet gaming disorder.

2.6 Proposed research framework

This proposed research framework includes 12 exogenous constructs: performance expectancy (PE), effort expectancy (EE), social interaction (SIT), social influence (SIF), facilitating conditions (FC), price value (PV), hedonic motivation (HM), habit (HA), flow experience (FE), emotion coping (EC), attitude (ATT), and self-efficacy (SEY). Gameplay intention (GI) serves as the main endogenous construct. It is predicted by the 12 exogenous constructs and further acts as the predictor of internet gaming disorder (IGD). The effects of attitude (ATT) and self-efficacy (SEY) on gameplay intention (GI) are hypothesised to be mediated by performance expectancy (PE) and effort expectancy (EE). After these mediation paths are examined, attitude and self-efficacy are not retained in the final structural model. The framework also includes three moderators: game genre, media platform, and gender. These variables are used to examine whether the relationships between the remaining 10 exogenous constructs and gameplay intention differ across gaming conditions and demographic groups.

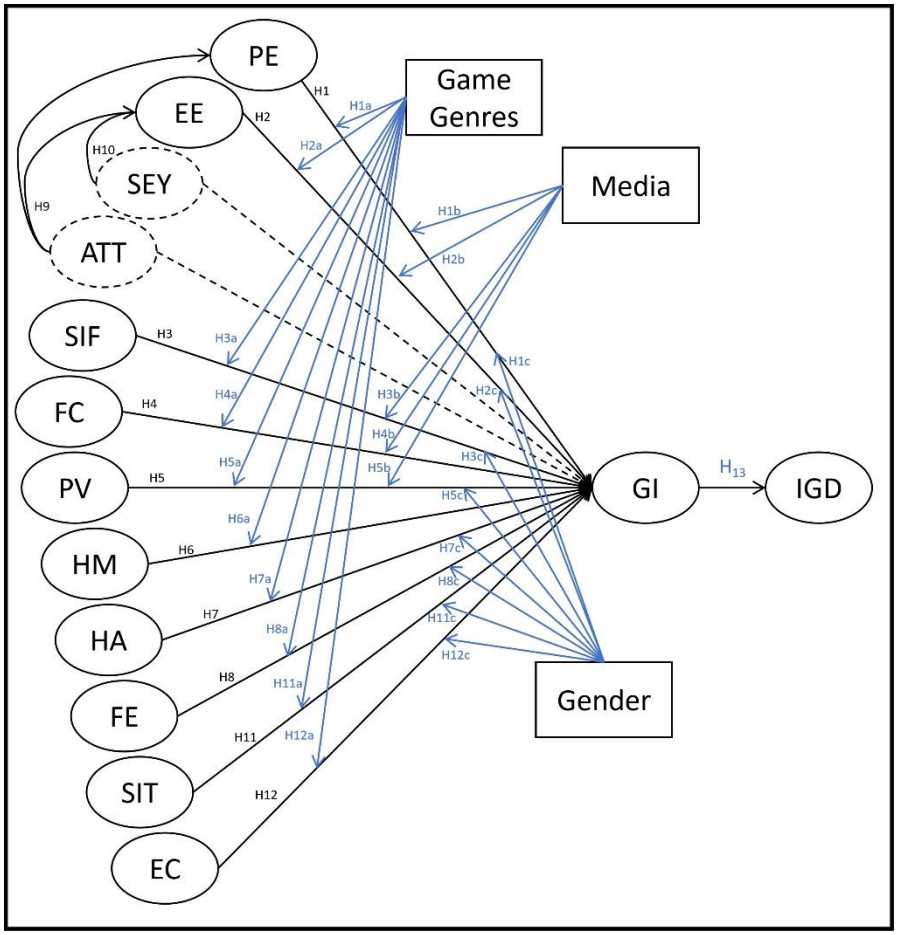


Figure 2.3 The Research Framework

Chapter 3

Research Methodology

This study adopts positivism as the philosophical paradigm guiding the methodological framework, which is structured around four research questions. The methodological chapter of this study primarily includes research philosophy, the research context related to UTAUT2, population and sample size, and the sampling plan. It also covers data collection tools, translation techniques, cross-sectional study design, questionnaire response issues, pilot test design, data collection procedures, questionnaire design, and data analysis design. Figure 3.1 in Section 3.1.4 illustrates the relationship between the philosophical paradigm and the methodological framework.

3.1 Research Philosophy

Research philosophy refers to a system of beliefs and assumptions concerning the nature of knowledge development and the ways in which research is conducted (Saunders et al., 2019). This study's research philosophy informs not only its theoretical stance but also its methodological decisions. The following sections discuss ontology, epistemology, axiology, and the overall research paradigm, explicitly linking each philosophical dimension to the methodological choices adopted in this study.

3.1.1 Ontology

Ontology addresses fundamental assumptions about the nature of reality (Lim, 2023; Saunders et al., 2019). The ontological perspective shapes the researcher's viewpoint and methodology for investigating their research topics. From a positivist ontological perspective, reality is viewed as objective, stable, and independent of the researcher, consisting of observable and measurable phenomena (Creswell, 2003). The positivist ontology supports the use of structural equation modeling and hypothesis testing within a quantitative research design.

In this study, key constructs such as gameplay intention, behavioral predictors, and internet gaming disorder are treated as objective phenomena that can be operationalized through measurable indicators. An established conceptual framework derived from prior information systems research is selected. Constructs are defined as theoretical latent variables with hypothesized relationships. Gaming behavior is conceptualized as a structured system of measurable elements rather than as subjective or socially constructed experiences.

3.1.2 Epistemology

Epistemology involves assumptions about knowledge, including what is deemed acceptable, valid, and legitimate, as well as methods for communicating knowledge to others (Lim, 2023; Saunders et al., 2019). The epistemology of positivism holds that authentic knowledge can only be gained through experience and observation (Creswell, 2003; Saunders et al., 2019). It emphasizes evidence-based scientific methods, asserting that trustworthy information is acquired through rigorous observation, experimentation, and logical reasoning.

This study adopts a quantitative approach to examine relationships among constructs. Structured questionnaires are used to collect standardized data across a large sample. Empirical testing of hypotheses is conducted through statistical modeling. Partial least squares structural equation modeling (PLS-SEM) is employed to assess measurement validity, structural relationships, and predictive capability within the proposed model. Knowledge claims are derived from statistical evidence rather than interpretive accounts.

3.1.3 Axiology

Axiology addresses the role of values and ethics in shaping research decisions. Researchers must make a key axiological decision about how much influence their own values and beliefs should have on their research and whether this influence is beneficial (Lim, 2023; Saunders et al., 2019). Positivism emphasizes the value of scientific methods, focusing on acquiring generalizable knowledge through objective research methods free from subjective biases (Creswell, 2003; Saunders et al., 2019). Given this strong commitment to objectivity and neutrality, axiological considerations occupy a relatively minor position within the positivist paradigm.

In this study, axiological considerations are reflected in the use of standardized instruments, closed-ended survey items, and consistent analytical procedures. Data interpretation relies on statistical criteria rather than subjective judgment. Ethical principles are addressed through informed consent, anonymity, and responsible data management. The research aims to generate value-neutral findings with relevance for academic research, industry practice, and policy development.

3.1.4 Research Paradigm

This study's research philothis study employes meticulous statistical analysis toolssophy employs a positivist framework. Positivism aligns with the philosophical stance of natural scientists, focusing on the examination of observable social phenomena to generate generalizations similar to scientific laws (Creswell, 2003; Nardi, 2018; Saunders et al., 2019). Positivists emphasize a rigorous empiricist approach focused on obtaining objective data and factual evidence free from human interpretation or bias. Results obtained in this manner are replicable and broadly applicable, though they may lack depth and flexibility (Creswell, 2003; Gill et al., 2010). The primary goal is to provide objective, replicable, and applicable results for theoretical research, marketing strategies, or policy-making.

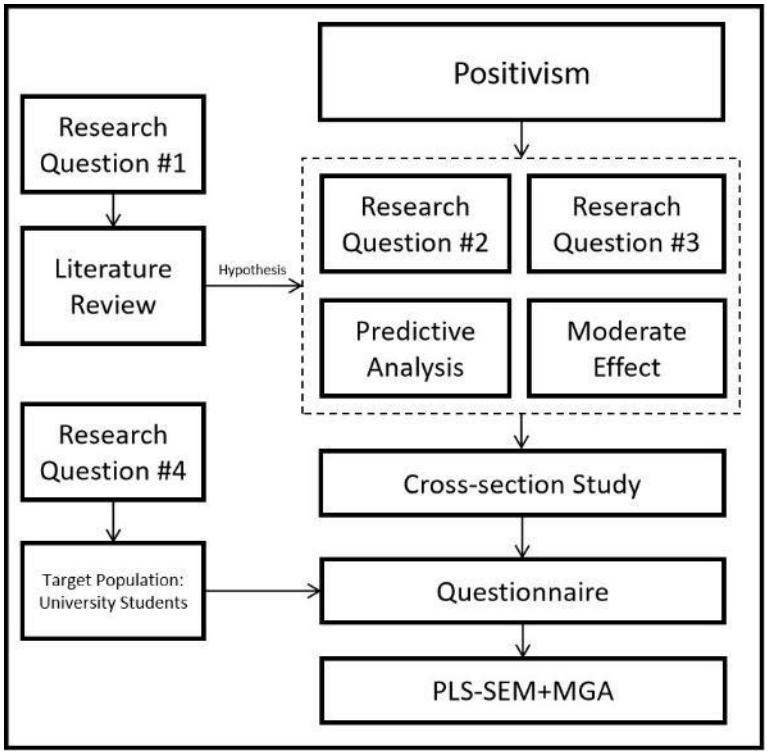


Figure 3.1 Research Paradigm

Guided by positivism and based on the UTAUT2 framework, this study's research paradigm investigates internet addiction among Chinese university students using a quantitative approach. It aims to develop an expanded model based on the mature UTAUT2 framework in the field of IGD. This model applies to gaming consumption and explores gaming addiction in greater depth. These investigations aim to uncover the underlying mechanisms or processes that connect variables to explain why specific situations occur. Figure 3.1 illustrates

the relationship between the philosophical paradigm and the methodological framework.

This study begins with a literature review to understand the current body of research on UTAUT2 in the domains of gaming and gaming addiction. UTAUT2 is a comprehensive theoretical model that integrates multiple prominent theories in the field of information technology acceptance and use. To address the research question #1, “How are gameplay intention and IGD affected by potential common gameplay behavior predictors?” this study conducts a detailed review of existing research on these sub-theories within the contexts of gaming and gaming addiction. Based on the findings from the collected literature, this study consolidates relevant content to expand and refine the UTAUT2 model.

This study explores the research questions #2 and #3, “What is the predictability of the extended UTAUT2 on potential internet gaming disorder?” and “How do game genres, media, and gender affect the degree of predictability of the extended UTAUT2 on gameplay intention?” within a positivist framework. This framework necessitates rigorous statistical analysis to draw conclusions and establish theoretical principles for future research. Consistent with positivist methodology, a cross-sectional study is particularly suitable for this research as it involves collecting and analysing data at a single point in time (Saunders et al., 2019). This approach facilitates the objective analysis needed to identify key relationships and patterns, which are essential for developing generalizable rules that enhance understanding in the field (Levin, 2006; Setia, 2016). The findings provide targeted marketing and policy recommendations for the gaming industry and contribute to expanding the analytical scope of the UTAUT2 theory series.

Under the guidance of positivism, the selection of data collection tools and statistical analysis methods in a cross-sectional study is driven by the need for objectivity, precision, and reliability (Dillman et al., 2014). Positivism emphasizes the use of measurable and observable data, making structured questionnaires or surveys particularly appropriate for collecting quantifiable information at a specific point in time (Levin, 2006; Saunders et al., 2019). Online surveys align well with positivist principles as they enable the systematic collection of data from a large sample of respondents, allowing for quantification and statistical analysis (DeVellis, 2016). This method is especially effective for testing hypotheses and identifying patterns or relationships between variables. By using closed-ended questions, surveys ensure consistency in the data, facilitating comparisons across participants (Dillman et al., 2014). Although interviews and focus group interviews offer rich, detailed insights and allow for the exploration of complex

issues, they tend to be more subjective and less generalizable. In positivist research, where the objective is to test theories and derive generalizable rules, surveys are typically preferred because they provide the precise, objective data necessary for rigorous statistical analysis.

Under the framework of positivism, this study employs meticulous statistical analysis tools to address its research inquiries. Partial least squares structural equation modeling (PLS-SEM) plays a critical role in statistical applications, as it enables researchers to test and validate theoretical models using empirical data (Hair et al., 2018; Hair et al., 2022, 2023). Positivism emphasizes understanding phenomena through observable and measurable data, and PLS-SEM aligns with this by facilitating the evaluation of complex relationships between variables, managing measurement errors, and making predictions (Saunders et al., 2019). In this study, PLS-SEM is utilized to conduct predictive analyses of IGD, while the multi-group analysis (MGA) technique is integrated to assess the moderating effects of game genres, media, and gender. This approach enhances the study's ability to draw objective conclusions and provides a comprehensive understanding of the factors influencing GI and IGD.

Before data collection, it is essential to establish a clear understanding of the phenomenon under study to ensure the relevance and informativeness of the data collected. According to annual research reports and development policies in the Chinese gaming industry, students are the most prominent demographic in the Chinese gaming consumer market. The issue of gaming consumption among Chinese university students, particularly gaming addiction, has been a significant concern for educational institutions, governments, society, and the market (D. Chen, 2020; Z. Liu et al., 2021; Xi & Hu, 2022; H. Yang & Lin, 2019; J. Yi, 2018). This study aligns with the industry's areas of focus by prioritizing efforts to address gaming consumption issues related to Chinese university students. The research question #4, "What is the extent of potential addiction risk posed by the daily gaming consumption intentions of Chinese university students?" guides this investigation.

Data for this study are collected from a specific group rather than distributed randomly across various groups. As such, non-probability sampling is employed to provide a more detailed understanding of the behavioral patterns of the targeted group. This approach allows for a focused analysis of the factors influencing gaming consumption and addiction within the Chinese university student demographic.

This study, guided by the positivist framework, adopts a cross-sectional design to address the research questions. Data is collected from Chinese university students using a carefully structured questionnaire to ensure standardized and quantifiable responses. The analysis employs partial least squares multi-group analysis (PLS-MGA), a robust statistical tool that enables the examination of moderating effects across different groups.

To enhance the study's theoretical foundation and strengthen its methodology, a systematic literature review is conducted. This review gathers extensive research on related topics, providing justification for the selected research design and methods. The integration of this literature not only informs the study's design and implementation but also contributes to the overall rigor and credibility of the findings, ensuring that conclusions are well-supported by empirical evidence.

3.2 Research Context

Our UTAUT2-based research framework builds on the UTAUT paradigm as its foundation (Venkatesh et al., 2016). According to Venkatesh et al. (2016), individual technology acceptance and use can be contextualized through eight dimensions: technology, users, task, time, organization, location, environment, and rationale. This section introduces the first six dimensions, namely technology, users, task, time, organization, and location, to describe the contextual background of gaming behavior and to clarify the empirical setting of the research. The environment dimension is not discussed because it primarily refers to physical conditions such as temperature, lighting, and building settings, which are beyond the scope of the present study. The rationale dimension is not repeated in this section, as its philosophical foundations have already been discussed in detail in the Research Philosophy section. These dimensions are not treated as measurable constructs in the structural model. Instead, they provide contextual support for the design of primary data collection and data analysis, and help frame the interpretation of the results and discussion.

3.2.1 Technology

The first dimension is the technology attribute, with the target information technology in this study being computer and mobile games. A broad search identified 13 relevant articles, spanning from 1982 to 2024, that use UTAUT2 to predict GI (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Hattingh et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Kesuma & Princes, 2024; Ong et al., 2023; Ramírez-Correa et al., 2019). Games are already considered as a system of IS technology and have been proven to be effectively explained using UTAUT2.

Additionally, this study distinguishes various game genres and uses them as a moderating factor. Different game categories have demonstrated varying influences on players' behavior and psychology (Elliott et al., 2012b; Na et al., 2017). Notably, Jang & Byon (2020a) is the first to incorporate game genres as moderators in an esports consumption model, which is an extension of UTAUT2. This approach further emphasizes the relevance of UTAUT2 in understanding and predicting gameplay behaviors across different contexts.

3.2.2 Users

The game player serves as the user class. The primary objective is to investigate the underlying causes of players' problematic gaming behavior. Game players are consumers of gaming products and users of information system technology. They are neither game designers nor employees of gaming companies but individuals who invest considerable time and money in gaming activities (Harborth & Pape, 2017; Jang & Byon, 2020a).

Gender differences play a significant role in gaming behavior and addiction. Studies have shown that male and female players experience varying patterns and degrees of game addiction (Jang et al., 2021b; H. Li et al., 2015). Given these disparities, gender is included as a common moderating factor in the research. This will help identify how gender influences the relationship between gameplay behaviors and potential gaming addiction, providing a more nuanced understanding of player behavior across different demographic groups.

3.2.3 Task

The task of this conceptual model focuses on uncovering the relationship between general gaming consumption behavior and potential problematic gaming behavior. Players often turn to games as a coping mechanism for emotional stress, using gaming as a means of recovery and emotional regulation (Lazarus & Folkman, 1987; Reinecke, 2009).

Problematic online gaming behavior, or online game addiction, is characterized by excessive gameplay and the over-satisfaction of psychological needs (X. Liu et al., 2011). UTAUT2 expands upon UTAUT by incorporating hedonic factors from a consumer behavior perspective (Venkatesh et al., 2012). In line with this, this study aims to further refine UTAUT2's applicability to hedonic information systems, such as gaming, by integrating additional factors that address psychological and emotional needs. These enhancements provide deeper insights into the underlying mechanisms of gaming addiction and improve the model's predictive power for understanding problematic gaming behaviors.

3.2.4 Time

The conceptual model emphasizes the post-adoptive use phase within the UTAUT paradigm, which considers time across three stages: adoption, initial use, and post-adoptive use (Venkatesh et al., 2016). This study focuses specifically on post-adoptive use, where users engage deeply with the technology's feature-level functionality. This includes the ongoing utilization and approval of existing features, as well as exploring and adopting new feature extensions (Venkatesh et al., 2016).

Given that gaming addiction issues typically emerge after extended use, this study concentrates on players who are already in this post-adoption phase. By studying university students, a primary demographic for game usage, this investigation targets a group that demonstrates stable, sustained gaming behaviors and a certain level of experience. This focus helps identify the underlying causes of potential gaming addiction in users who are past the initial adoption stage and are more likely to exhibit behavior patterns associated with problematic use.

3.2.5 Organization and Location

The final dimension of the conceptual model addresses the organization and location contexts, tailored specifically to university students in China. The organization class refers to students enrolled in universities, while the "location" is China. Chinese universities offer four-year undergraduate programs, as well as master's and doctoral programs. In some English-speaking countries, there are differences in the educational structure between "university" and "college". However, in China, both provide formal four-year undergraduate education. The main difference lies in the national ranking, where colleges are generally rated lower than universities.

In August 2021, the Notice on Further Strict Management and Practical Prevention to Minors from Indulging in Online Games imposed stringent time restrictions on minors' gaming activities. Under this policy, online game enterprises are allowed to provide services to individuals under the age of 18 only from 8 p.m. to 9 p.m. on Fridays, weekends, and legal holidays. Before entering university, most students had limited access to games due to these age restrictions and the rigorous preparation for the university entrance examination. However, once they reach adulthood and transition into university life, students often experience newfound freedom and a more flexible schedule. This freer living environment in university allows ample time for gaming, which can potentially increase the risk of developing gaming addiction.

This study focuses on university students, evaluating whether the adoption and consumption of common internet games lead to problematic gaming behavior in this population. By examining this group, results aim to better understand the contextual and individual factors that contribute to potential gaming addiction.

In summary, this study and the proposed conceptual model are built upon six of the eight dimensions of the UTAUT paradigm: technology, users, task, time, organization, and location. The foundation of this research is UTAUT2, which serves as the primary framework for constructing the model, with targeted extensions to enhance its predictive capability for hedonic information systems, particularly regarding usage intention. Notably, this study is the first to establish a UTAUT2-based model aimed at identifying the dimensions that can predict both the acceptance and the problematic use of games. This model seeks to contribute new insights into understanding gaming behaviors and potential addiction risks in the context of online games.

3.3 Primary Data Collection Design

3.3.1 Population Group

Saunders et al. (2019, p. 294) define population as “the full set of cases from which a sample is taken is called the population.” This study focuses on IGD among university students, with Chinese university students identified as a high-risk population for IGD (X. Jiang, 2019; Lian & Huang, 2021; J. Yi, 2018). IGD has become a significant social issue in China, driven by the widespread availability of the internet and the rapid growth of the online gaming industry. As more university students immerse themselves in the virtual world, some develop addiction problems due to excessive gaming. The purpose of this study is to examine whether general gaming consumption motives are linked to gaming addiction among Chinese university students, providing deeper insights into the factors contributing to IGD in this high-risk group.

3.3.2 Sample Size Estimate

The sample size significantly impacts the statistical power and reliability of this study (Jackson, 2003). Since this study uses PLS-SEM for parameter analysis and MGA, sample size estimation should be based on subgroup sizes rather than the overall sample (Cheah et al., 2023). As model complexity increases, requiring more parameter estimation, a larger sample size is necessary. A larger sample size is particularly critical for PLS-SEM, as it enhances statistical power and improves the reliability and validity of results. In PLS-MGA, larger sample sizes allow for effective subgroup comparisons, ensuring adequate representation for meaningful group differences (Cheah et al., 2023; Hair et al., 2022; Henseler et al., 2016). Sufficient sample sizes also reduce the risk of sampling bias and improve the generalizability of findings, especially when examining complex models with multiple constructs (Klesel et al., 2022; Saunders et al., 2019).

The path coefficient with the minimum absolute magnitude and effect size are unknown prior to data collection and analysis. Therefore, G*Power or any predefined minimum power thresholds were not used to estimate or adjust subgroup sample sizes.

As this study employed the non-parametric permutation-based test to conduct PLS-MGA, the inverse square root method was adopted to determine the minimum subgroup size of 160 (Cheah et al., 2023; Hair et al., 2022; Kock & Hadaya, 2018). Although this method may slightly overestimate sample size, it ensures sufficient detection of moderation effects. Given the largest subgroup size is 10, the target sample size is 10 × 160 = 1,600.

Insufficient or imbalanced subgroup sizes can reduce the statistical power of moderation effects (Aguinis et al., 2017). To mitigate this, subgroup sample size differences should not exceed a factor of two (Cheah et al., 2020; Hair et al., 2018). When subgroup sizes are close but below the minimum, additional questionnaires can be distributed to the specific subgroup. Conversely, if subgroups are too large, random sampling can help balance subgroup sizes (Aguinis et al., 2017; Hair et al., 2018).

3.3.3 Sampling Plan

Sampling involves utilizing data gathered from a limited portion of a population to reflect the entire group, enabling the derivation of conclusions about the overall population (Nardi, 2018). This methodology plays a vital role in research, ensuring the validity and neutrality of collected data and confirming that the sample accurately mirrors the population. Sampling typically takes two forms: probability sampling and non-probability sampling. Probability sampling refers to designating the likelihood, which is nonzero, of each population element being chosen for inclusion in the sample (Saunders et al., 2019). There are four sampling strategies under probability sampling: simple random sampling, stratified random sampling, systematic random sampling, and cluster or multistage sampling.

On the other hand, non-probability sampling occurs when not every element has an equal chance of being chosen, limiting conclusions to those who completed the survey successfully (Nardi, 2018). When random sampling is time-consuming and not highly feasible, particularly in low-demand situations, non-probability sampling can be chosen, but the limitations of its results should be acknowledged. Non-probability sampling includes four strategies: convenience or accidental sampling, purposive or judgmental sampling, quota sampling, and snowball sampling (Nardi, 2018). While such methods impose limitations on statistical generalization, they are frequently applied in studies focusing on specific subpopulations.

The target population of this study consists of Chinese university students who actively engage in digital gaming. Although university students are a readily identifiable group, identifying gamers within this population requires additional screening. Snowball sampling is selected to address this challenge, as it facilitates access to participants embedded within gaming-related social networks. This approach aligns with the study's focus on gaming behavior and enables the recruitment of respondents who meet the specific inclusion criteria.

Gamers usually have interconnected networks within the gaming community. This sampling plan aims to distribute the questionnaire through the gaming community networks of the players themselves. Students from freshman to senior levels across 11 universities in China serve as initial contact points and share the questionnaire with peers who have gaming experience. This network-based distribution extends beyond individual institutions and regions, supporting broader geographic coverage while maintaining relevance to the target population.

Despite its suitability for accessing a specific and networked population, snowball sampling is subject to several limitations. Structural biases in snowball sampling primarily arise from its reliance on social networks, leading to uncontrolled sample composition, limited representativeness, and unknown response rates (Biernacki & Waldorf, 1981; Ting et al., 2025). Because recruitment follows existing relational ties, the procedure is susceptible to network dependence, homophily, and clustering effects, where participants disproportionately refer individuals with similar characteristics, experiences, or social positions. These mechanisms systematically restrict sample diversity and hinder the generalizability of findings.

To address reliance on social networks and the resulting lack of control over sample composition, the sampling process is initiated from multiple starting points across different universities, academic levels, and regions. This strategy reduces dependence on a single referral chain and limits the dominance of any one network. The use of multiple initial seeds supports broader coverage of target social circles and increases heterogeneity within the sample (Ting et al., 2025).

Potential limitations in representativeness are managed through careful interpretation of findings. The study does not aim to produce population-level estimates but focuses on examining structural relationships among gameplay-related constructs (Ting et al., 2025). Analytical techniques such as multi-group analysis are applied to assess whether key relationships differ across demographic and contextual subgroups, including gender, game genre, and gaming media. This approach allows systematic variation associated with network-based recruitment to be examined rather than ignored.

In addition, precise response rates cannot be calculated due to the decentralized distribution of the questionnaire. To mitigate the impact of unknown response rates and potential nonresponse bias, the survey design emphasizes clarity, accessibility, and low participation burden, and these measures are integrated into the data collection design and summarized in Section 3.3.7 (Dillman et al., 2014; Ting et al., 2025).

3.3.4 Data Collection Tool

The Web and Mobile questionnaire is an internet-based approach that operates on mobile or computer devices (Saunders et al., 2019). It is typically delivered through a Web link, such as a URL or QR code. Most web surveys function on a browser-based platform, allowing respondents to directly engage with the survey through their internet browsers (Dillman et al., 2014). In the past, this delivery method often required respondents to access the questionnaire on a computer connected to a wired internet connection, which significantly limited the speed and reach of distribution. However, with the widespread availability of smartphones and high-speed wireless networks, people can now access, complete, and share questionnaires anytime and anywhere using their mobile devices. This study designs and distributes questionnaires through online platforms, primarily targeting mobile phones, although they are accessible via computers.

The design and distribution of the questionnaire are facilitated through the built-in WeChat sub-program SoJump, which is accessible via the WeChat app on mobile phones. The promotion and usage of SoJump in China is similar to Amazon's survey design and distribution platform. SoJump offers a comprehensive system for survey design, organization, storage, distribution, and analysis, all free of charge. Its user-friendly interface and robust functionality have made it popular among researchers, businesses, and individual users (Shao & Xie, 2021). SoJump provides two options for survey distribution: URL and QR code. Respondents can access and complete the survey through the WeChat app or a browser on their smartphones or computers, then submit their responses. If respondents exit the survey midway, the system will not record the incomplete attempt. The features offered by SoJump align perfectly with this study's requirements for survey design, distribution, and storage. The same tool is used for both the pilot test and the formal questionnaire distribution. Within SoJump, Chinese versions of the nominal and ordinal scales required for this research are created. The data collected by SoJump can be stored in a format compatible with various statistical analysis software, with Excel being used to store the data.

The primary target population of data collection is Chinese university students. Currently, smartphone ownership and WeChat usage among Chinese students stands at 100%. During the COVID-19 pandemic, the Chinese government implemented the Health Code policy to control the spread of the virus, requiring

collaboration between the government and the WeChat app. WeChat is a social networking platform accessible via smartphones. The implementation of the Health Code policy required individuals to have a smartphone and a WeChat account. Students are required to present their Health Code on their smartphones when entering or leaving the campus. This policy has led to a 100% ownership rate of smartphones and WeChat accounts among the student population, significantly reducing the technological barriers to distributing the questionnaire.

3.3.5 Translation Techniques for Questionnaires

This study is an international study targeting Chinese university students, and the questionnaire needs to be translated from English into Chinese. In international research, maintaining consistent meaning across different languages is crucial (DeVellis, 2016; Nardi, 2018). The translation of questionnaire language should consider the following four points: the precise meaning of individual words; the meanings of word groups that are natural to a native speaker and not deductible from the individual words; the equivalence of meanings for people in their everyday experiences; and the correct use of language, including word and phrase ordering to create well-formed sentences (Saunders et al., 2019).

There are typically three techniques for questionnaire translation: direct translation, back-translation, and parallel translation (Saunders et al., 2019). In this study, back-translation is employed. This technique involves translating the questionnaire into the target language and then having a different translator translate it back into the original language. The goal is to evaluate the translation's equivalence and accuracy. This process ensures the validity and reliability of the questionnaire in different linguistic and cultural contexts by identifying any differences or misunderstandings that may occur during translation. The original questionnaire and the back-translated version are compared, and any differences are rectified to enhance accuracy. By using this technique, researchers can ensure that the translated questionnaire effectively conveys the intended meaning to respondents in the target language.

The translation work is carried out by an international intermediary and certified accordingly. The initial English questionnaire was first translated into Chinese by a native Chinese speaker. Then, a native English speaker translated the Chinese version back into English. This process of translating from Chinese to English was completed twice. Some adjustments were made to the first translated version, and the questionnaire was further refined based on the application of the UTAUT2 questionnaire in Chinese academic journals. Therefore, this back-translation process has three stamped and handwritten-signed translation certificates.

3.3.6 Cross-sectional Study Design

A cross-sectional study is conducted when a survey is administered to a specific sample of respondents at a single point in time (Levin, 2006; Nardi, 2018). It captures a momentary snapshot of the population, enabling researchers to analyse the relationships between variables at that specific time. Such studies are frequently used to evaluate prevalence, associations, or correlations within a larger population (Saunders et al., 2019).

The present study adopts a cross-sectional design to examine the relationships between gameplay-related factors and the risk of internet gaming disorder. The research objectives focus on testing theoretically specified relationships and evaluating the predictive capability of an extended UTAUT2 model rather than on tracking behavioral change over time. The cross-sectional approach is appropriate for this purpose, as it supports hypothesis testing, model validation, and large-scale data analysis within a bounded timeframe.

A longitudinal design would be more suitable for investigating developmental paths or causal changes in gaming behavior. Such an approach requires repeated measurements across extended periods and greater control over participant retention. These requirements exceed the scope of the current study, which emphasizes structural relationships and predictive assessment rather than temporal dynamics. The cross-sectional design allows efficient data collection from a large sample of Chinese university students during an academic semester, supporting the statistical power required for PLS-SEM analysis.

The target effective subgroup sample size was set at a minimum of 160, based on the inverse square root method, with a total intended sample size of 1,600. Data collection is conducted over a period of approximately six weeks using a structured questionnaire. While the cross-sectional design does not permit direct inference of temporal causality, it provides an appropriate methodological foundation for examining associations and predictive relationships within the stated research objectives.

3.3.7 Improving Snowball Sampling Response Rates

3.3.7.1 Increase the Benefits of Survey Participation

The first point is to "specifically convey how the survey results will be useful" (Dillman et al., 2014, p.28). The introduction page of this questionnaire highlights its application in the development of the gaming industry, the formulation of industry policies, and the optimization of underage anti-addiction systems. Emphasizing these aspects can spark respondents' interest, helping them feel that their participation contributes to the gaming industry.

The second point is to "ask interesting questions" (Dillman et al., 2014, p.28). The questionnaire primarily explores respondents' motivations for playing their favorite games and the potential risks of addiction associated with these games. These questions are closely tied to respondents' gaming behavior and daily usage patterns. The questionnaire also inquires about the influence of these motivations on gaming behavior, allowing respondents to self-reflect on their gaming motivations.

The third point is to "convey that others have responded" (Dillman et al., 2014, p.30). This study primarily uses the snowball sampling method, which relies heavily on participant interactions and referrals. Participants who have completed the questionnaire will pass it on to individuals with similar characteristics based on shared experiences and interests. Experienced gamers typically engage in frequent interactions with other gamers. The questionnaire is disseminated through the gamers' network of relationships.

3.3.7.2 Decreasing the Costs of Participation

The first point is to "reduce complexity" (Dillman et al., 2014, p.32). The questions in this questionnaire address basic issues that consumers face during the consumption process. The response format is multiple-choice, requiring respondents to indicate an approximate degree without providing specific numerical values. This approach significantly reduces the time needed for respondents to consider their answers.

The second point is to "make it convenient to respond" (Dillman et al., 2014, p.35). The questionnaire is distributed through the built-in WeChat sub-program SoJump. QR codes or hyperlinks are generated from SoJump for easy sharing within the community. Respondents can access the questionnaire homepage by scanning the QR code or clicking the hyperlink, without downloading additional

programs. One nominal scale question requires text input, while all ordinal scale questions are multiple-choice. Navigation buttons are provided on each page to allow respondents to move to the previous or next page easily.

The third point is to "minimize requests to obtain personal or sensitive information" (Dillman et al., 2014, p.36). This questionnaire collects limited personal information, restricted to gender and study year. It does not request sensitive information such as name, health or medical records, sexual experiences, or drug use.

3.3.7.3 Establishing Trust

The first point is to “emphasize sponsorship by a legitimate authority” (Dillman et al., 2014, p.39). The distribution of the questionnaire has received ethical approval from the University of Nottingham. The University of Nottingham Malaysia campus signs the questionnaire, helping to instill confidence in respondents that the survey is part of meaningful academic research that can contribute to industry development.

The second point is to “build upon previously established relationships and friendships” (Dillman et al., 2014, p.39). The questionnaire is distributed with the help of connections within the target university. Respondents are likely to trust these directors, teachers, and students, which will facilitate the smooth distribution of the questionnaire within these student groups.

The third point is to “assure confidentiality and protection of data” (Dillman et al., 2014, p.40). The collected data is uploaded to the university’s database, as required by the University of Nottingham. A pledge on the introductory page assures respondents that the data collected is used for this study and stored in the university’s official database, ensuring confidentiality and data security.

3.4 Scales and Measurements

In terms of data collection, the questionnaire incorporates nominal and ordinal scales. Nominal scales represent identifiable categorical categories using discrete measures. These categories are not quantitative and are not intended to be ranked; instead, they serve to classify or assign a value or number to different categories for a quick overview (Nardi, 2018).

Ordinal scales, on the other hand, are used to measure variables where the category values are ranked in a specific order. Although ordinal measurements are also discrete, they indicate progression or regression in a defined sequence (Nardi, 2018). These scales enable the classification and ranking of responses to facilitate effective data analysis.

3.4.1 Nominal Scales for Moderators

In this study, nominal scales is used to collect data on two items: the name of the game and the respondent’s gender. Gender serves as a moderator, collected through a closed-ended question with two response options: 1 (“Male”) and 2 (“Female”). This format is widely used in studies collecting socio-demographic information and follows standard practice. No adjustments are made to the gender question.

The game name is collected through an open-ended question. Open-ended questions allow respondents to provide unique answers without being restricted by predefined options, promoting more authentic responses (Dillman et al., 2014). This question aims to capture respondents' favorite game names, which should be unique to each individual. Closed-ended questions are unsuitable for this purpose due to the extensive variety of potential responses. While open-ended questions offer greater flexibility, it is essential to guide respondents on how to answer in a manner suitable for subsequent analysis. To ensure the collection of appropriate data, specifying the desired type of response in the question stem is recommended (Dillman et al., 2014, p. 128-129).

The question stem and categorization techniques used for collecting game types are informed by prior research (Elliott et al., 2012b; Siste et al., 2021). Game names often serve as unique labels recognized globally in different languages. Respondents are asked to provide the full Chinese name of their single favorite game and answer follow-up questions based on that game.

For accurate game categorization, fully established databases such as Gamefaqs.com are preferred over self-categorization methods, shown in Table 2.6 in Section 2.4.10.2 (Elliott et al., 2012a, 2012b). Using the provided game names, this study uses Gamefaqs.com to determine the game's genre and the electronic device used for gameplay. The collected game names are manually categorized by the researcher into the corresponding game genres and media. This process is completed using Excel's filter function.

3.4.2 Ordinal Scales for Exogenous and Endogenous Variables

Among ordinal scales, the questionnaire includes 12 exogenous variables and two endogenous variables with 47 questions, all of which are ordinal items. The conceptual model, based on the UTAUT2 paradigm, primarily explores psychological states or needs before and after adopting information technology. The questionnaire employs a 7-point Likert-type scale across all 47 items, rated as follows: 1 ("Strongly disagree"), 2 ("Disagree"), 3 ("Somewhat disagree"), 4 ("Neither agree nor disagree"), 5 ("Somewhat agree"), 6 ("Agree"), and 7 ("Strongly agree") (Venkatesh et al., 2012, 2016). Literature examining GI under UTAUT2 consistently uses this original 7-point scale. The 7-point scale was chosen for its ability to enhance granularity and increase statistical power, aligning with Venkatesh et al. (2012).

For the measurement of IGD, the Gaming Disorder Test (GDT) is selected (King et al., 2020; Pontes et al., 2021). Existing IGD scales commonly use a 5-point Likert scale rated 1 ("Never"), 2 ("Rarely"), 3 ("Sometimes"), 4 ("Often"), and 5 ("Very often"). The 5-point scale is popular in research due to its historical usage, lower cognitive burden across diverse populations, ease of data processing, and broad empirical support (King et al., 2020).

Mixing different Likert scales can lead to issues in data comparability and may negatively affect the reliability, validity, and effectiveness of statistical analyses (Jebb et al., 2021; Simms et al., 2019). When scales used for questionnaires differ in rating, the designer can adjust the rating design appropriately according to the needs of the research (Heggestad et al., 2019). Moreover, within different weights of Likert scales, it has been demonstrated that the IGD questionnaire can use "agree" and "disagree" to characterize the level of respondents' reactions to the questions (Charlton & Danforth, 2007; Rehbein et al., 2015). Therefore, it is advisable to maintain a consistent scale within the same study to ensure data comparability and the reliability of the analysis results (Dillman et al., 2014).

Some studies on IGD have shown that 7-point Likert scales provide strong validity and reliability (Charlton & Danforth, 2007, 2010; Metcalf & Pammer, 2011). Using a 7-point scale may improve the validity and reliability of the questionnaire compared to shorter scales (Charlton & Danforth, 2007, 2010; Dillman et al., 2014). Therefore, to ensure consistency across all questionnaire

items and minimize errors in subsequent statistical analyses, a uniform 7-point Likert scale is used in the questionnaire.

3.4.3 Measurement Items

3.4.3.1 Items of Moderator Scales

All items of the moderators are presented in Table 3.1. The Gender variable includes two options: male and female. Both Game Genre and Media are derived from the same open-ended question.

The information technology examined in this scale is illustrated as "my favorite game." This description follows Jang and Byon's ESC model, in which respondents answer all questions based on the game they choose to play (Jang & Byon, 2020a). This design encourages respondents to focus on their perception of a single game, allowing the questionnaire to assess the specific characteristics of that game. Additionally, it ensures that respondents have at least some familiarity with their chosen game, which increases the likelihood of accurate responses (Jang & Byon, 2020a, 2020b).

All questions in this scale use "my favorite game" as the reference point to capture the moderating effects of media and game genres. The collected game names are classified according to the categories listed on Gamefaqs.com, which organizes games based on type and platform.

Table 3.1 Items of Moderator Scales

Moderators	Scales
Gender	1. Male 2. Female
Game Genre/Media	Please choose and enter the full name of your favorite game (either from a computer/laptop or from a mobile phone/tablet; if from other platforms, please fill in “other”): _____. Please answer the following questions according to the game you select. If the game you choose is available on multiple platforms, please indicate your most frequently used platform type in parentheses after the name

3.4.3.2 Items from UTAUT2-based Scales

This study comprises a total of 11 variables with 37 items derived from UTAUT2-related research in the gaming domain, as presented in Table 3.2. Among these, 28 items are directly adapted from the scales of UTAUT2 in the gaming context. FE, originally not part of UTAUT2, was incorporated into the ESC model by Jang & Byon (2020a), with questionnaire items sourced from H. Yang & Lin (2019) and

Jang & Byon (2020a). The application of SEY and ATT draws from the conceptual design of UTAUT, with these two variables frequently appearing in other theoretical studies on game acceptance and use (Venkatesh et al., 2003).

This questionnaire makes a few textual changes to the scale design. As mentioned in the preceding section, the questionnaire shifted the investigated technology from "mobile Internet" to "my favorite game." In addition to the previously mentioned unified information technology, the term "using" in the scale is replaced with "playing," aligning with Jang & Byon (2020a). The original meaning of the sentence has not changed as a result of this modification; all of them indicate the behavior of using the targeted technology. This design is mainly a corresponding change in response to the targeted technology being the game (Jang & Byon, 2020a). Usually, people are more likely to comprehend the phrase "playing" a game than "using" a game. Also, "playing" corresponds descriptively to "gameplay" in the endogenous variable.

Although the majority of studies analysing games using UTAUT2 have inherited the word "using" from UTAUT2 itself, many other studies analysing games, using the information system acceptance and use model, prefer to use the word "playing" to express usage behavior (S. Gao et al., 2016; Hsu & Lu, 2004; Mulyawan & Rafdinal, 2021; J. Wu & Holsapple, 2014). To make it simpler for respondents to comprehend the meaning of the sentence more generally and to preserve consistency in the presentation of items, scales, and variables, "playing" is used to convey game-specific behavior. All of the items in this questionnaire use “playing” instead of “using.”

3.4.3.2.1 Performance Expectancy (PE)

PE is a UTAUT2 term defined as the degree to which players believe the game will enable them to reach their use purpose (S. Gao et al., 2016; Hsu & Lu, 2004; H. Yang & Lin, 2019). In the questionnaire, four items (#1 to #4) derived from UTAUT2-related research, primarily applied in game studies, are collected to assess the effectiveness of PE. The original UTAUT2 design for PE scale is directly referenced in the four components selected for the present scale, as shown in Table 3.2 (Venkatesh et al., 2012). These components have been applied in six studies investigating games (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; P. Ramírez-Correa et al., 2019).

According to the available data, these scales and their items meet the requirements for construct reliability (CR) greater than 0.7, average variance

extracted (AVE) greater than 0.5, and factor loading greater than 0.5 (Hair et al., 2018). The CR ranged from 0.88 to 0.963, the AVE ranged from 0.708 to 0.932, and the factor loadings ranged from 0.808 to 0.969.

3.4.3.2.2 Effort Expectancy (EE)

EE is a UTAUT2 term defined as the degree of ease with which consumers play a game (Jang & Byon, 2020a; Venkatesh et al., 2012). The four items (#5 to #8) in the EE scale are derived from the original UTAUT2 questionnaire design, as shown in Table 3.2 (Venkatesh et al., 2012).

In ten studies investigating gameplay intentions using the UTAUT2 theory, these items have been further validated as effective in capturing respondents' perceptions of the difficulty or ease of gaming (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Ramírez-Correa et al., 2019). According to the available data, these scales and their items meet the requirements for CR, AVE, and factor loading. CR ranged from 0.78 to 0.943, the AVE ranged from 0.5 to 0.826, and factor loadings ranged from 0.60 to 0.944.

3.4.3.2.3 Social Influence (SIF)

SIF is defined as the degree to which an individual perceives that important others believe he/she should play games (Fishbein & Ajzen, 1975; Venkatesh et al., 2012). The three items (#9 to #11) in the SIF scale are derived from the original UTAUT2 questionnaire design, as shown in Table 3.2 (Venkatesh et al., 2012).

In 13 studies investigating gameplay intentions through SIF, subjective norms, and social norms, these items have been further validated as effective in capturing respondents' perceptions of others' opinions (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Lee & Tsai, 2010; Ramírez-Correa et al., 2019; Venkatesh et al., 2012; J. Wu & Holsapple, 2014). According to the available data, these scales and their items meet the requirements for CR, AVE, and factor loading. CR ranged from 0.75 to 0.965, the AVE ranged from 0.59 to 0.93, and factor loadings ranged from 0.55 to 0.967.

3.4.3.2.4 Facilitating Conditions (FC)

FC is defined as the users' perceptions of the resources and support available to play games (Lee & Tsai, 2010; Venkatesh et al., 2012). The four items (#12 to #15) in the FC scale are derived from the original UTAUT2 questionnaire design, as shown in Table 3.2 (Venkatesh et al., 2012).

In six studies investigating gameplay intentions through FC, these items have been further validated as effective in capturing respondents' perceptions of their ability to master devices and access technical support (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; P. Ramírez-Correa et al., 2019). According to the available data, these scales and their items meet the requirements for CR, AVE, and factor loading. CR ranged from 0.734 to 0.951, the AVE ranged from 0.541 to 0.904, and factor loadings ranged from 0.607 to 0.955.

3.4.3.2.5 Price Value (PV)

PV is defined as the degree of perceived value that players exchange for playing games at a monetary cost (Jang & Byon, 2020a; Venkatesh et al., 2012). The three items (#16 to #18) in the price value scale are derived from the original UTAUT2 questionnaire design, as shown in Table 3.2 (Venkatesh et al., 2012).

In 11 studies investigating gameplay intentions through PV, these items have been further validated as effective in capturing respondents' perceptions of the monetary value of the games they choose (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Ramírez-Correa et al., 2019). According to the available data, these scales and their items fulfill the requirements for CR, AVE, and factor loading. CR ranged from 0.74 to 0.91, the AVE ranged from 0.50 to 0.841, and factor loadings ranged from 0.61 to 0.94.

3.4.3.2.6 Hedonic Motivation (HM)

HM is defined as the fun or pleasure derived from playing a game (Jang & Byon, 2020a; Venkatesh et al., 2012). The three items (#19 to #21) in the HM scale originate from the original UTAUT2 questionnaire design, as shown in Table 3.2 (Venkatesh et al., 2012).

These items and their combinations have also demonstrated strong performance in studies related to the marketing theory of hedonic consumption, the hedonic-

motivation system adoption model, and flow-based cognitive absorption. Twelve studies confirm that these items effectively reflect respondents' level of enjoyment derived from the chosen game (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Koo, 2009; Lee & Tsai, 2010; Lowry et al., 2013; Ramírez-Correa et al., 2019; Venkatesh et al., 2012; J. Wu & Holsapple, 2014; Ye et al., 2020). According to the available data, these scales and their items meet the requirements for CR, AVE, and factor loading. CR ranged from 0.81 to 0.985, the AVE ranged from 0.601 to 0.970, and factor loadings ranged from 0.78 to 0.997.

3.4.3.2.7 Habit (HA)

HA is defined as the extent to which players feel that playing a game is a routine activity (Harborth & Pape, 2017, 2020; Jang & Byon, 2020a). The three items (#22 to #24) in the HA scale are derived from the original UTAUT2 design, while the fourth item (#25) comes from the ESC model, as shown in Table 3.2 (Jang & Byon, 2020b; Venkatesh et al., 2012).

This questionnaire, based on Jang & Byon's (2020b) adaptation of the HA scale in the ESC model, replaces one item from UTAUT2. Specifically, the original item "I am addicted to using mobile Internet" was substituted with "If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite esports game." This change was made to address potential collinearity issues, as the original item measuring addiction overlapped conceptually with the dependent variable, IGD.

To mitigate this issue, the questionnaire adopts a validated item from the ESC model that effectively measures HA while avoiding conceptual redundancy (Jang & Byon, 2020b). Studies confirm that the substituted item's factor loading remains stable, consistently exceeding 0.7 across different studies and moderator analyses, thereby maintaining its explanatory power (Jang et al., 2021a, 2021b; Jang & Byon, 2020b).

The final HA scale consists of three items from UTAUT2 and one item from the ESC model. This combination has been validated within the ESC model as an effective measure of the impact of HA on GI. Additionally, nine studies confirm that the selected items effectively capture respondents' perceptions of their daily gaming behavior patterns (Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Ramírez-Correa et al., 2019; Venkatesh et al., 2012).

According to the available data, these scales and their items meet the requirements for CR, AVE, and factor loading. CR ranged from 0.78 to 0.945, the AVE ranged from 0.50 to 0.901, and factor loadings ranged from 0.57 to 0.968.

3.4.3.2.8 Flow Experience (FE)

FE is defined as the extent to which an individual is fully immersed or absorbed in a game's virtual world (Jang et al., 2021b; Jang & Byon, 2020a). The items (#26 to #28) measuring FE in this questionnaire are primarily based on the design proposed by Shin & Shin (2011), as shown in Table 3.2. The ESC model incorporates flow theory to extend the application of UTAUT2 in the gaming domain and adopts the content of this questionnaire (Jang & Byon, 2020a).

According to the available data, these scales and their items meet the criteria for CR, AVE, and factor loading (Jang et al., 2021b; Jang & Byon, 2020a; Lee & Tsai, 2010; Shin & Shin, 2011; H. Yang & Lin, 2019). CR ranged from 0.781 to 0.95, the AVE from 0.573 to 0.83, and factor loadings from 0.752 to 0.95.

However, the study by Jang & Byon (2020a) encountered some issues with the FE scale. Anomalies in item performance led to lower values in factor loading, CR, and AVE. The extremely low factor loading for one item may have resulted from inconsistencies in the questionnaire responses collected. Nevertheless, this does not preclude future studies from using scales based on this structure. Both earlier studies and subsequent research have consistently reported strong statistical performance for this questionnaire (Jang et al., 2021b; Shin & Shin, 2011; H. Yang & Lin, 2019).

Therefore, this questionnaire retains the existing FE scale design while directly incorporating the refinements made in the ESC model (Jang & Byon, 2020a; Shin & Shin, 2011).

3.4.3.2.9 Self-efficacy (SEY)

SEY is defined as an individual's belief or self-confidence in the ability to play a game (C. Chen et al., 2019). The three items (#29 to #31) measuring SEY in this questionnaire are primarily adapted from Kulviwat et al. (2014), as shown in Table 3.2. While the wording differs slightly from the SEY scale used in UTAUT, both measures align conceptually (Kulviwat et al., 2014; Venkatesh et al., 2003). Prior studies have validated the mediating effects of perceived usefulness and perceived ease of use on self-efficacy (Kulviwat et al., 2014; Venkatesh et al.,

2003). Additionally, this scale has been effectively applied in research on game usage intention and gaming addiction (C. Chen et al., 2019, 2020). Given its relevance to gaming-related SEY, this questionnaire adopts the scale from Kulviwat et al. (2014).

According to the available data, the scale meets the criteria for CR, AVE, and factor loading (C. Chen et al., 2019, 2020; Kulviwat et al., 2014; Pedersen, 2005; Venkatesh, 2000; Venkatesh et al., 2003). CR ranges from 0.82 to 0.934, AVE from 0.667 to 0.826, and factor loading from 0.56 to 0.99.

3.4.3.2.10 Attitude (ATT)

ATT is defined as the degree to which a player positively or negatively values playing a game (Davis, 1989). The items (#32 to #34) measuring ATT in this questionnaire are primarily adapted from Venkatesh et al. (2003) and H. Chen et al. (2017), as shown in Table 3.2.

Venkatesh et al. (2003) originally proposed four items for the ATT scale in UTAUT. However, the present questionnaire excluded two, "The system makes work more interesting" and "Working with the system is fun," from the original set. To maintain measurement validity, this questionnaire incorporates one alternative item (#32) from a validated scale: "I feel good about playing mobile games" (H. Chen et al., 2017).

The three selected items have demonstrated strong statistical performance across multiple studies. According to available data, the scale meets the criteria for CR, AVE, and factor loading (H. Chen et al., 2017; S. Gao et al., 2016; Lee & Tsai, 2010; Mulyawan & Rafdinal, 2021; Venkatesh et al., 2003). CR ranges from 0.77 to 0.914, AVE from 0.595 to 0.78, and factor loading from 0.505 to 0.89.

3.4.3.2.11 Gameplay Intention (GI)

GI refers to the intention to play a game (Jang & Byon, 2020a). It serves as the primary endogenous variable in this model and is adapted from UTAUT2. The three items (#35 to #37) in the GI scale originate from the original UTAUT2 questionnaire, as shown in Table 3.2 (Venkatesh et al., 2012).

Several studies applying UTAUT2 to examine GI confirm that these items effectively capture respondents' willingness to engage in gameplay (Baabdullah, 2018, 2020; Brigido et al., 2019; Harborth & Pape, 2017, 2020; Jang & Byon,

2020a). According to available data, these scales and their items meet the criteria for CR, AVE, and factor loading. CR ranges from 0.84 to 0.97, AVE from 0.814 to 0.943, and factor loading from 0.84 to 0.978.

Table 3.2 Items from UTAUT2-based Scales

No.	Constructs	Order	Original Items	Present Items	Source
1	Performance Expectancy	PE1	I find mobile Internet useful in my daily life.	I find my favorite game useful in my daily life.	(Venkatesh et al., 2012)
2		PE2	Using mobile Internet increases my chances of achieving things that are important to me.	Playing my favorite game increases my chances of achieving things that are important to me.	
3		PE3	Using mobile Internet helps me accomplish things more quickly.	Playing my favorite game helps me accomplish things more quickly.	
4		PE4	Using mobile Internet increases my productivity.	Playing my favorite game increases my productivity.	
5	Effort Expectancy	EE1	Learning how to use mobile Internet is easy to me.	Learning how to play my favorite game is easy for me.	(Venkatesh et al., 2012)
6		EE2	My interaction with mobile Internet is clear and understandable.	My interaction with my favorite game is clear and understandable.	
7		EE3	I find mobile Internet easy to use.	I find my favorite game easy to play.	
8		EE4	It is easy for me to become skillful at using mobile Internet.	It is easy for me to become skillful at playing my favorite game.	
9	Social Influence	SIF1	People who are important to me think that I should use mobile Internet.	People who are important to me think that I should play my favorite game.	(Venkatesh et al., 2012)
10		SIF2	People who influence my behavior think that I should use mobile Internet.	People who influence my behavior think that I should play my favorite game.	
11		SIF3	People whose opinions that I value prefer that I use mobile Internet.	People whose opinions I value prefer that I play my favorite game.	

No.	Constructs	Order	Original Items	Present Items	Source
12	Facilitating Conditions	FC1	I have the resources necessary to use the system.	I have the resources necessary to play my favorite game	(Venkatesh et al., 2012)
13		FC2	I have the knowledge necessary to use the system.	I have the knowledge necessary to play my favorite game.	
14		FC3	Mobile Internet is compatible with other technologies I use.	My favorite game is compatible with other games I play.	
15		FC4	I can get help from others when I have difficulties using mobile Internet.	I can get help from others when I have difficulties playing my favorite game.	
16	Price Value	PV1	Mobile Internet is reasonably priced.	My favorite game is reasonably priced.	(Venkatesh et al.,
17		PV2	Mobile Internet is a good value for the money.	My favorite game is a good value for the money.	2012)
18		PV3	At the current price, mobile Internet provides a good value.	At the current price, my favorite game provides a good value.	
19	Hedonic	HM1	Using mobile Internet is fun.	Playing my favorite game is fun.	(Venkatesh et al.,
20	Motivation	HM2	Using mobile Internet is enjoyable.	Playing my favorite game is enjoyable.	2012)
21		HM3	Using mobile Internet is very entertaining.	Playing my favorite game is very entertaining.	
22	Habit	HA1	The use of mobile Internet has become a habit for me.	The play of my favorite game has become a habit for me.	(Jang et al., 2021a; Venkatesh et al.,
23		HA2	I must use mobile Internet.	I must play my favorite game.	2012)
24		HA3	Using mobile Internet has become natural to me	Playing my favorite game has become natural to me.	

No.	Constructs	Order	Original Items	Present Items	Source
25		HA4	If I have to select a task in my leisure time, it is an obvious choice for me to play (my favorite esports game).	If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite game.	
26	Flow Experience	FE1	During my playing of an esports game, I was absorbed intensely in the activity	During the playing of my favorite game, I was absorbed intensely in the activity.	(Jang & Byon, 2020a; Shin & Shin, 2011)
27		FE2	I strongly feel that I am inside a different world when playing my favorite esports game.	I strongly feel that I am inside a different world when playing my favorite game.	
28		FE3	When playing with my favorite game, I do not feel any control.	When playing with my favorite game, I do not feel any control.	
29	Self-efficacy	SEY1	I am able to use it without the help of others.	I am able to play my favorite game without the help of others.	(Kulviwat et al., 2014)
30		SEY2	I have the necessary time to make it useful to me.	I have the necessary time to make my favorite game useful to me.	
31		SEY3	I am able to use it reasonably well on my own.	I am able to play my favorite reasonably well on my own.	
32	Attitude	ATT1	I feel good about playing mobile games.	I feel good about playing my favorite game.	(H. Chen et al., 2017; Venkatesh et al., 2003)
33		ATT2	I like playing mobile games.	I like playing my favorite game.	
34		ATT3	Using the system is a good idea.	Playing my favorite game is a good idea.	
35	Gameplay Intention	GI1	I intend to continue using mobile Internet in the future.	I intend to continue playing my favorite game in the future.	(Venkatesh et al., 2012)
36		GI2	I plan to continue to use mobile Internet frequently.	I plan to continue to play my favorite game frequently.	

No.	Constructs	Order	Original Items	Present Items	Source
37		GI3	I will always try to use mobile Internet in my daily life.	I will always try to play my favorite game in my daily life.	

3.4.3.3 Items from Psychology Studies

One key contribution of this study is the integration of psychological factors related to IGD into the UTAUT2 framework, enhancing its ability to analyse gamers' psychological needs. The questionnaire items for these three variables were adapted from established surveys in previous studies, with minor modifications for consistency.

3.4.3.3.1 Social Interaction (SIT)

SIT, an in-game user-to-user interaction, refers to the requirement for interaction among two or more players within the game (Alzahrani et al., 2017; H. Chen et al., 2017; Dindar, 2018; Lee & Tsai, 2010). The three items (#38 to #40) in the SIT scale of this questionnaire are adapted from Morahan-Martin & Schumacher's (2003) application of the UCLA Loneliness Scale, as shown in Table 3.3. This scale has been used to examine the social needs of individuals with varying levels of loneliness in gaming activities. The present questionnaire selects items with high correlation scores, which have been widely applied in gaming-related research and validated in models of information system technology acceptance and use (Haagsma et al., 2013a; Hsu & Lu, 2004; Lee & Tsai, 2010; J. H. Wu et al., 2010). According to the available data, these scales and their items meet the criteria for CR, AVE, and factor loading. The CR ranged from 0.856 to 0.92, the AVE ranged from 0.643 to 0.73, and the factor loading ranged from 0.74 to 0.912.

Minor adjustments are made to item descriptions for contextual alignment. In item #38, "Going online" is revised to "Playing my favorite game" to specify that social interactions occur within the game rather than in general online spaces. In item #39, "Online" is replaced with "in-game" to clarify that the friendships referenced originate within the game environment.

3.4.3.3.2 Emotion Coping (EC)

EC refers to the extent to which individuals experiencing emotional stressors tend to use games as a means of recovery (Lazarus & Folkman, 1987; Reinecke, 2009). This questionnaire focuses on three primary emotional stressors: depression, impulsivity, and anxiety. Items #41 to #43 are adapted from Carver's (1997) Brief COPE Scale, which consists of 28 items and has been widely applied in studies on gaming addiction (Burleigh et al., 2022a, 2022b; Schneider et al., 2018). One of the selected items is based on the "substance use" category,

originally phrased as, "I've been using alcohol or other drugs to help me get through it," with modifications to align with the study's context.

Firstly, gaming addiction, alcohol addiction, and drug addiction are all classified as mental disorders in the DSM-5 and ICD-11, sharing similar addiction mechanisms (Petry et al., 2015). To ensure relevance, the phrase "alcohol or other drugs" was replaced with "games."

Secondly, the Brief COPE Scale is widely used in emotion regulation research, with the three selected emotional stressors being commonly examined in such studies (Brambila-Tapia et al., 2023; Burleigh et al., 2022a, 2022b; Carver, 1997; Ribadier & Varescon, 2019; Schneider et al., 2018; Studer et al., 2016). Individuals may turn to potentially addictive behaviors to establish stable emotional coping mechanisms. To reflect this, the questionnaire integrates specific emotional stressors into the items by replacing "it" with "depression," "impulsivity," and "anxiety."

Finally, the original item implies that respondents have already developed a pattern of using addictive substances (Carver, 1997). However, this study aims to explore the likelihood of respondents considering gaming as a coping mechanism rather than already using it as one. EC focuses on capturing players' intention to moderate emotional issues through gaming or their perception of gaming as a tool for emotional relief. Therefore, "have been using" is revised to "would like to use" to better capture respondents' perceptions during the selection phase. In the original questionnaire, the expression "have been using" indicates that respondents have previously used and are still currently using something as a coping mechanism. The expression "would like to use" conveys an expectation or intention to use something, rather than necessarily having already used it.

Therefore, the items state: "I would like to use my favorite game to help me get through depression," "I would like to use my favorite game to help me get through impulsivity," and "I would like to use my favorite game to help me get through anxiety."

The original items and reference studies are displayed in Table 3.3. According to the available data, these scales meet the criteria for CR, ranging from 0.80 to 0.88. However, due to the use of multiple multidimensional scales and length limitations, specific details regarding average variance extracted and factor loading are not provided.

3.4.3.3.3 Internet Gaming Disorder (IGD)

Items #44 to #47, listed below Table 3.3, constitute the Gaming Disorder Test (GDT), which assesses players' gaming activity over the past six months. GDT, developed by Pontes et al. (2021), evaluates gaming-related behaviors across platforms. This questionnaire directly measures respondents' levels of gaming addiction using the GDT, which aligns with the ICD-11 definition of IGD and is widely applied in IGD research.

According to the ICD-11, individuals with IGD must exhibit three key criteria over the past 12 months: impaired control over gaming; giving increasing priority to gaming to the extent that it takes precedence over other life interests and daily activities; continuation or escalation of gaming despite negative consequences. Each item in the GDT corresponds directly to these criteria.

No modifications have been made to the original GDT items in this questionnaire. Existing research confirms that this scale meets the criteria for CR and factor loading (I. H. Chen et al., 2023; Cudo et al., 2022; Ghazi et al., 2024; L. Li et al., 2023; Pontes et al., 2021; Strojny et al., 2023). The CR of the scale ranged from 0.74 to 0.924, while factor loading values range from 0.58 to 0.90.

Table 3.3 Items from Psychology Studies

No.	Constructs	Order	Original Items	Present Items	Source
38	Social Interaction	SIT1	Going online has made it easier for me to make friends.	Playing my favorite game has made it easier for me to make friends.	Morahan-Martin & Schumacher (2003)
39		SIT2	My online friends understand me better than other people.	My in-game friends understand me better than other people.	
40		SIT3	I prefer communicating online to face-to-face communication.	I prefer communicating online to face-to-face communication.	

No.	Constructs	Order	Original Items	Present Items	Source
41	Emotion Coping	EC1		I would like to use my favorite game to help me get through depression.	(Burleigh et al., 2022a, 2022b; Carver, 1997)
42		EC2	I've been using alcohol or other drugs to help me get through it	I would like to use my favorite game to help me get through impulsivity.	
43		EC3		I would like to use my favorite game to help me get through anxiety.	
44	Internet Gaming Disorder	IGD1	I have had difficulties controlling my gaming activity.		Pontes et al. (2021)
45		IGD2	I have given increasing priority to gaming over other life interests and daily activities.		
46		IGD3	I have continued gaming despite the occurrence of negative consequences (e.g., on interpersonal relationships, studies, or work).		
47		IGD4	I have experienced significant problems in life (e.g., personal, family, social, educational, and occupational) due to the severity of my gaming behavior.		

3.5 Data Collection Procedure

3.5.1 Pilot Test

The pilot test aims to enhance the questionnaire, ensuring that respondents can easily answer questions and record data without encountering issues (Saunders et al., 2019). Before distributing the formal questionnaire, input from experts or a panel of experts regarding the appropriateness of the questions is sought during the initial stage of the pilot test (Saunders et al., 2019; Thabane et al., 2010). This process helps refine the questionnaire structure and establish content validity, enabling essential adjustments before pilot testing with a population closely resembling the final study sample.

While sample size calculation is not always necessary for pilot studies, the pilot sample should still reflect the target population and adhere to the same criteria as the main study (Thabane et al., 2010). Ensuring representativeness is essential for reliable research outcomes. Only two studies related to UTAUT2 that investigated gaming intentions conducted a pilot test, with Baabdullah (2018) mentioning a sample size of 30 (Baabdullah, 2018; P. Ramírez-Correa et al., 2019). Since this study's PLS-SEM also includes MGA, the sample size requirements are more extensive and stringent. Therefore, the pilot test sample size was increased to approximately 50 individuals. The target population for this study primarily consists of Chinese university students, and the pilot test was conducted among Chinese university students and professional researchers.

The pilot test's main objectives include assessing the reliability and validity of the questionnaire. Reliability is tested using Cronbach's alpha (CA) and composite reliability (CR) for internal consistency, and indicator loadings are used to evaluate indicator reliability. Convergent validity is assessed using average variance extracted (AVE), and discriminant validity is tested using the heterotrait-monotrait ratio (HTMT). All analyses are conducted using SmartPLS 4.

Additionally, active communication with participants is maintained to identify and resolve potential issues with the questionnaire distribution process. These issues may include accessibility problems related to operating systems, wording clarity in the questionnaire content, translation issues, design problems with option labels, and the time required to complete the questionnaire (Dillman et al., 2014; Saunders et al., 2019; Thabane et al., 2010). By conducting the pilot test, efforts are made to minimize potential issues with the questionnaire before distributing

the formal version, ensuring the effectiveness of data collection in subsequent stages.

Prior to conducting the pilot test, the questionnaires used in this study were required to obtain ethical approval from the university. The ethical approval process requires the completion of an ethics proposal questionnaire, which includes 19 binary-choice questions and 4 open-ended questions for self-assessment. This ethics proposal is submitted to the university's dedicated ethics board for review and approval. The survey questionnaire is distributed to the target group of university students only after authorization is obtained and a pilot test is completed.

On November 12, 2024, this study received approval for research ethics under NUBS-REC-2024-14 from the Research Ethics Committee of the Business School at the University of Nottingham. The application included three documents: "Information for Research Participants," "Participant Consent," and "Privacy Notice." Screenshots of the approved documents are provided in Appendix A.1. The Chinese version of the pilot test questionnaire is provided in Appendix B.1. Before answering the questionnaire, participants were required to provide informed consent by entering their name in the designated fill-in-the-blank field.

After receiving ethics approval, this pilot test distributed 50 questionnaires via SoJump to experts in the research field and university student gamers across China. These experts are primarily individuals familiar with the UTAUT2 theory and possessing strong proficiency in both Chinese and English writing and speaking. The students, who were core fans of a game streamer, had a certain level of familiarity with the games and the topics discussed. Participants were encouraged to share any difficulties they encountered while accessing the online survey or interpreting the questionnaire.

3.5.2 Primary Data Collection

The questionnaire is distributed to a group of university students in China, regardless of gender, with an age range of 18 years and above. As a Chinese international student in Malaysia, the researcher distributed the survey to students through a personal network and the networks of collaborating research units. Structural equation modeling methods are used to analyse the data, providing a more explanatory analysis of model parameters. The minimum sample size is set at 1,600 based on the inverse square root method (Cheah et al., 2023; Hair et al., 2022; Kock & Hadaya, 2018). However, to account for potential invalid responses, additional questionnaires are collected to ensure the required number of valid responses is met.

The cross-sectional questionnaire is created and distributed through the SoJump mini-program in WeChat, a mobile platform app available on both Android and Apple devices. SoJump generates QR codes and URLs for questionnaire sharing, which can be distributed across various electronic devices connected to the internet. Respondents access the questionnaire via SoJump to submit their responses.

This study employs a snowball sampling method, which is a non-probability sampling plan. Initially, the questionnaire was shared with research collaborators at the target universities, who distributed it to class representatives and then to students. The designated contact persons at each target university have approved the distribution of the questionnaire on their respective campuses. These students, in turn, shared the questionnaire with other university student gamers. SoJump automatically collects, stores, and manages the responses, outputting completed questionnaires in formats compatible with mainstream data analysis software. Once a sufficient number of questionnaires are collected, the response window was closed, and the data was analysed using SmartPLS 4. The results of the data analysis are elaborated in subsequent chapters.

The primary data collection for this study relies solely on survey questionnaires, with distribution approved after obtaining ethical approval from the university. Without approval, the questionnaire cannot be distributed or stored in the school's database. Following the completion of the pilot test, adjustments were made to the questionnaire based on feedback from experts and participants, as well as insights from the statistical results. Subsequently, a new application for ethical approval was submitted. The final version of the questionnaire for this study received ethical approval from Nottingham Business School on 17

February 2025. Screenshots of the approved documents are provided in Appendix A.2. The Chinese version of the pilot test questionnaire is provided in Appendix B.2.

3.6 Data Analysis Plan

Existing studies analysing gaming intentions using the UTAUT2 model primarily employ two types of SEM: Covariance-Based Structural Equation Modeling (CB-SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM). Research using CB-SEM in the context of UTAUT2 typically focuses on theory development, empirical testing, model fit assessment, and multiple group analysis (Baabdullah, 2018, 2020; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b; Ong et al., 2023). On the other hand, studies utilizing PLS-SEM often emphasize theory development, predictive analysis, and multi-group analysis (Brigido et al., 2019; Harborth & Pape, 2017, 2020; Kesuma & Princes, 2024; Ramírez-Correa et al., 2019).

Each data analysis method has its own characteristics, strengths, and weaknesses. Based on the research objectives and the design of the hypothetical model, this study selects PLS-SEM as the theoretical tool for data analysis (Hair et al., 2022). PLS-SEM's excellent predictive analysis capabilities in large samples align well with the requirements of this study in analysing IGD-related outcomes (Hair et al., 2020; Hair & Sarstedt, 2019, 2021). It is particularly suitable for new models that lack extensive empirical analysis but are supported by theoretical foundations (Hair et al., 2019; Henseler et al., 2009). Additionally, PLS-SEM demonstrates strong analytical capability in handling complex models with multiple constructs (Hair et al., 2019; Hair et al., 2023).

Additionally, PLS-SEM is employed to conduct Multi-group Analysis (MGA) among different sub-sample groups (Hair et al., 2022). PLS-MGA is more suitable for analysing moderating effects in models with multiple constructs, diverse samples, and more than three groups. Its rigorous statistical procedures make it well-suited for this study's examination of group heterogeneity, enabling a more detailed exploration of player gaming behavior across different game genres and genders.

3.6.1 Partial Least Squares Structural Equation Modeling (PLS-SEM)

Structural Equation Modeling (SEM) is a statistical technique that allows for the analysis of complex relationships between multiple variables. It combines features of factor analysis and path analysis, enabling the simultaneous handling of multiple dependent and independent variables (Hair et al., 2022). SEM is primarily divided into two types: Covariance-Based Structural Equation Modeling (CB-SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM). Researchers must choose the SEM technique that aligns with their research goals, data attributes, and model configuration (Hair et al., 2011, 2019; Urbach & Ahlemann, 2010). The differences between CB-SEM and PLS-SEM, summarized by Urbach & Ahlemann (2010), are shown in Table 3.4.

Table 3.4 Comparison of PLS-SEM and CB-SEM (Urbach & Ahlemann, 2010)

Criteria	**PLS-SEM**	**CB-SEM**
Objective	Prediction-oriented	Parameter-oriented
Approach	Variance-based	Covariance-based
Assumption	Predictor specification (non-parametric)	Typically multivariate normal distribution and independent observations (parametric)
Parameter estimates	Consistent as indicators and sample size increase (i.e., consistency at large)	Consistent
Latent variable scores	Explicitly estimated	Indeterminate
Epistemic relationship between an LV and its measures	Can be modeled in either formative or reflective mode	Typically only with reflective indicators. However, the formative mode is also supported
Implications	Optimal for prediction accuracy	Optimal for parameter accuracy

Criteria	PLS-SEM	CB-SEM
Sample size	Power analysis based on the portion of the model with the largest number of predictors. Minimal recommendations range from 30 to 100 cases.	Ideally based on power analysis of specific model — minimal recommendations range from 200 to 800.
Type of optimization	Locally iterative	Globally iterative
Significance tests	Only by means of simulations; restricted validity	Available
Availability of global Goodness of Fit (GoF) metrics	Are currently being developed and discussed	Established GoF metrics available

CB-SEM is primarily used to confirm or reject theoretical models. It focuses on estimating how well a proposed theoretical model fits the covariance matrix of a sample dataset (Cho et al., 2020). This method is essential for theory testing and confirmation. By assessing the fit between the theoretical model and the observed data, researchers can determine the validity of the hypothesized relationships among variables (Henseler et al., 2009; Hooper et al., 2008).

PLS-SEM, on the other hand, is introduced as a "causal-predictive" approach to SEM, focusing on explaining the variance in the model's dependent variables (W. Chin et al., 2020). It is particularly useful when the objective of research is to predict key target constructs or identify key driver constructs (Gregor, 2006; Richter et al., 2016). PLS-SEM has been rapidly evolving as a statistical modeling technique and has seen extensive application across various disciplines (Venkatesh et al., 2016). The method is beneficial for exploratory research where theory is less developed (Tenenhaus et al., 2005).

The aim of this study is to theoretically expand the UTAUT2 model and apply it to predict the intention to use games and subsequent continuous gaming behavior. Additionally, the new conceptual model seeks to compare different types of gaming groups to observe

variations in the predictive model. PLS-SEM excels in prediction-oriented research, focusing on maximizing the explained variance of dependent variables, making it effective for predictive modeling (Hair et al., 2020; Hair & Sarstedt, 2019, 2021). Venkatesh et al. (2012) used PLS-SEM as the primary analytical tool in designing UTAUT2. The majority of studies employing the UTAUT2 theory have also chosen PLS-SEM as the tool for predicting consumer acceptance and use of information technology (Venkatesh et al., 2016).

The predictive model used in this study is an extension of the UTAUT2 model. This extended model lacks sufficient empirical validation for its structure, but its theoretical foundation is closely tied to other theoretical models of information system technology acceptance and use. PLS-SEM is suitable for situations where the theoretical foundation is weak or incomplete, allowing researchers to explore relationships between variables without strong theoretical constraints (Hair et al., 2019; Henseler et al., 2009).

Additionally, the extended model in this study is complex, featuring 10 pairs direct and indirect path relationships, 1 sole direct path, two mediating paths, and three sets of moderating variables. PLS-SEM is capable of estimating complex models with many indicators, constructs, and relationships, even when the data distribution is non-normal (Cassel et al., 1999; W. W. Chin, 1998; Hair et al., 2022).

This study uses PLS-SEM to test 36 hypotheses. These include 10 pair direct and indirect effects (Hypotheses #1, #2, #3, #4, #5, #6, #7, #8, #11, #12), 1 sole direct path (Hypotheses #IGD) and 2 mediating effects (Hypotheses #9, #10). In the analysis of mediate effects, Hypotheses #9 and #10 are tested within the whole extension model, while the remaining hypotheses are analysed through path analysis in the conceptual model proposed in this study. Following the path analysis, this study conducts an MGA based on the extended model. The MGA involves 3 groups of moderators, with a total of 23 hypotheses to be tested (Hypotheses #1a, #2a, #3a, #4a, #5a, #6a, #7a, #8a, #11a, #12a, #1b, #2b, #3b, #4b, #5b, #1c, #2c, #3c, #5c, #7c, #8c, #11c, #12c).

In PLS-SEM analysis, it is common to analyse two types of model structures (Brigido et al., 2019; Hair et al., 2022; Urbach & Ahlemann, 2010). The first type is the measurement model, which defines the relationship between latent variables and their observed indicators (Hair et al., 2022). Measurement models can be classified into two main categories: reflective measurement models, where indicators reflect the latent construct, and formative measurement models,

where indicators form or cause the latent construct (Bollen & Diamantopoulos, 2017; Hair & Sarstedt, 2019).

The second type is the structural model, which specifies the relationships between latent variables, representing the hypothesized causal connections and directional influences among these constructs (Hair et al., 2022). It includes paths, often depicted as arrows, indicating the direction and strength of the relationships between the latent variables. This study establishes both measurement and structural models in PLS-SEM.

3.6.1.1 Assessment of Reflective Measurement Models

The present measurement model is based on UTAUT2 and fully aligns with the definition of a reflective measurement model (Urbach & Ahlemann, 2010). A reflective measurement model defines indicators as effects of a latent variable, meaning the latent variable causes or forms the indicators, which should change consistently and positively correlate with each other (Hair et al., 2022; Urbach & Ahlemann, 2010).

Table 3.5 Assessment of Reflective Measure Models (Henseler et al., 2015; Urbach & Ahlemann, 2010)

Validity Type	Criterion	Description	Sources
Indicator reliability	Factor loadings (λ)	Measures how much of the indicators variance is explained by the corresponding latent variable. Values should be significant at the .050 level and higher than .700. For exploratory research designs, lower thresholds are acceptable. The significance can be tested using bootstrapping.	W. W. Chin (1998)
Internal consistency reliability	Cronbach's alpha (CA)	Measures the degree to which the manifest variables load simultaneously when the latent variable increases. Alpha values ranges from 0 (completely unreliable) to 1 (perfectly reliable). Proposed threshold value for confirmative (explorative) research: CA>.800 or .900 (0.700). Values must not be lower than .600.	Cronbach (1951)
Internal consistency reliability	Composite Reliability (CR)	CR is a method used to evaluate internal consistency, reflecting the consistency among measurement items of latent constructs and considering the loading weights of each item. The threshold for CR typically ranges from 0.70 to 0.80, with higher values indicating greater internal consistency and reliability of the measurement model. Values must not be lower than .600.	Fornell & Larcker (1981) and Bagozzi & Yi (1988)
Convergent validity	Average variance extracted (AVE)	Attempts to measure the amount of variance that an LV component captures from its indicators relative to the amount due to measurement error. Proposed threshold value: AVE > 0.500.	Fornell & Larcker (1981)

Validity Type	Criterion	Description	Sources
Discriminant validity	Heterotrait-monotrait ratio (HTMT)	HTMT calculates the ratio of the average correlations between items measuring different constructs (heterotrait-heteromethod correlations) to the average correlations between items measuring the same construct (monotrait-heteromethod correlations). A low HTMT value indicates that constructs are distinct from one another, supporting discriminant validity. Two common thresholds are used: $HTMT_{0.85} \leq 0.85$or $HTMT_{0.90} \leq 0.90$.	Henseler et al. (2015)

Urbach & Ahlemann (2010) summarized the essential reliability and validity analyses for reflective measurement models, shown in Table 3.5, including the use of Cronbach's alpha (CA) and composite reliability (CR) to assess internal consistency reliability, indicator loadings to verify indicator reliability, and average variance extracted (AVE) to evaluate convergent validity.

Additionally, this study employs the heterotrait-monotrait ratio (HTMT) as a substitute for the assessment of cross-loadings and the Fornell-Larcker criterion to assess discriminant validity. Variance-based PLS-SEM is utilized for statistical analysis in this study. The Fornell-Larcker criterion and the assessment of cross-loadings, although traditionally used in structural equation modeling (SEM) for evaluating discriminant validity, present significant limitations in the context of variance-based PLS-SEM (Henseler et al., 2015).

3.6.1.2 Assessment of the Structural Model

PLS-SEM holds significant advantages in model prediction, particularly in scenarios involving small sample sizes, complex models, non-normal data distributions, and multicollinearity (Hair et al., 2018; Urbach & Ahlemann, 2010). Its predictive orientation and flexibility make it widely used across various applications. Predictive analysis of the hypothesized model encompasses the construction of structural models. The analysis of the structural model focuses on path analysis and mediation effects. In the path analysis, this study primarily discusses the predictive ability of the hypothesis models. Path analysis uses three indicators: coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). Additionally, the path influence and significance of independent variables on dependent variables are evaluated through the analysis of path coefficients. The predictive indicators mentioned above are summarized from Urbach & Ahlemann (2010), as shown in Table 3.6.

Table 3.6 Assessment of the Structural Model (Urbach & Ahlemann, 2010)

Validity Type	Criterion	Description	Sources
Model Validity	Coefficient of determination (R^2)	Attempts to measure the explained variance of an LV relative to its total variance. Values of approximately 0.670 are considered substantial, values around 0.333 moderate, and values around 0.190 weak.	W. W. Chin (1998) and Ringle (2004)
Model validity	Path coefficients	Path coefficients between the LVs should be analysed in terms of their algebraic sign, magnitude, and significance.	Huber et al. (2007)
Model validity	Effect size (f^2)	Measures if an independent LV has a substantial impact on a dependent LV. Values of .020, .150, .350 indicate the predictor variable's low, medium, or large effect in the structural model.	Cohen (1988) and Ringle (2004)

Validity Type	Criterion	Description	Sources
Model validity	Predictive relevance (Q^2)	The Q^2 statistic is a measure of the predictive relevance of a block of manifest variables. A tested model has more predictive relevance the higher Q^2 is, and modifications to a model may be evaluated by comparing the Q^2 values. The proposed threshold value is $Q^2 > 0$. The predictive relevance's relative impact can be assessed by means of the measure q^2.	Stone (1974), Geisser (1975) and Fornell & Cha (1994)

Mediation analysis primarily observes the mediating role of PE and EE in the model (Hypothesis #9 and #10), analysing significant changes in direct and indirect effects along each path. In PLS-SEM, mediation analysis provides critical insights into the mechanisms underlying observed relationships between variables (Venkatesh et al., 2012). Researchers can improve their theoretical and practical understanding of the phenomena they are studying by better interpreting the mechanisms via which independent variables influence dependent variables by comprehending the role of mediators (Hair et al., 2018; Hayes & Rockwood, 2020).

Mediation occurs when the independent variable (IV) affects the dependent variable (DV) indirectly through a third variable, the mediator, thereby providing a more nuanced understanding of the causal pathways involved. Mediation can be classified into two types: full mediation and partial mediation (Baron & Kenny, 1986; Hair et al., 2017; MacKinnon et al., 1995; Nitzl et al., 2016).

When the mediator variable is included in the model, the relationship between the IV and DV is fully explained, making the direct impact non-significant. This is known as full mediation. This implies that the mediator is the only way the IV affects the DV.

Partial mediation happens when the mediator only partially explains the nature of the link between the IV and DV, leaving the direct effect of the IV on the DV considerable even after taking the mediator into consideration. This suggests that the total impact of the IV on the DV is influenced by both direct and indirect mechanisms. Accurately evaluating the structural links in PLS-SEM requires an understanding of these characteristics since it helps researchers separate the many interdependencies between variables in a model.

3.6.2 Partial Least Squares Multi-Group Analysis (PLS-MGA)

The multi-group analysis (MGA) technique is a commonly used tool in business research for analysing moderation effects within PLS-SEM (Hair et al., 2022). It enables researchers to gain deeper insights into the distinct characteristics of different groups, known as heterogeneity analysis. Individuals, groups, or organizations may exhibit varying degrees of within-group homogeneity and between-group differences due to diverse internal and external factors, such as language, culture, geography, work, or age (Sarstedt & Ringle, 2010). Heterogeneity analysis employs statistical techniques to examine within-group consistency and observe subtle differences between groups (H. Ting et al., 2019). MGA is a widely utilized statistical method for heterogeneity analysis within SEM.

Over the past few years, PLS-MGA has primarily been employed for comparative analyses between two groups (Cheah et al., 2023). Although less frequently applied to comparisons involving three or more groups, there exists a well-established and comprehensive analytical procedure for such cases. This study follows the guidelines for PLS-MGA usage as summarized by Hair et al. (2022), Cheah et al. (2020), and Cheah et al. (2023) to design the moderation effect analysis. Additionally, this study represents the first study to apply PLS-MGA for analysing three or more groups within an extended model based on the UTAUT2 framework.

Cheah et al. (2023) highlight several considerations when conducting comparisons among three or more groups. Multiple pairwise comparisons between groups increase the likelihood of Type I errors; the Šidák technique or the Bonferroni correction are advised to reduce this mistake rate (Hair et al., 2023). Without considering the estimates themselves, the omnibus test of group differences (OTG) is limited to showing whether average parameter estimates vary significantly between groups, which could inflate F-test scores even in the absence of actual group differences (Cheah et al., 2020; Klesel et al., 2022). Most importantly, a significant amount of research involving multi-group analysis overlooks measurement invariance, potentially leading to less accurate results.

As a result, Cheah et al. (2023) incorporated several modifications to the traditional PLS-MGA process to make it more suitable for comparisons involving multiple groups. This revised procedure consists of four steps: data preparation, parameter analysis of the measurement model, assessment of measurement invariance between groups, and, finally, the analysis of the structural model.

3.6.2.1 Data Preparation

In the first stage of data preparation, researchers have three key tasks (Cheah et al., 2023). The first task is to clearly define the rationale and theoretical basis for group segmentation. This typically stems from the researcher's prior experience in the field, as well as theoretical foundations validated through statistical analysis. In this study, moderation effects are analysed across game genres, media, and gender. The game genres category includes 10 subgroups, with the final subgroups for model analysis determined by the actual data collected. The classification of game genres is based on the globally recognized official classification website (gamefaqs.com). This classification approach has been extensively used in psychological studies on gaming addiction. However, its application within the UTAUT2 framework is being explored for the first time.

Table 3.7 Code List of Moderators

Moderator	Subgroup Name	Variable Code	Dummy Variable
Game Genres	Action	ACT	1
	Action Adventure	ACA	2
	Adventure	ADV	3
	Miscellaneous	MIS	4
	Puzzle	PUZ	5
	Racing	RAC	6
	Role-Playing	ROP	7
	Simulation	SIM	8
	Sports	SPO	9
	Strategy	STR	10
Gender	Male	MALE	1
	Female	FEMALE	2
Media	Computer/Laptop	CoLa	1
	Mobile phone/Tablet	MoTa	2

In both the media and gender categories, there are two subgroups each. Media is divided into mobile and computer, while gender is divided into male and female. The use of UTAUT2 to study gaming intentions has increasingly emphasized the differentiation between devices. Although these studies have not directly compared mobile and computer games, consumers have exhibited different behavioral patterns in computer gaming versus mobile gaming. Gender is a widely used category in moderation effect analysis and has already appeared in UTAUT2-related research. This study further analyses the moderating effect of gender to gain a deeper understanding of the different consumption motivations between males and females.

The second task in data preparation is to define the coding of groupings within the analysis software. In this study, the three moderators are all categorical variables. The subgroups are non-continuous, non-quantitative, and without intervals; they merely represent categories or groups. Table 3.7 shows the list of subgroup names. The variable values of gender and media are converted into binary dummy variables to facilitate model processing. The game genres are assigned dummy variable values ranging from 1 to 10.

The third task is to determine the minimum sample size required for each subgroup. The minimum sample size for each subgroup within the moderators has already been established in Section 3.3.2. The MGA procedure for game genres is adjusted based on the actual sample sizes collected, which leads to modifications in the number of subgroups included. Only those subgroups that meet the minimum sample size requirement are included in the model analysis. However, if a significant disparity in sample sizes exists between subgroups, random sampling is applied to the larger subgroup to ensure balanced analysis (Cheah et al., 2020).

3.6.2.2 Measurement Model Analysis in PLS-MGA

Once the data preparation and collection are complete, researchers can begin constructing the measurement model and conducting a consistency analysis of the measurement model. In PLS-MGA, researchers must perform a separate analysis for assessing each subgroup’s measurement model (Cheah et al., 2023; Henseler et al., 2016). This ensures that both the overall sample and each subgroup's measurement model have adequate internal consistency, convergent validity, and discriminant validity. The reliability and validity tests include the use of criteria such as factor loadings, Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE), and heterotrait-monotrait ratio (HTMT), as presented in Table 3.5 in Section 3.6.1.1. If any item or variable fails to meet the required standards, the researcher must adjust or remove the problematic item.

After establishing valid measurement models for both the overall sample and the subgroup samples, researchers can proceed with the consistency analysis. Assessing measurement invariance refers to the consistency of test scores or assessment results when applied to different subjects or at different time points (Cheah et al., 2023; Hair et al., 2022). Consistency between the measurement models of different groups is a prerequisite for comparative analysis of the

structural model (Hair et al., 2022). This ensures that any differences observed in the structural model and path coefficients across groups are not due to varying interpretations or understandings of latent variables by different groups.

The Measurement Invariance of Composite Models (MICOM) procedure is recommended for conducting the invariance test (Cheah et al., 2023; Hair et al., 2022; Henseler et al., 2016). It aims to analyse whether the sample groups have a consistent understanding of the measurement items. The MICOM procedure includes three invariance tests: configural invariance, compositional invariance, and equal distribution of mean values and variances of composites.

3.6.2.2.1 Configural Invariance

The configural invariance test is the first step in conducting MICOM and involves two key aspects that researchers must standardize (Cheah et al., 2023; Hair et al., 2022). Once configural invariance is achieved, researchers can proceed to the primary analysis steps in MICOM.

The first aspect is to ensure that each specific subgroup has a consistent measurement model, with identical constructs and indicators. This is particularly important in cross-cultural studies, where careful attention must be given to maintaining consistency in the translation of each indicator across subgroups (Cheah et al., 2023). In this study, the questionnaire was distributed uniformly without distinguishing between subgroups. Instead, all participants received the same version of the questionnaire, and subgrouping was performed after data collection. Therefore, this issue is not a concern for this study.

The second aspect is to confirm that all subgroups undergo identical data processing steps and use the same algorithm settings. For instance, the handling of outliers or straight-line answers must be consistent across all subgroups. Additionally, the same PLS algorithm must be applied to each subgroup.

3.6.2.2.2 Compositional Invariance

The compositional invariance test is the second step in the MICOM procedure, ensuring that composite scores are equivalent across subgroups (Henseler et al., 2016). Compositional invariance exists when the composite scores of subgroups are perfectly correlated, meaning the initial correlation coefficient equals or exceeds the 5% quantile, and the p-value is not significant (Cheah et al., 2023). In the MICOM procedure, this is confirmed by the permutation test, which

demonstrates that all $c_{original}$-values do not exhibit significant differences (Henseler et al., 2016). The $c_{original}$-values for all composites are approximately equal to 1, indicating a high degree of similarity in composite formation between groups. The permutation test results show p-values greater than or equal to 0.05, confirming that the observed $c_{original}$-values do not exhibit significant differences when compared to the distribution generated under the null hypothesis of no group differences. Establishing compositional invariance indicates the presence of partial invariance.

When comparing only two subgroups, the conventional p-value is set at 0.05 (Cheah et al., 2020; Hair et al., 2022). However, when conducting pairwise permutation tests for more than two subgroups, Cheah et al. (2023) recommend adjusting the p-value based on the actual number of subgroups to avoid family-wise error. The Bonferroni or Šidák correction are standard techniques for adjusting the p-value according to the number of groups (Hair et al., 2022). Both can be implemented in SmartPLS. Under these corrections, the confidence intervals are adjusted accordingly.

Additionally, in this study, the hypotheses concerning the moderating effect of game genres are non-directional, so a two-tailed test is applied in the permutation test (hypotheses #1a, #2a, #3a, #4a, #5a, #6a, #7a, #8a, #11a, #12a). On the other hand, the moderating effects of media and gender are directional, so a one-tailed test is used in the permutation test (hypotheses #1b, #1c, #2b, #2c, #3b, #3c, #4b, #5b, #5c, #7c, #8c, #11c, #12c).

3.6.2.2.3 Equality of Composite Mean Values and Variances

The third step in the MICOM procedure is to test the equality of composite mean values and variances, which is the final requirement for establishing full measurement invariance (Henseler et al., 2016). A permutation test is used to assess whether the mean values and variances of composite scores differ significantly across groups (Henseler et al., 2016). The test involves calculating the observed differences in means and variances between groups and comparing them to a null distribution generated through repeated random permutations of group membership. If the p-values are greater than or equal to 0.05, the null hypotheses of equal mean values and variances cannot be rejected, indicating no significant differences. This confirms that any observed differences in composite scores are not due to measurement inconsistencies but rather reflect true group differences.

Partial invariance is established when configural invariance and compositional invariance hold, but either the equality of composite means or the equality of variances is not fully met (Hair et al., 2022). Full invariance requires all three conditions to be met simultaneously. Researchers must achieve at least partial invariance in the MICOM procedure before proceeding with the analysis of the structural model.

3.6.2.3 Construct Model Analysis in PLS-MGA

The primary objective of this study is to explore the moderating effects of game genres, gender, and media on various path coefficients, observing how the influence of independent variables on corresponding dependent variables changes across different sample groups. Given the large number of subgroups within the moderator game genres, some adjustments to the traditional MGA are necessary. Cheah et al. (2023) suggest using the non-parametric permutation-based test (NPT) for pairwise comparison between subgroups when investigating specific path coefficients. Although this technique may increase the risk of family-wise error (Type 1 error), researchers can control Type 1 error in NPT by applying the Bonferroni or Šidák correction (Hair et al., 2022).

For estimating critical values, NPT employs a permutation test to determine the reference distribution of the parameter difference (Cheah et al., 2023). Whether a change in parameters is statistically significant is determined using this method. Researchers should compare the results obtained from the conventional p-value (0.05), Bonferroni's p-value, and Šidák's p-value in NPT. Typically, the adjusted p-values from the Bonferroni and Šidák corrections will yield similar results. The purpose of MICOM is to ensure measurement model consistency across different groups, while NPT further assists researchers in analysing differences in path coefficients within the structural model, assuming consistent measurement models. The results of NPT primarily support the validation of each moderator hypothesis.

When pairwise comparisons in NPT reveal statistically significant differences, researchers can proceed with further parameter analysis of the path relationships within each subgroup. This part involves the descriptive comparison of values for path coefficients, coefficient of determination (R^2), effect size (f^2), and predictive power (Q^2) across subgroups. These parameters of the construct model are explained in detail in chapter 3.6.1.2. Researchers should estimate the construct model parameters separately for the overall sample and each subgroup sample.

The variations in these parameters across different subgroups warrant attention and discussion, further supporting the hypotheses related to each moderator.

3.6.3 Data Analysis Tool

SmartPLS 4 is a powerful statistical analysis tool that simplifies and optimizes the PLS-MGA process. Its intuitive interface allows users, even those without programming experience, to navigate easily. The drag-and-drop features and graphical path modeling tools make model construction and analysis straightforward. SmartPLS 4 supports not only PLS-MGA but also integrates essential functionalities like MICOM and NPT, ensuring comprehensive and in-depth analysis across different groups (Cheah et al., 2024).

Whether dealing with large or small sample sizes, SmartPLS 4's PLS-MGA capabilities efficiently handle multi-group analysis without the constraints of data distribution. It provides rich graphical outputs and reports, helping researchers visually understand and interpret key metrics such as path coefficients, effect sizes, R^2, and Q^2. With optimized algorithms compared to previous versions, SmartPLS 4 can perform complex model calculations in a shorter time, particularly enhancing efficiency in multi-group path analysis. Cheah et al. (2020) offer detailed steps for conducting PLS-MGA using SmartPLS, and the tool's functionalities align perfectly with the analytical needs of the research.

Chapter 4

Results

This chapter presents the findings from both the pilot test and the primary data analysis conducted in this study. In the pilot test, respondents provided several suggestions regarding the design and translation of the Chinese questionnaire. The analysis of the measurement model in the pilot test revealed certain problematic indicators. These issues were examined, and appropriate revisions were made to the Chinese questionnaire. The revised Chinese questionnaire was subsequently distributed to Chinese university students after obtaining a second round of ethical approval.

In the primary data analysis, this chapter presents the demographic characteristics of the formal dataset, an overview of the game products, the random sampling procedures for the moderator groups, the evaluation of the measurement model, the structural model analysis, and the results of the PLS-MGA. Finally, this chapter summarizes the accepted and rejected hypotheses based on statistical analyses.

4.1 Pilot Test Results

The pilot test questionnaire for this study was distributed on November 13, 2024, and data collection was completed within the same day. All participants successfully completed and submitted their responses, and the demographic data of the 50 respondents are summarized in Table 4.1. Based on the game names provided by the players, this study used Gamefaqs.com to identify the corresponding game genres and platforms. Four game genres were identified in the pilot test: Action (#1), Action Adventure (#2), Role-playing (#7), and Strategy (#10). Among the participants, 24 used a computer or laptop, while 26 used a mobile phone or a tablet.

Table 4.1 Demographic Profile of Pilot Study Participants

Profile of Pilot Study Participants		**Count**
Gender	Male	36
	Female	14
Academic Year	Freshman	7
	Sophomore	14
	Junior	25
	Senior	4
	Postgraduate	0
Monthly Living Expenses	0-1,999	23
	2,000-3,999	21
	4,000-5,999	4
	6,000-7,999	1
	8,000-9,999	1
	>10,000	0
Game Genres	Action	6
	Action Adventure	4
	Role-Playing	17
	Strategy	23
Media	Computer/Laptop	24
	Mobile Phone/Tablet	26

4.1.1 Feedbacks from Participants and Experts

Based on respondents' feedback, 28 out of 51 questions' Chinese descriptions were revised for clarity. First, regarding the question on monthly living expenses in the demographic section, research experts suggested adding a description of the currency type. As this study was conducted in English at a university in Malaysia, while the target participants were Chinese university students whose

primary language is Chinese, it was necessary to clearly indicate to both researchers and participants that the unit of calculation was Renminbi yuan (RMB).

Additionally, experts pointed out that Question 4 of the questionnaire, which was designed to collect moderator data through an open-ended question, could not directly determine the type of gaming device used by participants based on the name of the game. Many games are available on multiple types of electronic devices. Discussions with some participants confirmed that most mainstream games can now be played on both computers and mobile phones. Moreover, some games that were previously only accessible on mobile devices have, in recent years, become available for play on computers using emulators officially provided by the game developers. Therefore, following the suggestions from participants and experts, a clarification regarding media selection was added to this question. The revised item included the following instruction: “If the game you choose is available on multiple platforms, please indicate your most frequently used platform type in parentheses after the name.”

The remaining items mainly involved issues related to the readability of the Chinese translation. Based on feedback from both experts and participants, the distinction between items within certain dimensions in the Chinese version needed to be further improved. The two versions of the Chinese questionnaire are presented in Appendix B.1 and B.2. The three items measuring price value received particular attention from participants, who suggested clarifying the definitions of pricing, monetary value, and the comparison between price and value from a Chinese linguistic perspective. In addition, participants indicated that the four items measuring performance expectancy were perceived as lengthy and difficult to understand quickly. Therefore, the wording of these items was revised to use more accessible and straightforward Chinese expressions while preserving the original intent of the English version. Experts also proposed revision suggestions for several items to improve the clarity and naturalness of the Chinese translation without losing the meaning of the original English statements. These included EE2, EE3, SIF3, FC1, FC3, HM2, HM3, HA1, HA3, HA4, FE1, FE2, SEY1, ATT1, ATT3, SIT2, EC1, EC3, GI1, GI2, and GI3.

4.1.2 Assessment of Measurement Model Using Pilot Data

The PLS-SEM model was constructed and the analysis of the measurement model for the pilot data was conducted using the PLS Algorithm function in SmartPLS 4 (Version 4.1.0.8), with the results presented in Table 4.2.

The primary purpose of a pilot test in statistical analysis is to validate whether the items in a questionnaire effectively capture the target constructs, thus preventing issues in the data collected during the main study (Saunders et al., 2019). However, pilot tests are typically conducted with small sample sizes, which may affect the stability of the statistical analysis results. As a result, the criteria for defining standards are generally more tolerant (Hair et al., 2022). Larger sample sizes allow researchers to apply stricter criteria and further reduce the occurrence of exceptions in the analysis results (Henseler et al., 2015). Therefore, the statistically abnormal items observed in the pilot test of this study primarily serve to provide guidance for researchers to optimize the questionnaire items, rather than leading to final conclusions.

Table 4.2 Factor Loadings (λ), Cronbach's Alpha (CA), Composite Reliability (CR), Average Variance Extracted (AVE) for the Pilot Test's Hypothesized Measurement Model

Constructs	**Factors and variables**	**λ**	**CA**	**CR**	**AVE**
Performance Expectancy (PE)	I find my favorite game useful in my daily life (PE1)	0.805	0.885	0.921	0.744
	Playing my favorite game increases my chances of achieving things that are important to me (PE2)	0.885			
	Playing my favorite game helps me accomplish things more quickly (PE3)	0.922			
	Playing my favorite game increases my productivity (PE4)	0.834			
Effort Expectancy (EE)	Learning how to play my favorite game is easy for me (EE1)	0.864	0.863	0.907	0.710
	My interaction with my favorite game is clear and understandable (EE2)	0.827			
	I find my favorite game easy to play (EE3)	0.762			

Constructs	Factors and variables	λ	CA	CR	AVE
	It is easy for me to become skillful at playing my favorite game (EE4)	0.911			
Social Influence (SIF)	People who are important to me think that I should play my favorite game (SIF1)	0.827	0.824	0.895	0.740
	People who influence my behavior think that I should play my favorite game (SIF2)	0.851			
	People whose opinions I value prefer that I play my favorite game (SIF3)	0.901			
Facilitating Conditions (FC)	I have the resources necessary to play my favorite game (FC1)	0.792	0.803	0.872	0.631
	I have the knowledge necessary to play my favorite game (FC2)	0.878			
	My favorite game is compatible with other games I play (FC3)	0.702			
	I can get help from others when I have difficulties playing my favorite game (FC4)	0.797			
Price Value (PV)	My favorite game is reasonably priced (PV1)	0.670	0.811	0.885	0.723
	My favorite game is a good value for the money (PV2)	0.923			
	At the current price, my favorite game provides a good value (PV3)	0.932			
Hedonic Motivation (HM)	Playing my favorite game is fun (HM1)	0.931	0.826	0.895	0.744
	Playing my favorite game is enjoyable (HM2)	0.952			
	Playing my favorite game is very entertaining (HM3)	0.676			
Habit (HA)	The play of my favorite game has become a habit for me (HA1)	0.852	0.882	0.919	0.739
	I must play my favorite game (HA2)	0.833			
	Playing my favorite game has become natural to me (HA3)	0.897			
	If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite game (HA4)	0.855			
Flow Experience (FE)	During the playing of my favorite game, I was absorbed intensely in the activity (FE1)	0.932	0.929	0.955	0.876
	I strongly feel that I am inside a different world when playing my favorite game (FE2)	0.920			

Constructs	Factors and variables	λ	CA	CR	AVE
	When playing with my favorite game, I do not feel any control (FE3)	0.955			
Attitude (ATT)	I feel good about playing my favorite game (ATT1)	0.851	0.865	0.917	0.787
	I like playing my favorite game (ATT2)	0.912			
	Playing my favorite game is a good idea (ATT3)	0.897			
Self-efficacy	I am able to play my favorite game without the help of others (SEY1)	0.868	0.857	0.913	0.778
(SEY)	I have the necessary time to make my favorite game useful to me (SEY2)	0.906			
	I am able to play my favorite reasonably well on my own (SEY3)	0.873			
Social Interaction	Playing my favorite game has made it easier for me to make friends (SIT1)	0.855	0.731	0.847	0.651
(SIT)	My in-game friends understand me better than other people (SIT2)	0.880			
	I prefer communicating online to face-to-face communication (SIT3)	0.670			
Emotion Coping	I would like to use my favorite game to help me get through depression (EC1)	0.840	0.821	0.894	0.737
(EC)	I would like to use my favorite game to help me get through impulsivity (EC2)	0.807			
	I would like to use my favorite game to help me get through anxiety (EC3)	0.925			
Gameplay	I intend to continue playing my favorite game in the future (GI1)	0.883	0.888	0.930	0.817
Intention (GI)	I plan to continue to play my favorite game frequently (GI2)	0.919			
	I will always try to play my favorite game in my daily life (GI3)	0.909			
Internet Gaming	I have had difficulties controlling my gaming activity (IGD1)	0.843	0.842	0.855	0.603
Disorder (IGD)	I have given increasing priority to gaming over other life interests and daily activities (IGD2)	0.915			
	I have continued gaming despite the occurrence of negative consequences (e.g., on interpersonal relationships, studies, or work) (IGD3)	0.728			
	I have experienced significant problems in life (e.g., personal, family, social, educational, and occupational) due to the severity of my gaming behavior. (IGD4)	0.579			

4.1.2.1 Indicator Reliability

Out of the 47 items, 43 have factor loadings greater than 0.7, demonstrating a strong ability to explain the latent variables. Items PV1, HM3, SIT3, and IGD4 are below 0.7, but they all exceed 0.4. In the context of current reflective measurement models, factor loadings serve as an indicator of item reliability by reflecting the proportion of variance an observed item shares with its corresponding latent construct. Hair et al. (2022) suggest that loadings of 0.70 or above demonstrate satisfactory levels of reliability. In cases of exploratory research or where strong theoretical support exists, items with loadings ranging from 0.40 to 0.70 may still be considered acceptable (Hair et al., 2022).

Items PV1, HM3, SIT3, and IGD4 show some correlation with their respective constructs, but the relationship is quite limited. Hair et al. (2021) suggest that items with factor loadings in this range should only be considered for deletion if their removal leads to an increase in CA or CR, and AVE. Additionally, content validity must be considered. Researchers should assess, based on theory, how well each measurement indicator represents its construct (Hair et al., 2022).

Regarding the factor loadings of the four items, this pilot test attempted to remove the items and observe the changes in CR and AVE. After removing PV1, HM3, and SIT3, slight increases in CA, CR, and AVE were observed. However, for IGD4, its removal led to a decrease in CA from 0.842 to 0.793. Therefore, IGD4, the only item with a factor loading below 0.6, was retained.

This pilot test considers that the participants may not exhibit strong IGD4-related symptoms of gaming addiction, resulting in IGD4 making a limited contribution to the IGD construct. Meanwhile, the other three items have factor loadings of at least 0.670, close to the 0.708 threshold. If removed, only two items would remain in their respective constructs, which could artificially inflate internal consistency reliability and convergent validity due to the low number of items (Hair et al., 2022). This pilot test prioritizes the possibility that the factor loading issue arises from the small sample size and translation issues of the Chinese questionnaire (W. W. Chin & Dibbern, 2010). Therefore, no items were removed.

4.1.2.2 Internal Consistency Reliability and Convergent Validity

All dimensions showed Cronbach's alpha (CA) and composite reliability (CR) values above 0.7, and average variance extracted (AVE) values above 0.5, indicating good internal consistency reliability and convergent validity of the questionnaire in the pilot test.

4.1.2.3 Discriminant Validity

Table 4.3 presents the HTMT results of the pilot test. The majority of the values meet the $HTMT_{0.90}$ criterion. However, the HTMT values between HA and FE, GI and HA, GI and FE, and GI and ATT fail to meet the $HTMT_{0.90}$ criterion.

Table 4.3 Heterotrait-Monotrait Ratio (HTMT) for the Pilot Test's Hypothesized Measurement Model

HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	ATT	SEY	SIT	EC	GI	IGD
PE														
EE	0.629													
SIF	0.696	0.745												
FC	0.629	0.890	0.794											
PV	0.750	0.540	0.655	0.721										
HM	0.686	0.616	0.750	0.716	0.867									
HA	0.529	0.455	0.665	0.682	0.562	0.740								
FE	0.552	0.518	0.657	0.675	0.533	0.730	0.923							
ATT	0.577	0.845	0.714	0.859	0.565	0.847	0.798	0.867						
SEY	0.623	0.745	0.618	0.842	0.696	0.624	0.541	0.594	0.763					
SIT	0.483	0.528	0.769	0.630	0.448	0.595	0.868	0.751	0.733	0.707				
EC	0.677	0.467	0.788	0.674	0.655	0.640	0.653	0.647	0.648	0.823	0.886			
GI	0.487	0.610	0.702	0.844	0.572	0.759	0.920	0.967	0.933	0.661	0.802	0.647		
IGD	0.087	0.163	0.261	0.245	0.148	0.126	0.394	0.292	0.224	0.130	0.551	0.428	0.286	

Discriminant validity refers to the degree to which a construct is empirically distinct from other constructs in the model, indicating that it captures unique aspects of the phenomenon that are not reflected by other constructs (Hair et al., 2022). The Heterotrait-Monotrait ratio (HTMT) is currently one of the most commonly used indicators for assessing the discriminant validity of reflective measurement models, with two widely recognized criteria being $HTMT_{0.85} < 0.85$ and $HTMT_{0.90} < 0.90$ (Henseler et al., 2015). These thresholds exhibit different preferences in terms of sensitivity and specificity when evaluating discriminant validity.

This pilot test adopted the $HTMT_{0.90}$ criterion. $HTMT_{0.90}$ is broader compared to $HTMT_{0.85}$, providing researchers with greater flexibility, particularly in cases where constructs are conceptually similar but not identical (Henseler et al., 2015). The model in this study is based on UTAUT2, with constructs mainly derived from UTAUT2 and extended constructs from other fields. Given the large number of constructs and items, as well as the small sample size in the pilot test, $HTMT_{0.90}$ is more appropriate.

In the analysis of discriminant validity, four pairs of constructs had HTMT values that did not meet the 0.90 threshold. An HTMT>0.90 indicates that the correlation between the corresponding constructs is too high, suggesting that the constructs are not sufficiently distinct (Hair et al., 2022).

Based on the guidelines provided by Henseler et al. (2015) for reducing HTMT values and enhancing discriminant validity, this pilot test applied the method of increasing monotrait-heteromethod correlations. The primary purpose of this approach is to identify any item within a construct that may be expressed in a way that differs substantially from other items within the same construct (Hair et al., 2022; Henseler et al., 2015). Specifically, when two items within a construct present ambiguous or inconsistent wording regarding the core concept, their indicator correlation value tends to be low. This, in turn, leads to a reduction in the average monotrait-heteromethod correlations. The approach focuses on removing items that show low indicator correlations with other items measuring the same construct, thereby improving monotrait-heteromethod correlations (Hair et al., 2022; Henseler et al., 2015).

Based on the HTMT results, at least two items from different constructs would need to be removed simultaneously in order to potentially reduce all problematic HTMT values in this pilot test.

This analysis first removed individual items. Accordingly, items from ATT, FE, HA, and GI were individually removed and tested to observe whether the HTMT values decreased after deletion. The deletion tests were divided into five groups, comprising a total of 15 sub-tests. The results of individually removing 13 items (ATT1*, ATT2, ATT3, FE1, FE2*, FE3, HA1, HA2*, HA3, HA4, GI1*, GI2, GI3) across the four constructs showed partial effectiveness. The items marked with an asterisk were those with the lowest indicator correlations within their respective constructs. The results showed that only ATT1*, FE1, and GI1* led to a decrease in all affected HTMT values when removed individually. In contrast, the removal of other items resulted in increases in some HTMT values within certain construct combinations. None of the items, when removed individually, could directly reduce all problematic HTMT values below the 0.90 threshold.

Therefore, this test further explored the simultaneous removal of two items among the ATT1*, FE1, GI1*. Although FE1 (FE1&FE2=0.765, FE1&FE3=0.844) is not the item with the lowest indicator correlation within the construct flow experience, its correlation values are very close to those of FE2* (FE1&FE2=0.765, FE2&FE3=0.832). This test combined the three items in pairs to examine the changes in HTMT values after their removal. The results indicated that only the simultaneous removal of GI1* and FE1 reduced all previously problematic HTMT values to below 0.90, while no new issues were observed in the originally acceptable HTMT values. As a result, GI1* and FE1 were identified as problematic items in this test.

This test employed the method of increasing monotrait-heteromethod correlations to reduce the HTMT values. The analysis identified two items whose removal significantly lowered the HTMT values to below the recommended threshold. This indicates that these two items differed in their expression from other items within their respective constructs, potentially causing confusion among respondents. As emphasized by Henseler et al. (2015), researchers need to carefully examine the definitions and delineations of items within a construct to ensure that the items are neither too ambiguous nor overly similar in wording. In addition, Cheah et al. (2023) pointed out that language differences in cross-cultural research may affect respondents' understanding of questionnaire items. Back-translation is one of the recommended approaches for this problem, which was also adopted in this study.

The items for the FE and GI constructs in this study were adapted from previous studies that had already been statistically validated (Jang & Byon, 2020a; Shin & Shin, 2011; Venkatesh et al., 2012). In these original studies, the English wording of the items did not present issues of discriminant validity. Therefore, this study

posits that the problem may lie in the Chinese translation of the items, which might not have accurately conveyed their intended meanings in English. This interpretation is also consistent with the feedback from respondents, who indicated that the wording of the items in the FE and GI constructs needed to be revised. Accordingly, the Chinese expressions of FE1, FE2, GI1, GI2, and GI3 were revised, and the specific changes are provided in Appendix B.1 and B.2.

In addition, the small sample size used in this pilot test may have introduced some degree of error into the results. Researchers may consider increasing the sample size to enhance the stability of the analysis and the accuracy of the findings, which may also help reduce HTMT values (Franke & Sarstedt, 2019; Henseler et al., 2015).

4.2 Primary Data Results

A total of 3,341 responses were collected. The first step of data processing involved identifying and removing invalid responses. Invalid questionnaires included those that were incomplete, submitted with missing answers, completed in an unusually short time, submitted multiple times by the same ID, had identical responses for all items, or were flagged by the survey platform for exhibiting obvious answer patterns. A total of 1,208 responses were identified as invalid and removed, leaving 2,133 responses for further screening.

In the second round of screening, we manually reviewed responses to question 4, which asked participants to specify their favorite game, and the device used to play. Invalid entries included blank responses, irrelevant answers, and games that could not be identified or categorized using GameFAQs.com. A total of 250 responses were excluded at this stage, resulting in 1,883 valid responses for subsequent analysis. The valid response rate was 56.36%.

4.2.1 Participant Characteristics

The distribution characteristics of the collected sample were summarized, and the mean and standard deviation of internet gaming disorder (IGD) were calculated for each group based on participants' self-reported responses. These results are presented in Table 4.4. The average IGD scores and standard deviations indicate the severity of gaming disorder within each group.

Table 4.4 Profile of Primary Data Participants

Participant Profile		**n.**	**Percentage**	**IGD Mean (SD)**
Gender	Male	978	51.94%	3.58 (1.77)
	Female	905	48.06%	3.05 (1.68)
Academic Year	Freshman	379	20.13%	3.33 (1.70)
	Sophomore	629	33.40%	3.39 (1.81)
	Junior	460	24.43%	3.36 (1.70)
	Senior	317	16.84%	3.26 (1.74)
	Postgraduate	98	5.20%	2.94 (1.76)
Monthly Living Expenses	0-1,999	1028	54.59%	3.18 (1.69)
	2,000-3,999	702	37.28%	3.35 (1.76)
	4,000-5,999	94	4.99%	3.91 (1.83)
	6,000-7,999	36	1.91%	4.46 (1.79)
	8,000-9,999	10	0.53%	4.3 (1.80)
	>10,000	13	0.69%	5.42 (1.38)
Game Genres	Action (ACT)	427	22.68%	3.34 (1.72)
	Action Adventure (ACA)	222	11.79%	3.14 (1.73)
	Adventure (ADV)	21	1.12%	2.94 (1.74)
	Miscellaneous (MIS)	53	2.81%	3.22 (1.77)
	Puzzle (PUZ)	51	2.71%	3.26 (1.87)
	Racing (RAC)	15	0.79%	2.8 (1.63)
	Role-Playing (ROP)	222	11.79%	3.57 (1.78)
	Simulation (SIM)	20	1.06%	2.59 (1.47)
	Sports (SPO)	12	0.64%	3.27 (2.16)
	Strategy (STR)	840	44.61%	3.35 (1.74)
	STR_RS	420	22.3%	3.41 (1.74)
Media	Computer/Laptop (CoLa)	576	30.59%	3.49 (1.75)
	Mobile Phone/Tablet (MoTa)	1307	69.41%	3.25 (1.75)
	MoTa_RS	944	50.13%	3.24 (1.76)
Total Media Group_RS		1520	80.72%	3.34 (1.76)
Total Game Genres Group_RS		1291	68.56%	3.40 (1.74)
Total Gender Group		1883	100%	3.325 (1.75)
Total		1883	100%	3.325 (1.75)

A total of 1,883 valid responses were obtained. Among them, 978 were male (51.94%), and this group reported a higher level of IGD, averaging 3.58 (1.77). In contrast, 905 were female (48.06%), with a lower reported level of 3.05 (1.68). These results suggest that male players tended to experience more severe symptoms of gaming disorder compared to female players.

All participants were university students. Specifically, there were 379 freshmen (20.13%), whose average level of IGD was 3.33 (1.70). A total of 629 sophomores (33.40%) reported an average IGD level of 3.39 (1.81). Among the 460 juniors (24.43%), the average level was 3.36 (1.70). The 317 seniors (16.84%) reported a slightly lower level of 3.26 (1.74). The lowest level was found among the 98 postgraduate students (5.20%), who reported an average of 2.94 (1.76).

Participants were also asked to report their monthly living expenses, measured in RMB, grouped into intervals of 2,000 RMB. A total of 1,028 participants (54.59%) reported monthly expenses between 0 and 1,999 RMB, with an average IGD level of 3.18 (1.69). Another 702 participants (37.28%) fell into the 2,000 to 3,999 RMB range, with a reported level of 3.35 (1.76). The 94 participants (4.99%) in the 4,000 to 5,999 RMB range reported a noticeably higher level of 3.91 (1.83). Among those with monthly expenses between 6,000 and 7,999 RMB, 36 participants (1.91%) reported an IGD level of 4.46 (1.79). For the 10 participants (0.53%) spending 8,000 to 9,999 RMB, the level was 4.30 (1.80). The highest level was reported by 13 participants (0.69%) whose monthly expenses exceeded 10,000 RMB, averaging 5.42 (1.38). As monthly living expenses increased, the level of IGD among university students showed a rising trend.

Based on the game genre classifications provided by GameFAQs.com, each participant’s reported game title and device used were used to categorize their gameplay. The Strategy genre was the largest group, comprising 840 participants (44.61%) who reported an average IGD level of 3.35 (1.74). The Action genre included 427 participants (22.68%) with an average IGD level of 3.34 (1.72), while the Role-Playing genre accounted for 222 participants (11.79%) with a relatively higher IGD level of 3.57 (1.78). Similarly, the Action Adventure group consisted of 222 participants (11.79%) reporting an average IGD level of 3.14 (1.73). Only these four groups met the minimum sample size requirement and were therefore included in the subsequent analysis of the moderating effect of game genres.

Several smaller groups were also identified. However, as their sample sizes were considerably smaller than the minimum required sample size of 160, they were excluded from the analysis of the moderating effect of game genres. The Puzzle genre included 51 participants (2.71%) reporting an IGD level of 3.26 (1.87), and the Miscellaneous group had 53 participants (2.81%) with an IGD level of 3.22 (1.77). The Adventure group had 21 participants (1.12%) with an IGD level of 2.94 (1.74), and the Simulation genre included 20 participants (1.06%) with a lower level of 2.59 (1.47). The Racing genre and Sports genre had the smallest numbers of participants, with 15 (0.79%) and 12 (0.64%), reporting IGD levels of 2.8 (1.63) and 3.27 (2.16), respectively.

Regarding device usage, 576 participants (30.59%) reported playing games on a computer or laptop, with an average IGD level of 3.49 (1.75). The remaining 1,307 participants (69.41%) played games on a mobile phone or tablet, with an average level of 3.25 (1.75).

4.2.2 Random Sampling for Moderator Groups

4.2.2.1 Introduction to Random Sampling

Both the media (n_{CoLa}=576, n_{MoTa}=1307) and gender (n_{Male}=978, n_{Female}=905) groups met the minimum sample size requirement. After classifying the game types, only four genre groups met the minimum sample size requirement of 160 participants (Cheah et al., 2023; Kock & Hadaya, 2018). Therefore, in the subsequent PLS-MGA analysis based on game genre, only the following four groups were retained for multi-group analysis: Action (n=427), Action Adventure (n=222), Role-Playing (n=222), and Strategy (n=840).

Klesel et al. (2022) indicated that greater differences in the sample size between subgroups reduce the model's ability to detect group differences. The non-parametric permutation-based test requires that the larger subgroup must not exceed twice the size of the smaller one; otherwise, the use of Henseler's PLS-MGA or a parametric approach is recommended (Cheah et al., 2020; Hair et al., 2018). For groups exceeding the recommended sample size requirement, random sampling was performed to ensure that no group's sample size was more than twice the size of the smallest group (Cheah et al., 2020; Hair et al., 2018).

As a result, random sampling was applied to the Strategy group and the Mobile Phone/Tablet group. The participant profile of the sampled data is presented in Table 4.4 in Section 4.2.1, and the corresponding profile of the game products is shown in Table 4.6 in Section 4.2.3, both labeled with the suffix "_RS".

Due to the application of random sampling, the samples used in the PLS-MGA analyses for game genres and media were not entirely identical. Therefore, the results of the moderating effect analysis for these two groups are only applicable within each respective group and cannot be generalized to comparisons between groups or with the overall sample.

In contrast, the two subgroups under the gender category did not show a great sample size difference. Therefore, no random sampling was applied for gender, and the PLS-MGA for this category was conducted using the full dataset. The analysis of the gender groups can be integrated with the results of the overall sample for comparative discussion.

4.2.2.2 Random Sampling Procedure

The random sampling procedure was conducted using Microsoft Excel. Specifically, the RAND function was used to generate a unique random variable for each case in the subgroup with excessive sample size. These values served as independent random identifiers. The cases were then sorted based on the dummy variable, and the top-ranked cases were selected according to the target sample size for that subgroup.

In the PLS-MGA analysis on game genres, the Strategy group after sampling included 420 participants, representing 22.3% of the total valid sample (n = 1,883), with an average IGD level of 3.41 (1.74). In the PLS-MGA analysis on media type, the sampled MoTa group included 944 participants, accounting for 50.13% of the total sample, with an average IGD level of 3.24 (1.76).

4.2.2.2.1 Random Sampling for Game Genres Group

In the game genre classification, four groups were included in the PLS-MGA: Strategy (n=840), Action (n=427), Action Adventure (n=222), and Role-Playing (n=222). Since the Strategy group contained 840 cases, which is more than twice the size of the smallest groups (n=222), a 50% random sample was drawn from this group, retaining 420 participants. The means and variances of each construct in the Strategy group before and after random sampling are presented in Table 4.5. The results show only minimal differences between the two datasets, indicating that the randomly sampled data adequately reflects the characteristics of the original dataset. After random sampling, a total of 1,291 participants remained in the dataset used for the PLS-MGA analysis on game genres.

4.2.2.2.2 Random Sampling for Media Group

In the media classification, two groups were included in the PLS-MGA: CoLa (n=576) and MoTa (n=1,307). The sample size of the MoTa group was more than twice that of the CoLa group. Within the MoTa group, it was observed that 719 participants reported playing Strategy games, accounting for more than half of the total MoTa sample. This number was also more than three times the size of the second-largest game genre in the MoTa group, which was the Action group with 198 participants.

To ensure sample diversity in terms of game products and to mitigate the potential overrepresentation of the Strategy genre, we conducted random

sampling specifically within the MoTa-Strategy subgroup. More than half of the Strategy cases in MoTa were randomly excluded, leaving a number slightly less than twice the Action group count. This approach preserved both the internal dominance of the Strategy genre within MoTa and the overall genre variety in the sample. As a result, 363 participants were randomly removed from the MoTa-Strategy group, reducing it from 719 to 356. After this sampling process, the remaining MoTa group consisted of 944 participants. The means and variances of each construct in the Media group before and after random sampling are presented in Table 4.5. The results show only minimal differences between the two datasets, indicating that the randomly sampled data adequately reflects the characteristics of the original dataset. After random sampling, a total of 1,520 participants were retained for the PLS-MGA analysis on media type.

Table 4.5 Mean and Variance of Constructs in the Strategy and Media Groups Before and After Random Sampling

Construct	Strategy		MoTa	
	Before (n=840)	After (n=420)	Before (n=1307)	After (n=944)
PE	4.28 (1.44)	4.28 (1.43)	4.29 (1.46)	4.32 (1.45)
EE	5.37 (1.27)	5.35 (1.30)	5.49 (1.25)	5.52 (1.25)
SIF	4.58 (1.49)	4.58 (1.50)	4.57 (1.50)	4.57 (1.49)
FC	5.09 (1.34)	5.06 (1.34)	5.12 (1.38)	5.13 (1.38)
PV	4.93 (1.43)	4.95 (1.39)	4.91 (1.44)	4.91 (1.46)
HM	5.78 (1.11)	5.79 (1.11)	5.84 (1.09)	5.85 (1.10)
HA	5.13 (1.36)	5.10 (1.36)	5.16 (1.39)	5.18 (1.38)
FE	5.17 (1.36)	5.13 (1.38)	5.20 (1.37)	5.20 (1.36)
SIT	4.42 (1.64)	4.39 (1.66)	4.33 (1.64)	4.31 (1.63)
EC	4.98 (1.46)	4.94 (1.47)	4.95 (1.50)	4.97 (1.50)
GI	5.46 (1.20)	5.42 (1.26)	5.49 (1.20)	5.54 (1.18)
IGD	3.35 (1.74)	3.41 (1.74)	3.25 (1.75)	3.24 (1.76)

4.2.3 Game Products Profile

The profiles of game products and game genres are presented in Table 4.6. This table includes the group names, group codes, number of game products, sample sizes, and the top five most-played game titles in each group along with their respective sample counts. The Strategy group had the largest sample size, with 840 participants across 32 game titles. The five most popular games in this group were Honor of Kings (n = 615), League of Legends (n = 106), Teamfight Tactics (n = 49), Plants vs. Zombies (n = 8), and Arknights (n = 7). After random sampling, the Strategy_RS group retained 420 participants from 27 game titles. The distribution of game titles in this group largely preserved the proportional structure of the original Strategy group.

Table 4.6 Profile of Game Products and Genres

Game Genre	Variable Code	Games Collected	Participants Collected (n.)	Top 5 Popular Games (Sample Collected)
Strategy	STR	32	840	Honor of Kings (615), League of Legends (106), Teamfight Tactics (49), Plants vs. Zombies (8), Arknights (7)
Stratrgy_RS	STR_RS	27	420	Honor of Kings (306), League of Legends (58), Teamfight Tactics (23) , Arknights (3)
Action	ACT	45	427	PUBG (164), Counter-Strike series (58), Valorant (42), Cross Fire (24), Naraka: Bladepoint (24)
Action Adventure	ACA	26	222	Identity V (54), Love and Deepspace (32), Sky: Children of the Light (28), Minecraft (19), GTA5 (12)
Role-Playing	ROP	47	222	Genshin Impact (69), Honkai: Star Rail (18), Black Myth: Wukong (17), Stardew Valley (13), Justice Online (11)
Miscellaneous	MIS	7	53	--
Puzzle	PUZ	5	51	--

Game Genre	Variable Code	Games Collected	Participants Collected (n.)	Top 5 Popular Games (Sample Collected)
Adventure	ADV	11	21	--
Simulation	SIM	16	20	--
Racing	RAC	3	15	--
Sports	SPO	6	12	--
Male	Male	114	978	Honor of Kings (292), PUBG (93), League of Legends (84), Counter-Strike series (54), Genshin Impact (40)
Female	Female	127	905	Honor of Kings (323), PUBG (71), Identity V (43), Fall Guys (39), PopStar! Series (36)
Computer/Laptop	CoLa	119	576	League of Legends (85), Counter-Strike series (58), Valorant (42), PUBG (31), Naraka: Bladepoint (22)
Mobile phone/Tablet	MoTa	106	1307	Honor of Kings (604), PUBG (133), Genshin Impact (57), Identity V (53), Teamfight Tactics (46)
Mobile phone/Tablet_RS	MoTa_RS	100	944	Honor of Kings (302), PUBG (133), Genshin Impact (57), Identity V (53), PopStar! Series (45)

The Action group included 427 participants who reported playing 45 different games. The five most frequently reported titles were PUBG (n=64), Counter-Strike series (n=58), Valorant (n=42), Cross Fire (n=24), and Naraka: Bladepoint (n=24). The Action Adventure group contained 222 participants from 26 games titles. The most frequently played games were Identity V (n=54), Love and Deepspace (n=32), Sky: Children of the Light (n=28), Minecraft (n=19), and GTA5 (n=12). The Role-Playing group also had 222 participants, who reported playing 47 different games. The five most popular titles were Genshin Impact (n=69), Honkai: Star Rail (n=18), Black Myth: Wukong (n=17), Stardew Valley (n=13), and Justice Online (n=11). The remaining six genre groups (MIS, PUZ, ADV, SIM, RAC, SPO) had relatively small sample sizes, with many game titles played by only one or two participants. Therefore, specific game titles in those groups are not listed in detail.

Among male participants, 978 responses were collected across 114 game titles. The most popular games among male players were Honor of Kings (n=292),PUBG (n=93), League of Legends (n=84), Counter-Strike series (n=54), and Genshin Impact (n=40). For female participants, 905 responses were collected covering 127 different titles. The most favored games among female players were Honor of Kings (n=323), PUBG (n=71), Identity V (n=43), Fall Guys (n=39), and the PopStar! series (n=36).

In the Computer or Laptop group, 576 participants reported playing 119 different game titles. The most popular games were League of Legends (n=85), Counter-Strike series (n=58), Valorant (n=42), PUBG (n=31), and Naraka: Bladepoint (n=22). In the Mobile Phone or Tablet group, 1,307 participants reported 106 game titles. The most frequently played games in this group were Honor of Kings (n=604), PUBG (n=133), Genshin Impact (n=57), Identity V (n=53), and Teamfight Tactics (n=46).

4.2.4 Descriptive Analysis Results

Prior to conducting the PLS-SEM analysis, a descriptive statistical analysis was performed to evaluate the characteristics and suitability of the dataset. Table 4.7 presents the statistical results for each measurement item and latent construct in terms of mean, median, mode, standard deviation, skewness, and kurtosis. As this study employed PLS-SEM and an NPT-based MGA approach, it was not necessary for the sample distribution to conform to specific assumptions.

Table 4.7 Descriptive Analysis Results of Primary Data

Construct	Items	Mode	Median	Mean	Standard D.	Skewness	Kurtosis
Performance	ALL	5	4	4.36	1.45	-0.22	-0.56
Expectancy	PE1	5	5	4.60	1.27	-0.47	0.05
	PE2	4	4	4.42	1.44	-0.22	-0.56
	PE3	4	4	4.14	1.53	-0.01	-0.73
	PE4	5	4	4.29	1.51	-0.15	-0.69
Effort	ALL	6	6	5.47	1.26	-0.89	0.55
Expectancy	EE1	6	6	5.40	1.25	-0.82	0.42
	EE2	6	6	5.65	1.16	-0.98	0.96
	EE3	6	6	5.30	1.36	-0.80	0.15
	EE4	6	6	5.54	1.23	-0.92	0.71
Social	ALL	4	5	4.61	1.47	-0.31	-0.48
Influence	SIF1	4	5	4.72	1.50	-0.37	-0.47
	SIF2	4	4	4.44	1.47	-0.14	-0.55
	SIF3	4	5	4.68	1.43	-0.41	-0.30

Construct	Items	Mode	Median	Mean	Standard D.	Skewness	Kurtosis
Facilitating	ALL	6	5	5.15	1.35	-0.70	0.07
Conditions	FC1	6	5	4.89	1.47	-0.52	-0.44
	FC2	6	5	5.19	1.31	-0.75	0.29
	FC3	6	6	5.39	1.25	-0.80	0.38
	FC4	6	5	5.14	1.31	-0.69	0.17
Price Value	ALL	6	5	5.04	1.44	-0.63	-0.07
	PV1	6	5	4.92	1.50	-0.58	-0.22
	PV2	6	5	5.07	1.41	-0.65	0.08
	PV3	6	5	5.14	1.40	-0.66	-0.06
Hedonic	ALL	6	6	5.86	1.09	-1.07	1.29
Motivation	HM1	6	6	5.84	1.12	-1.01	1.01
	HM2	6	6	5.91	1.06	-1.09	1.34
	HM3	6	6	5.85	1.07	-1.10	1.56
Habit	ALL	6	5	5.15	1.38	-0.73	0.11
	HA1	6	6	5.31	1.26	-0.83	0.45
	HA2	5	5	4.65	1.55	-0.34	-0.60
	HA3	6	5	5.34	1.24	-0.81	0.61
	HA4	6	6	5.32	1.33	-0.84	0.43
Flow	ALL	6	5	5.25	1.35	-0.72	0.15
Experience	FE1	6	6	5.55	1.22	-0.95	0.90
	FE2	6	5	5.06	1.43	-0.61	-0.12
	FE3	6	5	5.15	1.34	-0.60	-0.09
Attitude	ALL	6	6	5.76	1.09	-0.91	0.96
	ATT1	6	6	5.67	1.09	-0.81	0.68

Construct	Items	Mode	Median	Mean	Standard D.	Skewness	Kurtosis
	ATT2	7	6	5.96	1.06	-1.19	1.89
	ATT3	6	6	5.65	1.08	-0.82	0.72
Self-efficacy	ALL	6	6	5.32	1.26	-0.67	0.11
	SEY1	6	6	5.62	1.15	-0.88	0.72
	SEY2	5	5	4.82	1.33	-0.32	-0.34
	SEY3	6	6	5.52	1.14	-0.80	0.62
Social	ALL	4	4	4.34	1.63	-0.24	-0.79
Interaction	SIT1	6	5	5.02	1.33	-0.45	-0.28
	SIT2	4	4	3.92	1.72	0.07	-0.97
	SIT3	4	4	4.08	1.59	-0.14	-0.79
Emotion	ALL	6	5	4.98	1.47	-0.78	0.17
Coping	EC1	6	5	5.02	1.51	-0.86	0.34
	EC2	5	5	4.70	1.50	-0.52	-0.33
	EC3	6	5	5.22	1.36	-0.99	0.86
Gameplay	ALL	6	6	5.50	1.20	-0.76	0.42
Intention	GI1	6	6	5.84	1.08	-1.00	1.00
	GI2	6	6	5.36	1.19	-0.73	0.48
	GI3	6	5	5.28	1.25	-0.59	0.11
Internet	ALL	2	3	3.33	1.75	0.37	-0.93
Gaming	IGD1	3	4	3.86	1.62	0.13	-0.91
Disorder	IGD2	2	3	3.44	1.71	0.34	-0.88
	IGD3	2	3	3.36	1.77	0.37	-0.96
	IGD4	1	2	2.64	1.68	0.87	-0.32

With the exception of IGD, the mode, median, and mean values of all other latent constructs and their respective indicators ranged between 4 and 7. The IGD construct displayed a lower central tendency, with a mode of 2, a median of 3, and a mean of 3.33 (1.75).

The results indicated that the overall IGD scores of the collected sample were not high. With the exception of IGD and its corresponding items, nearly all constructs and items in the model exhibited negative skewness values. IGD was the only construct with a positive skewness value. Additionally, both the IGD construct and its items showed negative kurtosis values, indicating that the score distributions lacked a pronounced peak and were relatively evenly spread. The item scores for IGD were primarily concentrated in the lower range of the scale.

According to the scale proposed by Pontes et al. (2021) and King et al. (2020), the IGD questionnaire is primarily intended to assess the extent to which gaming behavior impacts players' real-life functioning, rather than to diagnose clinical psychological disorders. Based on the findings, the level of IGD in this sample can be classified as low to moderate.

4.3 PLS-SEM Analysis Results

Chapter 4.3 presents the results of the PLS-SEM analyses conducted on both the overall model and the conceptual model. The analysis of the overall model includes the evaluation of the measurement model for all constructs, as well as the examination of the mediation paths led by performance expectancy (PE) and effort expectancy (EE). Upon completion of the mediation analysis, attitude (ATT) and self-efficacy (SEY) were removed from the model. The revised model, referred to as the conceptual model, serves as the basis for the subsequent analyses. The analysis of the conceptual model focuses primarily on structural path analysis and predictive assessment of the construct model.

4.3.1 Measurement Model Evaluation Results

Before proceeding to the structural model analysis in PLS-SEM, it is essential to evaluate the measurement model to ensure the validity and reliability of all measurement items and latent constructs. In this study, all constructs were modeled using reflective indicators. Therefore, indicator reliability was assessed through factor loadings (λ), internal consistency reliability was evaluated using Cronbach's alpha (CA) and composite reliability (CR), convergent validity was examined through average variance extracted (AVE), and discriminant validity was assessed using the heterotrait-monotrait ratio (HTMT). The definitions and threshold criteria for each of these evaluation metrics are summarized in Table 3.5 in Section 3.6.1.1.

According to the criteria established for this study, factor loadings are expected to exceed 0.700. Cronbach's alpha and composite reliability values between 0.700 and 0.950 are considered ideal, with 0.600 being the minimum acceptable threshold. AVE values must exceed 0.500, and HTMT values should be below 0.900.

The measurement model was evaluated using the PLS-SEM algorithm in SmartPLS 4. All default settings were applied, including the path weighting scheme, default initial weights, and standardized output of the PLS-SEM results. Table 4.8 reports the results of the factor loadings, Cronbach's alpha, composite reliability, and average variance extracted. Table 4.9 also presents the HTMT values among all constructs.

All items had factor loadings ranging from 0.704 to 0.884, meeting the

requirement of exceeding 0.700. This indicates that each item effectively reflects the content of its corresponding latent construct. Cronbach's alpha values for all constructs ranged from 0.699 to 0.881. Only the construct self-efficacy had a slightly lower CA value of 0.699, while all others exceeded 0.700. The composite reliability values for all constructs ranged from 0.830 to 0.907, which satisfies the threshold for acceptable internal consistency. These results also confirm that there is no indication of item redundancy. The AVE values ranged from 0.550 to 0.730 for all constructs, surpassing the 0.500 threshold and indicating adequate convergent validity.

Finally, the HTMT values for all construct pairs were below the recommended threshold of 0.900, supporting the presence of sufficient discriminant validity among the constructs. In summary, all measurement model evaluation criteria were met, confirming the model's reliability and validity and supporting its suitability for subsequent structural model analysis.

Table 4.8 Assessment of Measurement Model of All Constructs (λ,CA ,CR, AVE)

Constructs	**Items**	**λ**	**CA**	**CR**	**AVE**
Performance	I find my favorite game useful in my daily life (PE1)	0.827	0.858	0.903	0.700
Expectancy	Playing my favorite game increases my chances of achieving things that are important to me (PE2)	0.852			
	Playing my favorite game helps me accomplish things more quickly (PE3)	0.848			
	Playing my favorite game increases my productivity (PE4)	0.819			
Effort	Learning how to play my favorite game is easy for me (EE1)	0.796	0.773	0.855	0.596
Expectancy	My interaction with my favorite game is clear and understandable (EE2)	0.728			
	I find my favorite game easy to play (EE3)	0.740			
	It is easy for me to become skillful at playing my favorite game (EE4)	0.820			
Social	People who are important to me think that I should play my favorite game (SIF1)	0.854	0.795	0.879	0.708
Influence	People who influence my behavior think that I should play my favorite game (SIF2)	0.827			
	People whose opinions I value prefer that I play my favorite game (SIF3)	0.843			

Constructs	Items	λ	CA	CR	AVE
Facilitating Conditions	I have the resources necessary to play my favorite game (FC1)	0.720	0.728	0.830	0.550
	I have the knowledge necessary to play my favorite game (FC2)	0.776			
	My favorite game is compatible with other games I play (FC3)	0.765			
	I can get help from others when I have difficulties playing my favorite game (FC4)	0.704			
Price Value	My favorite game is reasonably priced (PV1)	0.816	0.818	0.890	0.730
	My favorite game is a good value for the money (PV2)	0.884			
	At the current price, my favorite game provides a good value (PV3)	0.862			
Hedonic Motivation	Playing my favorite game is fun (HM1)	0.839	0.796	0.880	0.710
	Playing my favorite game is enjoyable (HM2)	0.867			
	Playing my favorite game is very entertaining (HM3)	0.821			
Habit	The play of my favorite game has become a habit for me (HA1)	0.813	0.806	0.873	0.632
	I must play my favorite game (HA2)	0.730			
	Playing my favorite game has become natural to me (HA3)	0.847			
	If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite game (HA4)	0.785			
Flow Experience	During the playing of my favorite game, I was absorbed intensely in the activity (FE1)	0.810	0.720	0.841	0.639
	I strongly feel that I am inside a different world when playing my favorite game (FE2)	0.799			
	When playing with my favorite game, I do not feel any control (FE3)	0.789			
Attitude	I feel good about playing my favorite game (ATT1)	0.815	0.737	0.851	0.655
	I like playing my favorite game (ATT2)	0.796			
	Playing my favorite game is a good idea (ATT3)	0.816			
Self-efficacy	I am able to play my favorite game without the help of others (SEY1)	0.765	0.699	0.833	0.624
	I have the necessary time to make my favorite game useful to me (SEY2)	0.771			
	I am able to play my favorite reasonably well on my own (SEY3)	0.833			

Constructs	Items	λ	CA	CR	AVE
Social Interaction	Playing my favorite game has made it easier for me to make friends (SIT1)	0.843	0.726	0.837	0.631
	My in-game friends understand me better than other people (SIT2)	0.789			
	I prefer communicating online to face-to-face communication (SIT3)	0.749			
Emotion Coping	I would like to use my favorite game to help me get through depression (EC1)	0.863	0.801	0.882	0.714
	I would like to use my favorite game to help me get through impulsivity (EC2)	0.812			
	I would like to use my favorite game to help me get through anxiety (EC3)	0.859			
Gameplay Intention	I intend to continue playing my favorite game in the future (GI1)	0.812	0.755	0.859	0.671
	I plan to continue to play my favorite game frequently (GI2)	0.816			
	I will always try to play my favorite game in my daily life (GI3)	0.829			
Internet Gaming Disorder	I have had difficulties controlling my gaming activity (IGD1)	0.882	0.881	0.907	0.709
	I have given increasing priority to gaming over other life interests and daily activities (IGD2)	0.881			
	I have continued gaming despite the occurrence of negative consequences (e.g., on interpersonal relationships, studies, or work) (IGD3)	0.830			
	I have experienced significant problems in life (e.g., personal, family, social, educational, and occupational) due to the severity of my gaming behavior. (IGD4)	0.770			

Table 4.9 Assessment of Measurement Model of All Constructs (HTMT)

HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	ATT	SEY	SIT	EC	GI	IGD
PE														
EE	0.360													
SIF	0.617	0.425												
FC	0.461	0.723	0.554											
PV	0.383	0.483	0.394	0.573										
HM	0.218	0.715	0.298	0.605	0.460									
HA	0.463	0.611	0.533	0.628	0.379	0.621								
FE	0.445	0.600	0.504	0.671	0.457	0.622	0.765							
ATT	0.359	0.702	0.433	0.662	0.439	0.831	0.753	0.728						
SEY	0.457	0.795	0.541	0.795	0.527	0.657	0.738	0.773	0.796					
SIT	0.571	0.213	0.579	0.422	0.321	0.163	0.504	0.541	0.290	0.389				
EC	0.457	0.347	0.414	0.396	0.304	0.311	0.511	0.547	0.452	0.483	0.624			
GI	0.423	0.661	0.459	0.637	0.408	0.713	0.840	0.724	0.870	0.736	0.387	0.520		
IGD	0.283	0.099	0.280	0.082	0.109	0.194	0.245	0.228	0.125	0.130	0.624	0.344	0.182	

4.3.2 Structural Model Evaluation Results

As summarized in Table 4.10, the study formulated eleven hypotheses regarding direct or indirect path effects (H1, H2, H3, H4, H5, H6, H7, H8, H11, H12, and H_{13}), along with two hypotheses involving mediation effects (H9 and H10). In accordance with the research design, the structural model analysis using PLS-SEM was conducted in two parts.

Table 4.10 Hypotheses Examined in the PLS-SEM Model

Order	Relationship	Hypothesis
H1	PE->GI->IGD	Higher performance expectations will increase gameplay intention, contributing to gaming disorder development.
H2	EE->GI->IGD	Higher effort expectancy will increase gameplay intention, contributing to gaming disorder development.
H3	SIF->GI->IGD	Higher social influence will increase gameplay intention, contributing to gaming disorder development
H4	FC->GI->IGD	Higher facilitating conditions will increase gameplay intention, contributing to gaming disorder development.
H5	PV->GI->IGD	Higher price value will increase gameplay intention, contributing to gaming disorder development.
H6	HM->GI->IGD	Higher hedonic motivation will increase gameplay intention, contributing to gaming disorder development.
H7	HA->GI->IGD	Higher habit will increase gameplay intention, contributing to gaming disorder development.
H8	FE->GI->IGD	Higher flow experience will increase gameplay intention, contributing to gaming disorder development.
H9	ATT->PE&EE->GI	The effect of attitude on gameplay intention will be fully mediated by performance expectancy and effort expectancy
H10	SEY->EE->GI	The effect of self-efficacy on gameplay intention will be fully mediated by effort expectancy.
H11	SIT->GI->IGD	Higher social interaction will increase gameplay intention, contributing to gaming disorder development.
H12	EC->GI->IGD	Higher emotion coping will increase gameplay intention, contributing to gaming disorder development.
H_{13}	GI->IGD	Higher gameplay intention will contribute to generate internet gaming disorder.

The first part focused on testing the mediating role of performance expectancy and effort expectancy within the overall model, corresponding to H9 and H10.

The second part excluded attitude and self-efficacy from the model and analysed the direct effects of the remaining predictors on gameplay intention, as well as

their indirect effects on IGD. This stage also examined the predictive power of each independent variable on the dependent variables through three key indicators: effect size (f^2), coefficient of determination (R^2), and predictive relevance (Q^2).

Both stages of the path analysis were conducted using the Bootstrapping function in SmartPLS 4. Bootstrapping is a non-parametric technique used to assess the statistical significance of PLS-SEM results. The analysis in this study was performed using the default settings, with 5,000 subsamples, the percentile bootstrap confidence interval method, and a fixed seed random number generator. In alignment with the hypothesis design, bootstrapping was conducted using a one-tailed test with a significance level of 0.05.

The effect sizes and coefficients of determination were generated using the PLS-SEM algorithm, while the analysis of predictive relevance was conducted using the Blindfolding function in SmartPLS 4. The default settings were used, and since the sample size of 1,883 is divisible by 7, an omission distance of 8 was selected for the blindfolding procedure, which falls within the recommended range of 3 to 10.

4.3.2.1 The Mediation Paths

The analysis of the mediating effects of performance expectancy (PE) and effort expectancy (EE) was conducted within the overall structural model. However, the mediation analysis focused solely on the significance of the direct and indirect effects along the specific hypothesized paths. Therefore, the reporting in this section, including the corresponding tables, presents only the coefficient values (β), standard deviations (SD), confidence intervals (CI), and p-values relevant to H9 and H10.

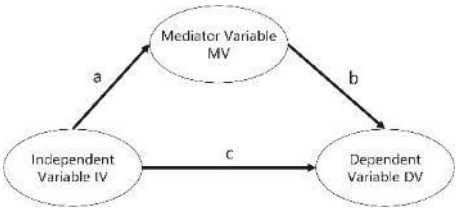


Figure 4.2 General Mediation

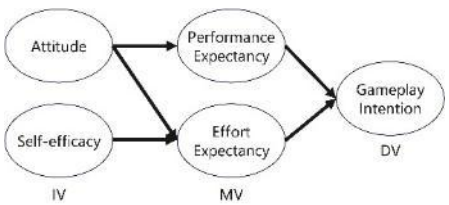


Figure 4.1 Mediation Paths of H9 and H10

Nitzl & Cepeda (2016) outlined a systematic approach for testing mediation effects by examining the significance of path coefficients a, b, and c, as illustrated in Figure 4.1. In the context of this section, H9 and H10 paths are also presented in Figure 4.2. According to the mediation analysis procedure, the first condition

for establishing mediation is that the indirect effect path (a*b) must be statistically significant. The second step involves assessing the significance of the direct effect path (c) in the presence of the indirect effect. If the direct effect is not significant, a full mediation effect is present. If the direct effect remains significant, it indicates a partial mediation effect.

The path analysis results were obtained from the overall model using 5,000 subsamples through the bootstrapping procedure. These results are summarized in Table 4.11.

Table 4.11 Structural Model Results of Mediation Paths

Path	β(SD)	95% CI	P-value	Result
$a_{ATT \rightarrow PE}$	0.292 (0.021)	[0.257, 0.327]	0.000	Accepted
$a_{ATT \rightarrow EE}$	0.290 (0.025)	[0.247, 0.331]	0.000	Accepted
$a_{SEY \rightarrow EE}$	0.422 (0.024)	[0.384, 0.462]	0.000	Accepted
$b_{PE \rightarrow GI}$	0.037 (0.020)	[0.004, 0.069]	0.033	Accepted
$b_{EE \rightarrow GI}$	0.061 (0.024)	[0.022, 0.101]	0.006	Accepted
$c_{ATT \rightarrow GI}$	0.263 (0.028)	[0.217, 0.309]	0.000	Accepted
$c_{SEY \rightarrow GI}$	0.034 (0.027)	[-0.011, 0.078]	0.108	Rejected
$a_{ATT \rightarrow PE} * b_{PE \rightarrow GI}$	0.011 (0.006)	[0.001, 0.021]	0.034	Accepted
$a_{ATT \rightarrow EE} * b_{EE \rightarrow GI}$	0.018 (0.007)	[0.006, 0.030]	0.007	Accepted
$a_{ATT \rightarrow PE} * b_{PE \rightarrow GI} + a_{ATT \rightarrow EE} * b_{EE \rightarrow GI}$	0.028 (0.009)	[0.014, 0.043]	0.001	Accepted
$a_{SEY \rightarrow EE} * b_{EE \rightarrow GI}$	0.026 (0.010)	[0.009, 0.043]	0.006	Accepted

According to the analysis, the total indirect effect of performance expectancy and effort expectancy on the relationship between attitude and gameplay intention is calculated as follows: $a_{ATT \rightarrow PE} * b_{PE \rightarrow GI} + a_{ATT \rightarrow EE} * b_{EE \rightarrow GI} = 0.028$ (95% CI [0.014, 0.043], p-value = 0.001). This result is statistically significant. Under the presence of this indirect effect, the direct effect of ATT on GI is $c_{ATT \rightarrow GI} = 0.263$ (95% CI [0.217, 0.309], p-value = 0.000), also statistically significant. Therefore, performance expectancy and effort expectancy exert a partial mediating effect on the relationship between attitude and gameplay intention. H9 is partially supported.

However, Urbach & Ahlemann (2010) suggested that in the context of information systems research, a path coefficient should exceed 0.1 in order to be considered meaningful within the model. In this study, the direct effect of ATT on GI exceeds 0.2, while its indirect effect is minimal. This further indicates that the mediating influence of PE and EE on the relationship between ATT and GI is very limited.

In the second mediation analysis, the indirect effect of effort expectancy on the relationship between self-efficacy and gameplay intention is $a_{SEY \rightarrow EE} * b_{EE \rightarrow GI}$ = 0.026 (95% CI [0.009,0.043], p-value = 0.006). This effect is statistically significant. Under the presence of this indirect effect, the direct effect from SEY to GI is $c_{SEY \rightarrow GI}$ = 0.034 (95% CI [-0.011,0.078], p-value = 0.108), which is not statistically significant. Therefore, effort expectancy fully mediates the relationship between self-efficacy and gameplay intention. H10 is fully supported.

Furthermore, the path coefficient for the direct effect of SEY on EE ($a_{SEY \rightarrow EE}$ = 0.422) was relatively substantial, indicating a strong association between the two constructs. In contrast, the path coefficients for both the direct and indirect effects of SEY on GI were below 0.1, suggesting very weak relationships. This further highlights the substitutive role of EE in capturing the explanatory power of SEY within the model.

4.3.2.2 Evaluation of Construct Model in the Conceptual Model

The conceptual model used in this study is based on the revised structure that excludes self-efficacy and attitude. It consists of the remaining hypothesized paths, including the direct effects of performance expectancy (H1), effort expectancy (H2), social influence (H3), facilitating conditions (H4), price value (H5), hedonic motivation (H6), habit (H7), flow experience (H8), social interaction (H11), and emotion coping (H12) on gameplay intention, as well as the indirect effects of these constructs on internet gaming disorder through gameplay intention. In addition, the model includes the direct effect of gameplay intention on IGD (H_{13}). The results of the bootstrapping analysis for all these paths are presented in Table 4.12.

Table 4.12 Results of Path Coefficients in the Conceptual Model

Hypothesis	Direct Path	β (SD)	P-values	Result	Indirect Path	β (SD)	95% CI	P-values	Result
H1	PE -> GI	0.041 (0.020)	0.019	Accepted	PE -> GI -> IGD	0.006 (0.003)	[0.001, 0.011]	0.025	Accepted
H2	EE -> GI	0.097 (0.025)	0.000	Accepted	EE -> GI -> IGD	0.013 (0.004)	[0.008, 0.020]	0.000	Accepted
H3	SIF -> GI	0.008 (0.021)	0.340	Rejected	SIF -> GI -> IGD	0.001 (0.003)	[-0.004, 0.006]	0.344	Rejected
H4	FC -> GI	0.054 (0.025)	0.016	Accepted	FC -> GI -> IGD	0.007 (0.004)	[0.002, 0.014]	0.020	Accepted
H5	PV -> GI	-0.003 (0.020)	0.436	Rejected	PV -> GI -> IGD	-0.0004 (0.003)	[-0.005, 0.004]	0.437	Rejected
H6	HM -> GI	0.208 (0.028)	0.000	Accepted	HM -> GI -> IGD	0.029 (0.005)	[0.022, 0.038]	0.000	Accepted

Hypothesis	Direct Path	β (SD)	P-values	Result	Indirect Path	β (SD)	95% CI	P-values	Result
H7	HA -> GI	0.360 (0.026)	0.000	Accepted	HA -> GI -> IGD	0.050 (0.008)	[0.039, 0.065]	0.000	Accepted
H8	FE -> GI	0.095 (0.023)	0.000	Accepted	FE -> GI -> IGD	0.013 (0.004)	[0.008, 0.020]	0.000	Accepted
H11	SIT -> GI	0.008 (0.022)	0.358	Rejected	SIT -> GI -> IGD	0.001 (0.003)	[-0.004, 0.006]	0.363	Rejected
H12	EC -> GI	0.104 (0.021)	0.000	Accepted	EC -> GI -> IGD	0.014 (0.004)	[0.009, 0.021]	0.000	Accepted
H_{13}	GI -> IGD	0.138 (0.017)	0.000	Accepted					

H1, H2, H4, H6, H7, H8, H12, and H_{13} are fully supported. Specifically, performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, habit, flow experience, and emotion coping all exert statistically significant direct effects on gameplay intention. Each of these constructs also demonstrates significant indirect effects on IGD through gameplay intention.

In contrast, Hypotheses H3, H5, and H11 are rejected. Social influence, price value, and social interaction do not show statistically significant effects on gameplay intention, nor do they exhibit significant indirect effects on IGD.

The analysis of effect size (f^2) and coefficient of determination (R^2) was conducted using the PLS-SEM algorithm, while the analysis of predictive relevance (Q^2) was carried out using the Blindfolding procedure. The results are presented in Table 4.13. Definitions and threshold values for each of these indicators are summarized in Table 3.6 in Section 3.6.1.2.

The thresholds for f^2 are divided into three levels and are used to assess the individual contribution of an exogenous variable to an endogenous variable. An f^2 value greater than 0.020 indicates a low effect size, greater than 0.150 indicates a medium effect size, and

greater than 0.350 indicates a large effect size. In this study, the results show that hedonic motivation (f^2 = 0.051) and habit (f^2 = 0.142) have low effect sizes on gameplay intention. Gameplay intention (f^2 = 0.020) also has a low effect size on internet gaming disorder. For the remaining dimensions with statistically significant path coefficients, the effect sizes were very small and did not meet the threshold for a low effect size. Paths with non-significant coefficients showed no effect size.

The thresholds for R^2 are also divided into three levels and are used to evaluate the explanatory power of the overall model for the variance of the endogenous variables. An R^2 value greater than 0.190 indicates weak explanatory power, greater than 0.333 indicates moderate explanatory power, and greater than 0.670 indicates strong explanatory power. In this study, the model explains 54.1% of the variance in gameplay intention and 1.9% of the variance in internet gaming disorder. These results suggest that the model has a moderate level of explanatory power for gameplay intention but a very limited ability to explain internet gaming disorder.

Table 4.13 Results of Effect Size ($f2$), Coefficient of Determination (R2), and Predictive Relevance (Q2) in the Conceptual Model

	f^2	R^2	Q^2
PE	0.002		
EE	0.011		
SIF	0.000		
FC	0.003		
PV	0.000		
HM	0.051		
HA	0.142		
FE	0.010		
SIT	0.000		
EC	0.016		
GI	0.020	0.541	0.357
IGD		0.019	0.00849

As for Q^2, any value greater than zero indicates that the model has predictive relevance for the corresponding endogenous variable, with higher values representing better predictive performance. The analysis results show that the model has predictive relevance for both gameplay intention (Q^2 = 0.357) and internet gaming disorder (Q^2 = 0.00849).

In summary, most constructs in this study were positively correlated with both gameplay intention and internet gaming disorder. Among the main structural relationships, only the correlations between hedonic motivation (β = 0.208, p-value = 0.000), habit (β = 0.360, p-value = 0.000), emotion coping (β = 0.104, p-value = 0.000), and gameplay intention (GI), as well as between gameplay intention and IGD (β = 0.138, p-value = 0.000), exceeded the threshold of 0.1 (Hair, 2022). While the model demonstrated a moderate level of explanatory power (R^2 = 0.541) and predictive relevance (Q^2 = 0.357) for gameplay intention, only two of the ten exogenous variables, habit (f^2 = 0.142) and hedonic motivation (f^2 = 0.051), showed meaningful effect sizes. In contrast, the model's explanatory power (R^2 = 0.019) and predictive relevance (Q^2 = 0.00849) for IGD were very limited. Gameplay intention was the only construct that exhibited a valid but small effect on IGD (f^2 = 0.020).

4.3.2.2.1 Path Coefficient (β) and Effect Size (f^2)

The data in this study show that certain exogenous variables have theoretical relevance in explaining and predicting gameplay intention but lack practical influence. Although performance expectancy (β = 0.041, f^2 = 0.002), effort expectancy (β = 0.097, f^2 = 0.011), facilitating conditions (β = 0.054, f^2 = 0.003), and flow experience (β = 0.095, f^2 = 0.010) are significantly and positively correlated with gameplay intention, the path coefficients are very small. This indicates that a one-unit change in these exogenous variables results in only a minimal change in the endogenous variable. The corresponding effect sizes further confirm that their explanatory power for changes in gameplay intention is limited.

Although the correlation between EC and gameplay intention reaches 0.104, the effect size of EC is below 0.020, suggesting that its contribution remains weak in explanatory terms. Hair et al. (2017) explain that such a discrepancy between statistical significance and practical relevance is often caused by excessively large sample sizes. Larger samples reduce the standard error and increase the stability of the t-values, which in turn leads to smaller p-values. However, effect size is not affected by sample size and therefore provides a more accurate reflection of the actual influence of an exogenous variable within the model.

The model in this study demonstrated good explanatory power (R^2 = 0.541) and predictive relevance (Q^2 = 0.357) for gameplay intention. However, the large

disparity in effect sizes among the exogenous variables indicates that the overall influence of the model is disproportionately dependent on a few key constructs.

4.3.2.2.2 Coefficients of Determination (R^2)

The overall explanatory power and predictive relevance of the model for internet gaming disorder (IGD) were found to be very limited. The coefficient of determination (R^2) reflects the proportion of variance in the observed data explained by the model, with the unexplained portion representing the error variance. In this study, the error variance was unusually large, indicating that residuals deviated substantially from their mean. This statistical outcome is likely due to a regional mismatch between the observed scores of IGD items and those of the other constructs. Specifically, the observed scores for IGD are concentrated in the lower range, whereas the observed scores for the exogenous variables are primarily located in the higher range. As a result, the model tends to systematically overestimate the predicted values of IGD, leading to negative residuals with large absolute values. This pattern of error is widespread throughout the dataset, and the residual scores appear to be negatively correlated with the predicted values.

According to Wooldridge (2013), the coefficient of determination is defined as the ratio of the variance of the model's predicted values to the variance of the observed values. This ratio can be expressed as the covariance between predicted and observed values divided by the product of their standard deviations. The covariance between predicted and observed values can itself be decomposed into the variance of the predicted values plus the covariance between the predicted values and the error terms. In our case, the negative correlation between residuals and predicted values caused the covariance between predicted values and error terms to be negative. This implies that the model systematically overpredicts IGD scores (Wooldridge, 2013). When this covariance is negative, the numerator of the coefficient of determination decreases, which in turn lowers the overall R^2 value. Therefore, this study infers that the extremely weak explanatory power of the conceptual model for IGD is primarily caused by the consistently low observed scores for IGD items and the distributional gap between these scores and those of the exogenous variables. A detailed analysis of the low observed IGD scores is presented in the discussion chapter.

4.3.2.2.3 Blindfolding Q^2

Blindfolding Q^2 is likewise determined by the magnitude of the residuals between predicted and observed values (Stone, 1974), although the prediction procedure differs from that of the coefficient of determination. The regional discrepancy between the actual scores of the exogenous variables and those of the endogenous variable produced a similar effect on the residuals, with the absolute values of the prediction errors being consistently large. This directly resulted in a Q^2 value for IGD that was close to zero, further confirming that the low observed scores of IGD items had a significant adverse impact on the performance of the conceptual model.

4.4 PLS-MGA Analysis Results

This study examined three groups of moderators: game genres, media, and gender. The analysis of the moderating effect of game genres involved ten hypotheses: H1a, H2a, H3a, H4a, H5a, H6a, H7a, H8a, H11a, and H12a. The analysis of media as a moderator included five hypotheses: H1b, H2b, H3b, H4b, and H5b. The analysis of gender as a moderator comprised eight hypotheses: H1c, H2c, H3c, H5c, H7c, H8c, H11c, and H12c. Although all moderation analyses were conducted within the conceptual model, the reporting of results and corresponding tables in this section focus exclusively on the path relationships associated with these specified hypotheses.

The PLS-MGA consists of three steps: data preparation, the Measurement Invariance of Composite Models (MICOM) procedure, and the Non-Parametric Permutation-based Test (NPT) (Cheah et al., 2023). These three steps were carried out using the Permutation Multiple Group Analysis (PeMGA) function in SmartPLS 4. This function applies non-parametric settings by default. PeMGA enables researchers to conduct the MICOM procedure, and cross-group comparisons of the structural model in a single integrated process.

4.4.1 Data Preparation

The first step in PLS-MGA is data preparation. Subgroup categorization, sample organization, and random sampling procedures were completed and described in Section 4.2.1 to 4.2.3. The game genres moderator included four groups with a total of 1,291 participants: Action (n_{ACT} = 427), Action Adventure (n_{ACA} = 222), Role-Playing (n_{ROP} = 222), and Strategy after random sampling (n_{STR_RS} = 420). The media moderator included two subgroups with a combined total of 1,520 participants: Computer/Laptop (n_{CoLa} = 576) and Mobile Phone/Tablet after random sampling (n_{MoTa_RS} = 944). The gender moderator included two subgroups drawn from the full dataset of 1,883 participants: Male (n = 978) and Female (n = 905).

Since the analyses for game genres and media were conducted using different subgroup samples, the corresponding moderation results are based only on those specific subsamples. Therefore, when interpreting and comparing these results with other subgroup findings or with results from the full sample, it is important to recognize the underlying sample differences.

After importing the dataset into SmartPLS 4, each subgroup was created using the “Generate Groups” function. In the “PERM setup” of the PeMGA module, the respective subgroups were selected under “Group A” and “Group B” for pairwise comparisons. Since the gender and media moderators both consist of only two subgroups, each of these comparisons involved a single pair. For the game genres moderator, four subgroups were included, resulting in six pairwise comparisons.

The significance level for the analyses of gender and media was set at the conventional level (p-value = 0.05). However, due to the multiple comparisons involved in the analysis of game genres, Šidák’s and Bonferroni’s corrections were applied to adjust the p-values and control the risk of family-wise error. With six pairwise comparisons among the game genres, the Šidák-adjusted significance threshold was calculated as 0.0085, while the Bonferroni-adjusted threshold was 0.0083. This study adopted the Šidák-adjusted value as the primary benchmark for evaluating p-value significance in game genre comparisons. When using the Šidák threshold, the random number generator was set to the fixed seed to ensure the reproducibility of the results.

Additionally, the study conducted parallel analyses using both the Bonferroni-adjusted p-value = 0.0083 and the conventional p-value = 0.05 for comparing path coefficients across constructs. For these two analyses, the random number generator was set to the random seed, which introduced slight variations in the output p-values. When significance is supported under multiple threshold criteria across repeated analyses, the robustness of the findings is enhanced.

The number of permutations was set at 5,000 to produce more stable results. As specified in the hypothesis framework and summarized in Table 2.7 at the end of Section 2.5.3.2, the analyses for game genres were conducted using a two-tailed test, while one-tailed tests were used for gender and media. Once the questionnaire content, sample grouping, and testing parameters were uniformly configured, configural invariance was established.

4.4.2 Measurement Model Evaluation of Randomly Sampled Moderator Subgroups

Given the extensive length of the analytical result tables, this study summarizes the key findings in Table 4.14 to enhance the clarity of the main text. All indicator scores meet the requirements for an exploratory study (Cheah et al., 2023; Hair et al., 2017). All analyses were conducted within the conceptual model. However, only the constructs and measurement items relevant to the hypotheses associated with the moderators are reported in this section.

Table 4.14 Summary of the Results of Measurement Model Evaluation within Subgroups

Constructs	Moderator	Subgroup	N	λ	CA	CR	AVE	HTMT
PE, EE, SIF, PV, HA, FE, SIT, EC, GI	Gender	ALL	1,883	[0.728, 0.884]	[0.720, 0.858]	[0.837, 0.903]	[0.596, 0.730]	[0.213, 0.840]
		Male	978	[0.697, 0.866]	[0.709, 0.860]	[0.821, 0.905]	[0.583, 0.715]	[0.260, 0.823]
		Female	905	[0.741, 0.905]	[0.716, 0.853]	[0.840, 0.899]	[0.611, 0.743]	[0.184, 0.858]
PE, EE, SIF, FC, PV, GI	Media	ALL	1,520	[0.700, 0.890]	[0.732, 0.855]	[0.832, 0.902]	[0.553, 0.736]	[0.359, 0.719]
		CoLa	576	[0.685, 0.872]	[0.743, 0.844]	[0.840, 0.895]	[0.569, 0.738]	[0.320, 0.736]
		MoTa_RS	944	[0.689, 0.902]	[0.723, 0.860]	[0.827, 0.905]	[0.545, 0.725]	[0.358, 0.716]
PE, EE, SIF, FC, PV, HM, HA, FE, SIT, EC, GI	Game Genres	ALL	1,291	[0.700, 0.890]	[0.720, 0.855]	[0.829, 0.902]	[0.553, 0.736]	[0.198, 0.830]
		ACT	427	[0.660, 0.893]	[0.707, 0.854]	[0.803, 0.902]	[0.576, 0.766]	[0.274, 0.788]
		ACA	222	[0.511, 0.926]	[0.671, 0.862]	[0.801, 0.912]	[0.509, 0.776]	[0.071, 0.813]
		ROP	222	[0.667, 0.890]	[0.722, 0.857]	[0.837, 0.901]	[0.581, 0.749]	[0.151, 0.850]
		STR_RS	420	[0.681, 0.871]	[0.715, 0.862]	[0.827, 0.906]	[0.544, 0.720]	[0.136, 0.864]

The detailed indicator scores corresponding to each construct within the specific subgroups are compiled into tables and presented in the appendix of this study. The results of factor loadings (λ), Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) are presented in Appendix C.1. The measurement model results for gender in the full sample are consistent with those reported in Section 4.3.1 and are not repeated in Appendix C.1. The HTMT analysis results are presented in Appendix C.2.

Most factor loadings across subgroups exceeded 0.700. Several items had loadings below 0.700 but still above 0.500. According to PLS-MGA guidelines, factor loadings above 0.500 are considered acceptable for exploratory analysis (Cheah et al., 2023; Hair et al., 2017). These included HA2 in the male group (λ_{Male_HA2} = 0.697), FC4 in the CoLa group (λ_{CoLa_FC4} = 0.685), FC1 in the MoTa_RS group ($\lambda_{MoTa_RS_FC1}$ = 0.689), EE3 in the ACT group (λ_{ACT_EE3} = 0.688), SIT2 in the ACT group (λ_{ACT_SIT2} = 0.660), EE2 in the ACA group (λ_{ACA_EE2} = 0.642), FC4 in the ACA group (λ_{ACA_FC4} = 0.511), FC4 in the ROP group (λ_{ROP_FC4} = 0.667), SIT3 in the ROP group (λ_{ROP_SIT3} = 0.645), and FC1 in the STR_RS group ($\lambda_{STR_RS_FC1}$ = 0.681).

Most constructs across subgroups reported Cronbach's alpha values above 0.700. Only the facilitating conditions in the ACA group had a slightly lower CA value of 0.671. However, its composite reliability was 0.801 and its AVE was 0.509, both of which meet the required thresholds. Therefore, the internal consistency reliability of this construct remains acceptable.

All constructs across all subgroups reported CR values above 0.700 and AVE values above 0.500, confirming satisfactory internal consistency reliability and convergent validity.

The results of the HTMT analysis are presented in Appendix C.2. All HTMT values were below the 0.90 threshold, indicating that the model achieved adequate discriminant validity within each subgroup.

4.4.3 Measurement Invariance of Composite Models (MICOM)

Procedure

4.4.3.1 Introduction of MICOM

The MICOM procedure requires that the measurement model pass a three-step assessment across all pairwise subgroup comparisons (Cheah et al., 2023). The first step is to establish configural invariance, which is a prerequisite for conducting the subsequent two steps. This step ensures that each specific subgroup has a consistent measurement model, with identical constructs and indicators, and confirms that all subgroups undergo identical data processing procedures and use the same algorithm settings. This requirement has already been fulfilled in the earlier data preparation section.

The second step is to establish compositional invariance, ensuring that composite scores are equivalent across subgroups. This involves testing whether the composite scores of each construct in the pairwise subgroup comparisons are highly correlated. Compositional invariance is considered established when the correlation coefficient is greater than or equal to the 5% quantile, or when the p-value for the difference test is not significant (Cheah et al., 2023; Hair et al., 2017).

When both Step 1 (configural invariance) and Step 2 (compositional invariance) are satisfied, the measurement model is said to exhibit partial invariance between the two comparison subgroups. This indicates that the observed items in each subgroup contribute to their respective latent variables with equivalent composite weights. In other words, each construct is defined consistently across different subgroups. At this stage, researchers may proceed to the pairwise comparisons of path correlation coefficients.

The final step is to establish equality of composite mean values and variances, which is the final requirement for achieving full measurement invariance. This step tests whether the scores of the latent variables differ significantly in terms of overall mean levels and variances across pairwise subgroup comparisons. When this step is satisfied, the measurement model demonstrates full invariance between the groups. At this point, the differences in path correlation coefficients between the two subgroups can be considered valid and are not influenced by differences in means or variances.

However, if full invariance is not achieved and only partial invariance is established, researchers may still proceed to compare path coefficients. While

such comparisons can reflect differences in the strength of relationships between constructs, the conclusions may be affected by variations in other parameters. In other words, the generalizability of these findings within the current research context and target populations may be limited.

4.4.3.2 Results of MICOM

This study assessed measurement invariance using the MICOM procedure, with the results summarized in Table 4.15, and the original outputs presented in Appendix D.1 to D.7. Additionally, a heatmap (Figure 4.3) was created to visually represent the extent to which invariance was established for each construct across all pairwise subgroup comparisons.

Table 4.15 Summary of the MICOM Results

Moderators	Comparison	Full Invariance (Step 3)	Partial Invariance (Step 2)	Configural Invariance (Step 1)
Gender	Male vs. Female	EE, FE, GI	PE, SIF, PV, HA, SIT, EC	All established
Media	CoLa vs. MoTa_RS	EE, GI	PE, SIF, FC, PV	
Game Genres	ACT vs. ACA	PE, SIF, PV, FE, SIT, EC	EE, FC, HM, HA, GI	
	ACT vs. ROP	SIF, PV, HM, HA, FE, SIT, EC	PE, EE, FC, GI	
	ACT vs. STR_RS	PE, EE, SIF, FC, PV, HM, HA, FE, SIT, EC, GI	--	
	ACA vs. ROP	PE, EE, SIF, FC, PV, HM, HA, FE, SIT, EC, GI	--	
	ACA vs. STR_RS	SIF, PV, SIT, EC	PE, EE, FC, HM, HA, FE, GI	
	ROP vs. STR_RS	SIF, HA, SIT, EC	PE, EE, FC, PV, HM, FE, GI	

The analysis followed the three-step procedure as designed. First, configural invariance was established, as all constructs across all subgroups were modeled using the same indicators, data treatment procedures, and algorithm settings. Second, partial invariance was confirmed for all constructs in each subgroup comparison. Specifically, the permutation c-values for every construct fell within their respective confidence intervals, indicating that the relative composition of the constructs was statistically equivalent across groups. These results demonstrate that partial measurement invariance was fully satisfied, thereby justifying the implementation of subsequent multi-group comparisons of path coefficients.

Comparison \ Construct	PE	EE	SIF	FC	PV	HM	HA	FE	SIT	EC	GI
Male vs. Female	2	3	2	NA	2	NA	2	3	2	2	3
CoLa vs. MoTa_RS	2	3	2	2	2	NA	NA	NA	NA	NA	3
ACT vs. ACA	3	2	3	2	3	2	2	3	3	3	2
ACT vs. ROP	2	2	3	2	3	3	3	3	3	3	2
ACT vs. STR_RS	3	3	3	3	3	3	3	3	3	3	3
ACA vs. ROP	3	3	3	3	3	3	3	3	3	3	3
ACA vs. STR_RS	2	2	3	2	3	2	2	2	3	3	2
ROP vs. STR_RS	2	2	3	2	2	2	3	2	3	3	2

3 Full Invariance
2 Partial Invariance
NA No Included

Figure 4.3 Heatmap of the MICOM Results

Furthermore, several construct comparisons met the criteria for full measurement invariance, meaning that both the differences in means and variances between subgroups were non-significant, with their observed values falling within the corresponding confidence intervals. For the gender moderator, full measurement invariance was achieved for effort expectancy, flow experience, and gameplay intention. For the media moderator, effort expectancy and gameplay intention demonstrated full invariance between the CoLa and MoTa subgroups.

In the game genres comparison, full invariance was observed for the following subgroup pairs: (1) ACT versus ACA for performance expectancy, social influence, price value, flow experience, social interaction, and emotion coping; (2) ACT versus ROP for social influence, price value, hedonic motivation, habit, flow experience, social interaction, and emotion coping; (3) ACT versus STR_RS for all constructs; (4) ACA versus ROP for all constructs; (5) ACA versus STR_RS for social influence, price value, social interaction, and emotion coping; and (6) ROP versus STR_RS for social influence, habit, social interaction, and emotion coping.

Since full measurement invariance was established for certain constructs across different groups, it is statistically appropriate to interpret these constructs as equivalent and to use the pooled sample to estimate the path relationships (Hair et al., 2022; Henseler et al., 2016). In addition, full invariance was confirmed between the ACT and STR_RS groups, as well as between the ACA and ROP groups, indicating that their data can be combined for analysis across all constructs within the conceptual model, and the results can be considered statistically meaningful.

For constructs that achieved partial invariance but not full invariance across groups, the measurement models can be considered structurally consistent, yet differences in subjective experiences may still exist between the groups. In such cases, the groups may exhibit genuine cognitive or behavioral differences with respect to the constructs. This means that participants from different groups may

have responded to items related to these constructs in systematically different ways, resulting in variations in the distribution of means and variances across groups.

For example, Performance Expectancy (PE) achieved partial invariance across all subgroup comparisons, but full invariance was established in only three of them. This indicates that among Chinese university student gamers in this study, the measurement items for PE contribute equally to the construct across different subgroups. However, in the five comparisons where full invariance was not achieved, there were notable differences in the distribution of PE item scores between the subgroups.

Specifically, as shown in Appendix D.2, the comparison of PE between CoLa and MoTa_RS in the media subgroup revealed a mean difference of 0.171, which falls outside the confidence interval of [–0.087, 0.086], indicating a significant difference in the average scores. Meanwhile, the variance difference was –0.071, which falls within the confidence interval of [–0.112, 0.113], suggesting no significant difference in variance between the two groups. This result implies that the CoLa and MoTa_RS groups differ significantly in terms of the mean level of PE, while the variability of their responses remains statistically similar.

Based on the above findings, the partial invariance result indicates that the items within PE hold equivalent importance and discriminative power for both CoLa and MoTa_RS groups. The significant difference in mean scores suggests that the actual impact level of each item varies notably between the two groups. Meanwhile, the similarity in variance implies a converging pattern in score dispersion, indicating no significant difference in the variability of responses across items.

This conclusion can be further supported by the PE factor loading scores for the two groups presented in Appendix C.1. The item weights are highly similar across both groups, showing identical rank orderings, which reflects consistent importance hierarchies. However, a notable visual difference is observed in the factor loading score of item PE1, indicating a perceptible variation in its contribution between the two groups. This observation further reinforces the results of the MICOM analysis.

This study achieved partial invariance across all subgroup comparisons, confirming that the specified measurement model is valid across all groups and that no measurement bias is present. However, in some group comparisons, differences in distributional patterns in construct scores were observed. MICOM

established at least partial invariance for most constructs, therefore, the structural comparison using PLS-MGA remain interpretable, though with caution, particularly for constructs with only partial support for invariance.

4.4.4 NPT-based Pairwise Path Coefficient Comparison

4.4.4.1 Introduction of the Test Setup

In the Non-Parametric Permutation-based Test (NPT) analyses for gender and media, the conventional p-value threshold of 0.05 was applied to evaluate the statistical significance of differences in path coefficients between groups. For game genres, this study adopted the Šidák's p-value threshold of 0.0085 as the primary benchmark for determining significance in pairwise path comparisons. To enhance the robustness of the results, the analysis was also repeated under a random seed setting using both the conventional p-value (0.05) and the Bonferroni's p-value (0.0083), and the additional outcomes are provided for reference.

A one-tailed test was applied for comparisons between male and female participants, as well as between the CoLa and MoTa groups. This setting was based on the prior hypothesis design of the study, which had already established that, in subgroup comparisons of gender and media across individual paths, one subgroup consistently exhibited stronger path effects. In other words, the direction of the moderator influence on path coefficients was theoretically anticipated based on prior research experience. Therefore, a one-tailed test was applied in this study.

In contrast, two-tailed tests were used for all six pairwise comparisons among the four game genre subgroups. Since this subgroup classification was applied to the UTAUT2 model for the first time, the directional influence of game genres on each path coefficient was unknown in the prior hypothesis testing design. Moreover, at the time of data collection planning, the specific game genres that could be included in the sample were not yet known. Therefore, it was not possible to predefine the expected direction of influence for the game genre moderator. Under such circumstances, where the direction of the effect is unknown, the use of two-tailed tests is statistically appropriate (Cheah et al., 2023).

4.4.4.2 NPT Results

This study summarizes the significant NPT results in Table 4.16, while the full NPT results are presented in Appendix E.

Table 4.16 Summary of the Significant NPT Results

Comparison	Path Relationship (Invariance)	Coefficient Difference	**Permutation Test**		
			Conventional p-value: 0.05	**Šidák's p-value adjustments: 0.0085**	**Bonferroni's p-value adjustments: 0.0083**
CoLa vs. MoTa_RS	PV(P) -> GI(F)	0.078	**0.041**		
ACT vs. ACA	FE(F) -> GI(P)	-0.152	**0.041**	0.038	0.046
ACT vs. ROP	HA(F) -> GI(P)	-0.217	**0.024**	0.024	0.022
ACT vs. STR_RS	SIF(F) -> GI(F)	0.230	**0.000**	**0.000**	**0.000**
ACT vs. STR_RS	HA(F) -> GI(F)	-0.193	**0.013**	0.013	0.011
ACA vs. ROP	FE(F) -> GI(F)	0.191	**0.032**	0.035	0.030
ACA vs. STR_RS	SIF(F) -> GI(P)	0.137	**0.039**	0.043	0.040
ACA vs. STR_RS	FE(P) -> GI(P)	0.169	**0.037**	0.038	0.040
ACA vs. STR_RS	SIT(F) -> GI(P)	-0.156	**0.047**	0.047	0.049

Note: In the "Path Relationship (Invariance)" column, "P" indicates partial invariance, while "F" indicates full invariance. Statistically significant p-value highlighted in bold.

According to the results based on the Šidák's p-value, only one path showed a statistically significant difference across subgroups: the effect of social influence on gameplay intention was significantly stronger in the Action group compared to the Strategy_RS group, with a path coefficient difference of 0.230 and a p-value of 0.000. The results based on the Bonferroni's p-value were identical to those obtained using the Šidák's p-value, confirming the stability of the finding.

The results based on the conventional p-value threshold of 0.05 revealed several conventionally significant differences in path coefficients across subgroups. Since both the gender and media moderators consisted of only two subgroups, there was no need to apply adjusted p-values. In contrast, for the group comparisons involving the game genres moderator, the Šidák's adjusted p-value

threshold was adopted as the standard for statistical significance. The conventional significant results observed in game genre comparisons were reported for reference only and do not represent statistically robust evidence.

In the media subgroup comparison, a conventional significant difference was observed in the relationship between price value and gameplay intention, with the CoLa and MoTa_RS groups showing a path coefficient difference of 0.078 and a p-value of 0.041.

In the game genre comparisons, seven subgroup pairs met the conventional p-value threshold. However, none of them reached significance under Šidák's or Bonferroni's adjusted p-value criteria. In the relationship between social influence and gameplay intention, the Action Adventure and Strategy_RS groups showed a conventional significant difference with a path coefficient difference of 0.137 and a p-value of 0.039.

For the construct habit, the comparisons between the Action and Role-Playing groups (diff = -0.217, p-value = 0.024) and between the Action and Strategy_RS groups (diff = -0.193, p-value = 0.013) revealed conventional significant differences in their influence on gameplay intention.

In terms of flow experience, three subgroup comparisons showed conventional significant differences in its effect on gameplay intention. These included Action versus Action Adventure (diff = -0.152, p-value = 0.041), Action Adventure versus Role-Playing (diff = 0.191, p-value = 0.032), and Action Adventure versus Strategy_RS (diff = 0.169, p-value = 0.037).

Finally, the comparison between Action Adventure and Strategy_RS indicated a conventional significant difference in the path from social interaction to gameplay intention, with a coefficient difference of −0.156 and a p-value of 0.047.

No statistically significant path differences were found in the gender subgroup comparison under the conventional p-value threshold.

In summary, while several pairwise comparisons in the game genre moderator showed statistically significant differences under the conventional p-value threshold, none of these remained significant when applying the Šidák or Bonferroni's corrections, except for one path. This outcome highlights the stricter nature of these adjustments in controlling family-wise error. Among all comparisons, only the relationship between social influence and gameplay intention in the Action versus Strategy_RS comparison met the adjusted significance thresholds. These findings offer valuable guidance for the

subsequent detailed discussion of individual path relationships and provide empirical support for interpreting group-specific effects.

4.4.5 Structural Model Assessment across Moderator Subgroups

Following the completion of the comparison analysis, this study conducted separate bootstrapping and blindfolding analyses for each individual subgroup. The bootstrapping procedure was performed with 5,000 subsamples, using a significance level of 0.05 and a one-tailed test. The path analysis was conducted based on the full conceptual model, and included evaluations of path coefficients, effect sizes (f^2), and coefficients of determination (R^2). Similarly, the blindfolding analysis was also conducted within the same conceptual framework to assess the predictive relevance (Q^2) of the model for each subgroup. The results of the path coefficient analysis are presented in Table 4.17. Paths not included in the pairwise comparison analysis are indicated in parentheses, and statistically significant paths with p-value less than 0.05 are marked with asterisks.

Table 4.17 Structural Path Coefficients across Moderator Subgroups

Path coefficient	Male (N=978)	Female (N=905)	CoLa (N=576)	MoTa_RS (N=944)	ACT (N=427)	ACA (N=222)	ROP (N=222)	STR_RS (N=420)
PE->GI	0.036	0.045	0.02	0.037	0.028	0.089	0.044	0.034
EE->GI	0.084**	0.11**	0.082**	0.113**	0.052	0.056	0.035	0.131**
SIF->GI	0.016	0.0003	0.036	0.034	0.122**	0.029	0.014	-0.108**
FC->GI	(0.087**)	(0.026)	0.07	0.059**	0.027	0.042	0.063	0.028
PV->GI	-0.0003	-0.001	0.036	-0.041**	0.038	-0.056	-0.025	0.046
HM->GI	(0.194**)	(0.225**)	(0.176**)	(0.246**)	0.253**	0.209**	0.262**	0.153**
HA->GI	0.337**	0.375**	(0.368**)	(0.329**)	0.245**	0.358**	0.462**	0.438**
FE->GI	0.09**	0.093**	(0.052)	(0.114**)	0.091**	0.243**	0.052	0.074
SIT->GI	0.002	0.024	(-0.02)	(0.035)	0.015	-0.086	-0.031	0.069
EC->GI	0.115**	0.095**	(0.097**)	(0.096**)	0.159**	0.108	0.011	0.065
GI->IGD	(0.153**)	(0.143**)	(0.132**)	(0.125**)	(0.16**)	(0.144**)	(0.118)	(0.197**)

4.4.5.1 Gender Group

In the comparison analysis between the male and female groups, no path demonstrated a significant group difference. However, in the separate path analyses conducted for each group, most constructs exhibited significant influences on the dependent variable. Specifically, effort expectancy, hedonic motivation, habit, flow experience, emotion coping, and gameplay intention showed significant effects in both the male and female groups. Facilitating conditions had a significant impact on gameplay intention only within the male group. The remaining constructs including performance expectancy, social

influence, price value, and social interaction did not have significant effects on gameplay intention in either gender group. The following discussion of path-specific results is presented in the order of Table 4.17.

The path coefficient from performance expectancy (PE) to GI in the male group was 0.036 with a p-value of 0.105. In the female group, the corresponding coefficient was 0.045 with a p-value of 0.0501. PE achieved only partial invariance in the gender subgroup comparison. The NPT-based pairwise comparison indicated no significant group difference. Both the male and female university student gamers generally perceived that gaming offers little benefit to their daily lives or to enhancing academic or work efficiency. The instrumental value of gaming was considered minimal, and gaming was largely viewed as a form of entertainment.

The path coefficient from effort expectancy (EE) to GI in the male group was 0.084 with a p-value of 0.006, and in the female group it was 0.11 with a p-value of 0.001. EE achieved full invariance in the gender subgroup comparison. The NPT-based analysis showed no significant difference between groups. Both the male and female students reported similar ease of use and adaptability to gaming. The perception that games are easy to learn and master had a significant influence on gameplay intention, but this influence was consistent across genders.

The path coefficient from social influence (SIF) to GI in the male group was 0.016 with a p-value of 0.310. In the female group, the coefficient was 0.0003 with a p-value of 0.496. SIF achieved only partial invariance in the gender subgroup comparison. No significant group difference was found. University student gamers generally do not place much importance on others' opinions regarding their gaming behavior. No significant gender differences were found in how players respond to social attitudes. This suggests that students' gaming behavior is largely unaffected by external social pressure.

The path coefficient from facilitating conditions (FC) to GI in the male group was 0.087 with a p-value of 0.014, indicating statistical significance. In contrast, the coefficient in the female group was 0.026 with a p-value of 0.211, which was not significant. Male gamers placed greater importance on having the necessary resources and technical knowledge to continue gaming. This pattern was not evident in female gamers. However, previous studies suggest that access to gaming resources and knowledge is necessary regardless of gender (Harborth &

Pape, 2017, 2020). The female players may perceive these resources as less critical, though still necessary for participation.

The path coefficient from price value (PV) to GI in the male group was –0.0003 with a p-value of 0.497. In the female group, the coefficient was –0.001 with a p-value of 0.482. PV achieved only partial invariance in the gender subgroup comparison. No group difference was observed. Price and value considerations appeared to be unimportant for university gamers. Most of the games reported were free-to-play, with no initial cost required. Although in-game items or decorative elements may involve optional spending, the cost is generally within the students' acceptable range and does not significantly influence their intention to continue playing (Jang & Byon, 2020a).

The path coefficient from hedonic motivation (HM) to GI in the male group was 0.194 with a p-value of 0.000, and in the female group, it was 0.225 with a p-value of 0.000. Hedonic motivation is consistently identified as a major factor influencing gameplay behavior, and university students are no exception. This study further confirms the stable effect of hedonic motivation on gameplay intention among student players.

The path coefficient for habit was 0.337 (p-value = 0.000) in the male group and 0.375 (p-value = 0.000) in the female group. HA achieved only partial invariance in the gender subgroup comparison. The NPT-based comparison indicated no significant group difference. Habit is the most influential factor driving gameplay among university student players. Gaming has become one of their primary leisure activities and is perceived as a routine part of daily life.

The path coefficient from flow experience (FE) to GI in the male group was 0.090 (p-value = 0.005), and in the female group, it was 0.093 (p-value = 0.001). FE achieved full invariance in the gender subgroup comparison. No significant group difference was observed. University student gamers generally reported highly positive flow experiences during gameplay, with no notable differences between male and female players. The games included in this study did not show any gender-based bias in facilitating flow. Both male and female students were able to find their own sense of enjoyment and immersion in the gaming environment.

The path coefficient from social interaction (SIT) to GI in the male group was 0.002 with a p-value of 0.480, while in the female group, it was 0.024 with a p-value of 0.208. SIT achieved only partial invariance in the gender subgroup comparison. No significant gender difference was detected. University students showed very low demand for social interaction through online games. This may

be due to their group-based campus and dormitory lifestyles, which provide sufficient opportunities for real-life interpersonal communication. As a result, students tend to prioritize real-world friendships. Their gaming companions are often the same peers they interact with in daily life, rather than online-only acquaintances.。

The path coefficient from emotion coping (EC) to GI in the male group was 0.115 (p-value = 0.000), and in the female group, it was 0.095 (p-value = 0.000). EC achieved only partial invariance in the gender subgroup comparison. No significant group difference was found. Both the male and female students reported using gaming as a way to relieve psychological stress. When facing academic or personal pressure, many students view gaming as a temporary coping mechanism.

The path coefficient from gameplay intention (GI) to IGD in the male group was 0.153 (p-value = 0.000), while in the female group, it was 0.143 (p-value = 0.000). Across both groups, a stronger intention to play was associated with a higher risk of developing internet gaming disorder. Participants acknowledged that increased gaming intention could interfere with real-life responsibilities and contribute to problematic gaming behavior.

4.4.5.2 Media Group

In the media group, multi-group analysis was conducted only for the paths from PE, EE, SIF, FC, and PV to GI. Among the paths, only the effect of price value on gameplay intention (β_{CoLa} = 0.036, β_{MoTa_RS} = -0.041**) showed a statistically significant group difference (diff = 0.078, p-value = 0.041). However, PV achieved only partial invariance in the media subgroup comparison.

This result indicates that pricing strategies for computer-based and mobile-based games have opposite effects on university students' gameplay intention. University students who primarily use computers for gaming do not place significant importance on perceived pricing, whereas those who use mobile devices are more sensitive to the price and value of games. Although some products offer reasonable pricing and good value for money, mobile gamers may still prefer free or low-cost games. In China, university students commonly rely on financial support from their families, which makes them more cautious when facing paid game content. Even if the product is considered to be worth the price, it may still exceed what an average student can afford.

In the path relationships where no significant group difference was found, several constructs still demonstrated significant effects on the dependent variable within individual subgroups. Effort expectancy, hedonic motivation, habit, emotion coping, and gameplay intention had significant path influences on their respective dependent variables in both the CoLa group and the MoTa_RS group. Facilitating conditions and flow experience had significant effects on gameplay intention only within the MoTa_RS group. Performance expectancy, social influence, and social interaction did not show significant effects on gameplay intention in either group. The following discussion of individual path results is presented in the order of Table 4.17.

The path coefficient from performance expectancy (PE) to GI in the CoLa group was 0.020 (p-value = 0.300), and in the MoTa_RS group, it was 0.037 (p-value = 0.078). PE achieved only partial invariance in the media subgroup comparison. No significant group difference was found. This further suggests that Chinese university students, regardless of whether they play on computers or mobile devices, generally do not place importance on the usefulness or functional value of games.

The path coefficient from effort expectancy (EE) to GI in the CoLa group was 0.082 (p-value = 0.029), and in the MoTa_RS group, it was 0.113 (p-value = 0.000). EE achieved full invariance in the media subgroup comparison. However, no significant group difference was found. This indicates that Chinese university students value the ease of use and operability of games regardless of whether they are played on computers or mobile devices. Players do not appear to perceive one platform as more difficult to access or learn than the other.

The path coefficient from social influence (SIF) to GI in the CoLa group was 0.036 (p-value = 0.196), and in the MoTa_RS group, it was 0.034 (p-value = 0.103). SIF achieved only partial invariance in the media subgroup comparison. No significant group difference was found. In entertainment-oriented gaming contexts, both computer and mobile players among university students tend to base their usage intentions more on personal interest than on social norms. For these players, perceptions of others' opinions or societal expectations exert minimal influence on their behavioral decisions.

The path coefficient from facilitating conditions (FC) to GI in the CoLa group was 0.070 (p-value = 0.098), and in the MoTa_RS group, it was 0.059 (p-value = 0.029). FC achieved only partial invariance in the media subgroup comparison. Although material resources and gaming-related knowledge were found to be

more important for university students who play mobile games, the difference in their impact across platforms was not statistically significant. Computer game players typically engage in gameplay in fixed settings and stable environments, whereas mobile game players are exposed to greater situational variability and can play in almost any context. As a result, mobile gamers tend to place higher demands on external supporting conditions to ensure that their gaming experience is not disrupted, even in more complex or unpredictable environments.

The path coefficient from hedonic motivation (HM) to GI in the CoLa group was 0.176 (p-value = 0.000), and in the MoTa_RS group, it was 0.246 (p-value = 0.000). The entertainment value provided by games on both computer and mobile platforms serves as a primary driving force for gameplay intention among university students. HM plays a strong and consistent role across both media types.

The path coefficient from habit (HA) to GI in the CoLa group was 0.368 (p-value = 0.000), and in the MoTa_RS group, it was 0.329 (p-value = 0.000). Habitual gaming behavior is a key predictor of gameplay intention across all platforms. The effect of habit remains consistent and stable among users of different media types.

The path coefficient from flow experience (FE) to GI in the CoLa group was 0.052 (p-value = 0.146), and in the MoTa_RS group, it was 0.114 (p-value = 0.000). In the mobile gaming environment, flow experience serves as a strong driver of gameplay intention. This may be attributed to the design of mobile games, which often emphasize short-duration and highly immersive experiences, allowing players to enter a state of flow more easily in fragmented and casual usage contexts.

The path coefficient from social interaction (SIT) to GI in the CoLa group was -0.020 (p-value = 0.315), and in the MoTa_RS group, it was 0.035 (p-value = 0.114). University student players do not rely on online social interaction, whether they play on computers or mobile devices. This is because their gaming typically occurs in shared physical environments such as dormitories, classrooms, or cafeterias where they are already accompanied by peers. As a result, their motivation to play games is not primarily driven by a need for online social engagement.

The path coefficient from emotion coping (EC) to GI in the CoLa group was 0.097 (p-value = 0.010), and in the MoTa_RS group, it was 0.096 (p-value = 0.000).

Regardless of the platform used, players demonstrate a strong tendency to play games for psychological reasons such as emotion regulation and stress relief.

The path coefficient from gameplay intention (GI) to IGD in the CoLa group was 0.132 (p-value = 0.000), and in the MoTa_RS group, it was 0.125 (p-value = 0.000). Regardless of the platform used, players with stronger gameplay intentions are more likely to exhibit tendencies associated with internet gaming disorder.

4.4.5.3 Game Genres Group

To control the family-wise error associated with multiple comparisons, this study applied the Šidák correction to adjust the significance level in the permutation-based multi-group analysis. In reporting the results, paths that were significant after correction (p-value $\leqslant$ 0.0085) were considered to have robust statistical significance. In contrast, paths that were significant under the conventional p-value threshold but not under the adjusted threshold (0.0085 < p-value $\leqslant$ 0.05) were treated as exploratory findings and interpreted only as indicative trends.

This study identified a statistically significant group difference at the Šidák-adjusted level only in the path from social influence (SIF) to gameplay intention. SIF achieved full invariance across all game genre group comparisons. A significant difference was found between the Action and Strategy_RS groups, with a path coefficient difference of 0.230 and a p-value of 0.000. In addition, although the difference between the Action Adventure and Strategy_RS groups was significant only at the conventional level with a path coefficient difference of 0.137 and a p-value of 0.039, the observed variation still warrants further investigation in future research.

When examining the individual path effects within each subgroup, the effect of social influence on gameplay intention was significant in the Action group (β = 0.122, p-value = 0.006) and in the Strategy_RS group (β = -0.108, p-value = 0.003). However, the effect was not significant in the Action Adventure group (β = 0.029, p-value = 0.300) or the Role-Playing group (β = 0.014, p-value = 0.416).

University students who play strategy games tend to have a strongly negative response to social influence. The more they perceive external social expectations, the less interest they show in playing games. This negative trend stands in sharp contrast to the more positive attitudes observed among students who play action and action adventure games. Social influence is one of the few

constructs in the UTAUT2 model that has been shown in previous studies to exert a negative impact on gameplay intention (Jang et al., 2021a). This adverse effect may be particularly evident among strategy game players, who often face disapproval from people in their immediate environment. When those around them view strategy games negatively, it significantly undermines their intention to play. By contrast, university students who play action games are typically surrounded by a more supportive social environment that encourages their gaming behavior.

In addition to the two group differences described above, this study identified six pairwise comparisons that demonstrated conventional significance. These differences were observed in the path effects of habit, flow experience, and social interaction on gameplay intention.

The effect of habit (HA) on GI was significant in the Action (β = 0.245, p-value = 0.000), Action Adventure (β = 0.358, p-value = 0.000), Role-Playing (β = 0.462, p-value = 0.000), and in the Strategy_RS group (β = 0.438, p-value = 0.000). The path from habit to gameplay intention was significantly positive across all four game genres, indicating that regardless of game type, habitual gaming behavior consistently enhances players' subsequent intention to continue using the game.

The comparisons between the Action and Role-Playing groups (diff = -0.217, p-value = 0.024) and between the Action and Strategy_RS groups (diff = -0.193, p-value = 0.013) revealed differences in their influence on gameplay intention, though these differences did not meet the Šidák's threshold for statistical robustness. HA achieved full invariance in both of these subgroup comparisons. University students who play action games appear to exhibit a lower degree of habitual gaming behavior in their daily lives compared to players of other genres, suggesting the possibility of different patterns of game-related dependency.

The effect of flow experience (FE) on GI was significant in the Action group(β = 0.091, p-value = 0.021), Action Adventure group (β = 0.243, p-value = 0.000), but it was not significant in the Role-Playing (β = 0.052, p-value = 0.202) and the Strategy_RS group (β = 0.074, p-value = 0.071). Three subgroup comparisons showed differences in its effect on gameplay intention, but none of them reached Šidák's adjusted significance. These included the Action versus Action Adventure (diff = -0.152, p-value = 0.041), Action Adventure versus Role-Playing (diff = 0.191, p-value = 0.032), and Action Adventure versus Strategy_RS (diff = 0.169, p-value = 0.037). FE achieved full invariance only in the first two subgroup comparisons.

The effect of flow experience on gameplay intention may vary across different game genres, though further research is needed to confirm this possibility. While the design of most games aims to provide players with immersive experience, gameplay mechanisms differ substantially by genre. Variations in interactivity, continuity, pacing, and goal orientation may influence the degree to which flow experience contributes to gameplay intention. Action adventure games, for example, often feature real-time feedback, clear objectives, and smooth control systems, which are more likely to facilitate a deep sense of immersion.

The effect of social interaction (SIT) on GI was not significant in the Action group (β = 0.015, p-value = 0.374), Action Adventure group (β = -0.086, p-value = 0.078), Role-Playing group (β = -0.031, p-value = 0.337), or in the Strategy_RS group (β = 0.069, p-value = 0.079). The comparison between the Action Adventure and Strategy_RS groups indicated a small difference (diff = -0.156, p-value = 0.047), though it did not meet the Šidák's threshold for statistical robustness. SIT achieved full invariance in this subgroup comparison. This result suggests that there may be differences in how social interaction is designed in action adventure versus strategy games. However, among the university student sample in this study, the predictive power of social interaction on gameplay intention was generally weak.

There were six remaining paths that did not exhibit any significant group differences. Among these, performance expectancy, facilitating conditions, and price value did not have significant effects on gameplay intention in any of the game genre subgroups. In contrast, the effect of hedonic motivation on gameplay intention was consistently significant across all subgroups. The effect of effort expectancy on gameplay intention was significant only in the Strategy_RS group, while the effect of emotion coping was significant only in the Action group. Detailed analyses and discussions of each path result are presented as follows.

The effect of performance expectancy (PE) on GI was not significant in the Action (β = 0.028, p-value = 0.267), Action Adventure (β = 0.089, p-value = 0.069), Role-Playing (β = 0.044, p-value = 0.242), and in the Strategy_RS group (β = 0.034, p-value = 0.214). No significant group difference was found. This suggests that university student players across all game genres do not consider the functional value of games to be important. They generally do not place emphasis on the potential positive impact of gaming on their daily life, academic performance, or work-related outcomes.

The effect of effort expectancy (EE) on GI was not significant in the Action (β = 0.052, p-value = 0.135), Action Adventure (β = 0.056, p-value = 0.200), and in the Role-Playing group (β = 0.035, p-value = 0.319), but it was significant in the Strategy_RS group (β = 0.131, p-value = 0.005). No significant group difference was found. In strategy games, players place greater importance on ease of use, as these games often involve complex commands, resource management, and logical operations. If the gameplay is not user-friendly, it may reduce players' intention to continue using the game. Although the perceived importance of ease of use may vary across different game genres, the overall effect of effort expectancy was not significantly moderated by game type.

The effect of facilitating conditions (FC) on GI was not significant in the Action (β = 0.027, p-value = 0.315), Action Adventure (β = 0.042, p-value = 0.248), Role-Playing (β = 0.063, p-value = 0.192), and in the Strategy_RS group (β = 0.028, p-value = 0.303). No significant group difference was found. In the university student sample of this study, the availability of technical resources and external support was not a key factor influencing players' willingness to continue gaming.

The effect of price value (PV) on GI was not significant in the Action (β = 0.038, p-value = 0.189), Action Adventure (β = -0.056, p-value = 0.149), Role-Playing (β = -0.025, p-value = 0.342), and in the Strategy_RS group (β = 0.046, p-value = 0.147). No significant group difference was found. As students are more frequently exposed to free or low-cost games, the importance of price or perceived value may be diminished compared to other motivational factors.

The effect of hedonic motivation (HM) on GI was significant in the Action (β = 0.253, p-value = 0.000), Action Adventure (β = 0.209, p-value = 0.002), Role-Playing (β = 0.262, p-value = 0.001), and in the Strategy_RS group (β = 0.153, p-value = 0.005). No significant group difference was found. Regardless of game genre, players' perception of enjoyment and fun remains a central factor driving their engagement. Hedonic motivation demonstrates consistency and universality across different types of games, serving as a robust predictor of gameplay intention.

The effect of emotion coping (EC) on GI was significant in the Action group (β = 0.159, p-value = 0.000), but it was not significant in the Action Adventure (β = 0.108, p-value = 0.052), Role-Playing (β = 0.011, p-value = 0.426), and in the Strategy_RS group (β = 0.065, p-value = 0.062). No significant group difference was found. Action games, due to their fast-paced nature, immediate feedback, and stimulating controls, are particularly well-suited for emotional regulation

purposes such as venting emotions, relieving stress, or redirecting attention. These characteristics enhance players' intention to engage with such games. In contrast, other game genres tend to emphasize narrative progression, strategic planning, or immersive exploration, which may reduce their effectiveness for immediate emotional regulation. Although the Action group exhibited a statistically significant path from emotion coping to gameplay intention, the multi-group analysis results indicated that the differences between groups were not statistically significant.

At last, the effect of gameplay intention (GI) on IGD was significant in the Action ($\beta = 0.160$, p-value = 0.000), Action Adventure ($\beta = 0.144$, p-value = 0.042), and in the Strategy_RS group ($\beta = 0.197$, p-value = 0.000), but it was not significant in Role-Playing group ($\beta = 0.118$, p-value = 0.105). No significant group difference was found. Stronger gameplay intention is generally associated with a higher tendency toward IGD. However, this path was not significant in the Role-Playing group, which may suggest that players are driven by different engagement motives and addiction mechanisms. Role-Playing games typically emphasize narrative development and character progression, with player intention leaning more toward story immersion than repetitive use. As a result, gameplay intention in this genre may not strongly predict IGD tendencies. The multi-group comparison analysis did not reveal any statistically significant group differences, indicating that while the path significance varied across groups, the strength of the path itself was not significantly moderated by game genre.

4.4.5.4 Effect Size (f^2)

The results of the effect size (f^2) analysis are also presented in Table 4.18. As in the previous table, paths not included in pairwise comparisons are shown in parentheses, and values representing meaningful effect sizes are displayed in bold.

Table 4.18 Effect Size (f^2) Estimates across Moderator Subgroups

f^2	Male (N=978)	Female (N=905)	CoLa (N=576)	MoTa_RS (N=944)	ACT (N=427)	ACA (N=222)	ROP (N=222)	STR_RS (N=420)
PE->GI	0.002	0.003	0.001	0.002	0.001	0.012	0.002	0.002
EE->GI	0.008	0.016	0.007	0.016	0.003	0.005	0.001	0.019
SIF->GI	0.000	0.000	0.002	0.002	0.019	0.001	0.000	0.016
FC->GI	(0.008)	(0.001)	0.005	0.005	0.001	0.002	0.005	0.001
PV->GI	0.000	0.000	0.002	0.003	0.002	0.005	0.001	0.003
HM->GI	(0.043)	(0.060)	(0.031)	(0.075)	0.075	0.058	0.069	0.027
HA->GI	0.120	0.158	(0.131)	(0.137)	0.070	0.162	0.197	0.191
FE->GI	0.009	0.010	(0.003)	(0.018)	0.009	0.082	0.003	0.006
SIT->GI	0.000	0.001	(0.001)	(0.002)	0.000	0.011	0.001	0.006
EC->GI	0.019	0.014	(0.013)	(0.015)	0.037	0.017	0.000	0.006
GI->IGD	(0.024)	(0.021)	(0.018)	(0.016)	(0.026)	(0.021)	(0.014)	(0.040)

Moderate effect sizes ($0.150 \leqslant f^2 < 0.350$) were observed for the relationship between HA and GI in the female group, Action Adventure group, Role-Playing group, and Strategy_RS group.

Paths with a low effect size ($0.020 \leqslant f^2 < 0.150$) included the relationship between HM and GI across all subgroups. Additionally, the relationship between HA and GI demonstrated low effect sizes in the male group, CoLa group, MoTa_RS group, and Action group. A low effect size was also observed for the relationship between FE and GI in the Action Adventure group, and between EC and GI in the Action group. The relationship between GI and IGD had low effect sizes in the male group, female group, Action group, Action Adventure group, and Strategy_RS group.

No path in any subgroup demonstrated a large effect size.

4.4.5.5 Coefficient of Determination (R^2)

The results for the coefficient of determination (R^2) are presented in Table 4.19. In all subgroups, the R^2 values for GI were greater than 0.333 but less than 0.670, indicating a moderate level of explanatory power from the independent variables. In contrast, the R^2 values for IGD were considerably lower, suggesting only minimal explanatory power from gameplay intention alone.

Table 4.19 Coefficient of Determination (R^2) Estimates across Moderators

R^2	Male	Female	CoLa	MoTa_RS	ACT	ACA	ROP	STR_RS
GI	0.519	0.568	0.476	0.593	0.536	0.566	0.545	0.553
IGD	0.024	0.020	0.018	0.016	0.026	0.021	0.013	0.039

4.4.5.6 Blindfolding Q^2

The results for predictive relevance (Q^2) are also shown in Table 4.20. All Q^2 values were greater than zero, indicating that the model possessed valid predictive relevance for each corresponding dependent variable across all subgroups.

Table 4.20 Predictive Relevance (Q2) Estimates across Moderator Subgroups

Q^2	Male	Female	CoLa	MoTa_RS	ACT	ACA	ROP	STR_RS
GI	0.342	0.373	0.299	0.385	0.337	0.351	0.350	0.358
IGD	0.012	0.005	0.006	0.006	0.010	0.006	0.005	0.019

The results of the structural analysis for IGD within each subgroup were consistent with those obtained from the overall model. The conceptual model also demonstrated very weak explanatory and predictive power for IGD within the subgroups. The population selected for this study showed generally low observed scores on the IGD items, while reporting higher scores on the exogenous variables, indicating a distributional mismatch. These findings further suggest that large prediction errors were common across the subgroups. Specifically, the model tended to overestimate IGD scores in each subgroup, and higher predicted values were associated with larger errors. Future research should consider a more in-depth examination of the appropriateness of using the IGD scale within specific populations.

Furthermore, it was observed that in both the overall sample and subgroup structural model analyses, the effect size and R^2 value of gameplay intention on IGD were nearly identical. This indicates that the explanatory and predictive

power for IGD in the structural model was derived almost entirely from gameplay intention. The indirect paths from the exogenous variables to IGD contributed little to no explanatory or predictive value. This suggested that the distributional discrepancy between IGD scores and the scores of all other variables led to the failure of the mediation paths. Although strong path effects were observed between the exogenous variables and the mediator, the combined predictions for IGD substantially deviated from the actual observed scores.

4.5 Summary of Hypotheses

The conclusions for all hypotheses tested in this study are summarized in Table 4.21. Based on the results from the preceding sections, the primary path analysis supports H1, H2, H4, H6, H7, H8, and H12. In the mediation analysis, H9 is partially supported and H10 is fully supported. In the moderation analysis, H3a and H5b are accepted. In addition, H7a, H8a, and H11a are accepted only at the conventional p-value level (0.05).

Table 4.21 Summary of Hypothesis Testing Results

Hypothesis of path analysis	**Hypothesis of moderate effect**	**Result**
H1: PE -> GI		Accepted
	H1a: GG	No difference
	H1b: MoTa_RS > CoLa	No difference
	H1c: Female > Male	No difference
H2: EE -> GI		Accepted
	H2a: GG	No difference
	H2b: CoLa > MoTa_RS	No difference
	H2c: Female > Male	No difference
H3: SIF -> GI		Rejected
	H3a: ACT > STR_RS**, ACA > STR_RS*	Accepted
	H3b: MoTa_RS > CoLa	No difference
	H3c: Male > Female	No difference
H4: FC -> GI		Accepted
	H4a: GG	No difference
	H4b: CoLa > MoTa_RS	No difference
H5: PV -> GI		Rejected
	H5a: GG	No difference
	H5b: CoLa > MoTa_RS*	Accepted
	H5c: Female > Male	No difference
H6: HM -> GI		Accepted
	H6a: GG	No difference
H7: HA -> GI		Accepted
	H7a: ACT < ROP*, ACT < STR_RS*	Accepted
	H7c: Female > Male	No difference
H8: FE -> GI		Accepted
	H8a: ACA > ACT*, ACA > ROP*, ACA > STR_RS*	Accepted
	H8c: Female > Male	No difference

Hypothesis of path analysis	Hypothesis of moderate effect	Result
H9: ATT -> PE & EE -> GI		Partial Accepted
H10: SEY -> EE -> GI		Fully Accepted
H11: SIT -> GI		Rejected
	H11a: STR_RS > ACA*	Accepted
	H11c: Female > Male	No difference
H12: EC -> GI		Accepted
	H12a: GG	No difference
	H12c: Male > Female	No difference
H_{13}: GI -> IGD		Accepted

Note: In the moderated effect results, "**" indicates that the hypothesis meets the Šidák's correction p-value threshold. "*" indicates that the hypothesis meets only the conventional p-value threshold.

Chapter 5

Discussion

This chapter discusses the empirical findings of the study in relation to the proposed research model and hypotheses. The discussion is structured around the individual constructs included in the model, examining each hypothesis sequentially. For each construct, the results are interpreted in light of existing literature from information systems and psychological perspectives, with particular attention to their roles in shaping gameplay intention and problematic gaming outcomes. Through this construct-by-construct discussion, the chapter clarifies the theoretical implications of the findings and highlights how the results extend current understanding of hedonic gameplay behavior.

5.1 Introduction

The preceding chapters have outlined the full sequence of data analysis and results, primarily aimed at addressing the four sets of research questions and objectives of this study. This chapter offers a critical discussion that integrates statistical findings with existing literature. It addresses the conclusions drawn from each hypothesis as well as the evaluation of the structural model.

This study is structured around four main sets of research questions and objectives, with corresponding results summarized as follows. The first set examines potential structural extensions of the UTAUT2 model within the gaming context. In the PLS-SEM analysis of the overall sample, three out of the five newly proposed dimensions were found to be statistically meaningful in the extended UTAUT2 framework: flow experience, emotion coping, and self-efficacy. Attitude was not fully mediated by performance expectancy and effort expectancy. Social interaction exhibited only a limited impact on gameplay intention in the overall sample.

The second contribution lies in extending the UTAUT2 model to the field of IGD, by analysing general gaming consumption demands and investigating whether a potential relationship exists with gaming addiction. In the analysis of the overall sample, the conceptual model revealed that performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, habit, flow experience, and emotion coping were all positively associated with gameplay intention and IGD.

However, the explanatory and predictive power of these dimensions for both gameplay intention and IGD was generally weak. Only habit and hedonic motivation demonstrated a meaningful level of explanatory strength. Among the newly proposed dimensions, flow and emotion coping showed slightly better performance than some of the original UTAUT2 constructs, though their effect sizes remained small. These patterns may be partly explained by the characteristics of the sample. The large sample size increased the statistical power, making it easier to detect significance even when the actual effects were weak. In addition, the high digital literacy of Chinese university student gamers likely reduced the influence of utilitarian constructs such as effort expectancy and facilitating conditions, since participants were already familiar with gaming technologies and platforms. Furthermore, the IGD scores in this sample were generally low, creating a distribution gap between IGD and other predictors, which may have further limited the model’s ability to explain IGD outcomes.

The third objective was to examine whether different game genres are associated with distinct patterns of consumer demand. This study applied PLS-MGA to provide targeted guidance for market and policy development based on genre-specific characteristics. The results revealed that in the overall sample, gender did not serve as a significant moderator within the conceptual model. This indicates that male and female university student players showed no substantial differences in gaming consumption patterns.

However, in the media moderator analysis based on random sampling, a statistically significant difference was observed between the Computer/Laptop group and the Mobile Phone/Tablet_RS group in the path from price value to gameplay intention. Participants in the Mobile Phone/Tablet_RS group were more sensitive to the price and value of the game itself and in-game products.

In the game genre moderator analysis, also based on random sampling, only the Action group and the Strategy_RS group showed a statistically significant difference in the effect of social influence on gameplay intention. Additionally, across the constructs of social influence, habit, and flow experience, seven group pairs demonstrated potential differences. Although these differences did not meet the threshold for statistical significance after Šidák correction, they still suggest meaningful directions for future research.

Lastly, this research focused on university students in China as a major gaming consumer group, aiming to explore their potential risk of exposure to IGD in the current market. This study represents the first explicit application of the UTAUT2 model within the university student population. Across a large sample of students, no significant prevalence of IGD was observed. The IGD scale used in this study primarily measured whether participants perceived their gaming behavior as having negative impacts on daily life, work, study, or social relationships. The findings indicated that most university student players scored relatively low on the IGD scale, suggesting that their gaming activities had not caused substantial harm to their daily life.

5.2 Discussion of Each Hypothesis

This section presents a comprehensive discussion of all the hypotheses tested in this study. For each hypothesised path, the results from the overall model are discussed alongside analyses conducted at the subgroup level, enabling a comparative and critical interpretation of the empirical findings across different contexts.

Before examining each hypothesis individually, it is important to clarify how statistical significance and practical impact are interpreted in this study. Across the extended UTAUT2 model, a considerable number of paths to gameplay intention demonstrate statistical significance (p-value < 0.05), indicating theoretical relevance within the conceptual framework, while some exhibit effect sizes with minimal practical impact ($f^2 < 0.02$). These modest effects reflect the influence of contextual factors, characteristics of the sample, and features of the model inherent in the hedonic gameplay setting, where multiple motivational, experiential, and psychological constructs operate simultaneously. Accordingly, the discussion that follows distinguishes between conceptual justification and empirical influence that depends on context, providing a nuanced interpretation of each construct rather than relying solely on statistical significance.

In this discussion, conceptual factors refer to the psychological and behavioral constructs directly incorporated into the research framework to explain gameplay intention and potential IGD-related behavior. In contrast, contextual factors refer to background conditions, such as technology type, user group differences, and geographical location, which provide contextual variation and may influence how the relationships among conceptual factors operate across different gaming settings.

5.2.1 Discussion of Performance Expectancy Factors (H1, H1a, H1b, H1c)

Performance expectancy (PE) is the extent to which using technology in daily life provides benefits for individuals in specific activities (Ramírez-Correa et al., 2019; Venkatesh et al., 2012). If an information technology does not help users achieve their goals or improve their experience with other objects, users will not choose it even when the technology performs well. In this study, PE refers to the degree to which players expect gaming to improve their quality of daily life. Among Chinese

university students, daily life is often centered on study, academic tasks, and campus life rather than work or family responsibilities (Jiang & Qiang, 2021; Q. Liu et al., 2024). This understanding differs from that of general populations.

In the context of Chinese university student gamers, this study proposed that PE can enhance gameplay intention and further influence IGD. It was also assumed that the effect of PE on GI would vary across game genres, media platforms, and gender. However, the statistical results show that PE has a very weak effect on both GI and IGD. All tests of the hypotheses and path estimates are reported in Table 5.1 at the end of the section. Only the direct path from PE to GI is statistically significant; however, both the path coefficient and the effect size are very small. It indicates that the practical impact of PE on GI is negligible. The significant result is likely driven by a large sample and reflects spurious significance (Hair et al., 2017). The statistical signal may overstate the importance of the construct, while its predictive value in this sample is close to zero. Based on the statistical analysis, the influence of performance expectancy on gameplay intention is almost absent.

This study found that earlier research offered mixed views on PE. Some studies argued that PE is not suitable in competitive game contexts, while others confirmed its positive effect on gameplay intention in specific game products (Baabdullah, 2018, 2020; Harborth & Pape, 2017, 2020; Jang & Byon, 2020a; Ong et al., 2023). However, there is still a lack of research that integrates and compares the influence of PE across different game types. For this reason, this study explored diverse moderation effects in order to identify patterns and to evaluate the applicability of PE in hedonic contexts. The findings suggest that the role of PE is highly sensitive to the functional design of information technology. As a construct with a strong utilitarian orientation, PE requires careful distinction of the purposes for which users adopt information technology. When the main purpose is driven by hedonic motivation, the influence of PE tends to be weakened by dimensions of intrinsic motivation.

5.2.1.1 Context Factors

Within the UTAUT2 framework, PE mainly reflects users' expectations of the external benefits gained from using information technology rather than improvements in their ability to operate it (Venkatesh et al., 2003). For users, information technology is a tool to carry out or enhance an activity, and its final

purpose is to support the continuation of that activity rather than to provide experiential value during the process of use. In the context of gaming, however, such expectations often shift toward improvements in the quality of the experience within the technology itself (van der Heijden, 2004). For example, Gosztonyi (2023) and Vahlo & Tuuri (2025) reported that players' aspirations to enhance creativity or productivity are mostly confined within the game environment rather than directed at improving outcomes in real life. The concept of PE in hedonic gaming contexts may therefore require more precise definition of usage purposes. In this sense, the expected improvements should be understood as enhancements related to in-game content or activities rather than other goals such as the task-oriented, job-oriented, or family-oriented activities described by Venkatesh et al. (2003). Supporting this interpretation, Uses and Gratifications Theory has been widely applied to show that gamers' utilitarian gratifications are largely fulfilled through in-game accomplishments rather than through external performance gains (Ghazali et al., 2019; H. Li et al., 2015).

Based on prior studies, this research suggests that games can be categorized according to their usage purposes, specifically whether the product is centered on a life-enhancing function. Games with life-enhancing functions include sport simulation games, puzzle games, social games, serious games, exergames, and educational games, and others (Baabdullah, 2018, 2020; Brown et al., 2021; Goumopoulos et al., 2023; Harborth & Pape, 2017, 2020; Huang et al., 2022; Wittland et al., 2015). In these games, the effect of PE on GI is highly evident. These products can extend social relationships, improve physical health, or build practical skills, and users therefore view performance gains as an important external benefit.

In this study, the game products collected and applied to statistical analysis were mainly mainstream competitive games in the current Chinese market, while games with life-enhancing potential were scarce (He et al., 2024). These kinds of games are mainly perceived as a form of entertainment rather than a tool for enhancing the quality of life, work, or study (Jang & Byon, 2020a; Jiang & Qiang, 2021; Ong et al., 2023; Ramírez-Correa et al., 2019). Jang & Byon (2020a) noted that players' engagement with competitive games is generally driven by intrinsic hedonic experiences, rather than instrumental purposes. Competitive games are driven by winning, instant feedback, and online social atmosphere rather than gains in real life performance (Stavropoulos et al., 2017; Jang & Byon, 2020a; Vahlo & Tuuri, 2025). For this reason, studies based on the ESC model often argue that PE should be removed (Jang & Byon, 2020a; Hattingh et al., 2024).

Based on the purposes of using game products, the findings of this study are consistent with prior research. In the full sample, PE does not provide meaningful explanatory power for gameplay intention. The four mainstream game products among Chinese university students lack life-enhancing functions related to school life. In the media group analyses, neither computer game players nor mobile game players show a significant effect of PE on gameplay intention. These results further suggest the limited general applicability of PE in mainstream games, as users of entertainment technologies pay relatively little attention to performance gains.

On the other hand, although demographic factors were not explicitly included in the literature review, they may help explain why PE appeared so weak in this study. It has been noted that users' purposes in adopting information technology change along with life patterns and contexts as they grow older (Venkatesh et al., 2003). For instance, younger workers tend to value extrinsic outcomes, while female workers may become more focused on family responsibilities with marriage and childbirth (Venkatesh et al., 2003). The Chinese university student gamers in this study are situated in campus life and are in the stage of emerging adulthood, where priorities revolve around academic achievement, peer belonging, and self-exploration (Arnett, 2000; Jiang & Qiang, 2021). These priorities are reflected in the structural features of their school environment, which is typically shaped by academic responsibilities, social networks in campus, and leisure activities (Zhang & Xie, 2008; Margaryan et al., 2011; Thompson, 2013). While speculative, this perspective suggests that performance-related benefits of gaming are not highly valued in this group. Future studies could integrate demographic variables more directly into the theoretical framing to test these possibilities.

5.2.1.2 Conceptual Factors

Van der Heijden (2004) noted in research on hedonic information systems that when the purpose of technology use shifts away from productivity enhancement toward the pursuit of pleasure and satisfaction, traditional utility perceptions lose their dominant role. When users of hedonic technologies engage with them to obtain intrinsic experiences, perceived enjoyment becomes one of the most important outcome expectations (Lowry et al., 2013; M. Ting & Min, 2024; H. Wang & Lee, 2020; Ye et al., 2020). In the application of UTAUT2, studies on mainstream games have often chosen to remove PE from analysis and have

identified the strong influence of HM (Hattingh et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020a, 2020b, 2021; Kesuma & Princes, 2024). In contrast, this study included PE and confirmed across four major game types that HM exerts a strong influence while PE shows only weak effects. By repeatedly verifying the weak impact of PE across different game types and media platforms, this study suggests that instrumental considerations of hedonic technologies are being marginalized by experiential motivations. Future studies may also consider game contexts where hedonic motivation rather than life-enhancing purposes is central, and in UTAUT2 examine HM as a mediating factor between PE and GI to observe its specific intermediary effect (Nurcholis & Miftaqulkismay, 2021).

In the context of gaming research, the integration of flow experience (FE) into the UTAUT2 framework offers a valuable explanation for the weakened direct effect of PE on gameplay intention. Studies in different technological contexts have shown that FE can function as a psychological mediator that translates the perceived usefulness of a game into an immersive experiential state, which in turn drives the intention to continue playing (Y.-M. Chen et al., 2018; Lu et al., 2024; Nurcholis & Miftaqulkismay, 2021; X. Wang et al., 2022). When users perceive a system as useful, they are more likely to experience flow. This suggests that in hedonic systems such as games, FE may explain how usefulness translates into the desire to keep playing, especially when enjoyment outweighs practical value. This study therefore proposes that future research could examine FE as a mediating factor in the relationship between PE and GI to assess how PE-related paths may be influenced.

Finally, the direct positive effect of habit on perceived usefulness has been confirmed in studies across multiple types of information technology (Alsharo et al., 2020; Rafique et al., 2020; W. Xu et al., 2025; Yen & Wu, 2016). Through repeated use, users form habits that allow them to better understand system operations and advantages, which in turn strengthens their perception of usefulness (Yen & Wu, 2016; Alsharo et al., 2020). As usage frequency increases and operations become more automatic, judgments of whether a system is useful may partly shift toward judgments of whether it fits established behavioral habits (Alsharo et al., 2020). This can make the original task-oriented logic through which perceived usefulness promotes intention become weak, so that its explanatory power in the model may be reduced or replaced by habit. This pattern is reflected to some extent in the findings of this study, where the influence of habit on GI was very strong, even exceeding HM. Therefore, when habit is included in the UTAUT2 model, its relationship with PE should be

carefully considered, especially in contexts where users have already developed behavioral habits and the threshold of system use is low.

Table 5.1 Results of Performance Expectancy Hypotheses

No.	Performance Expectancy Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H1	Higher performance expectations will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.041, p-value = 0.019, f^2= 0.002	Statistically significant but with minimal practical impact.
		All	Indirect effect to IGD	β = 0.006, [0.001, 0.011], p-value = 0.025	
H1a	Game genres will moderate the effect of performance expectancy on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		ACT	Direct effect	β = 0.028, p-value = 0.267	
		ACA	Direct effect	β = 0.089, p-value = 0.069	
		ROP	Direct effect	β = 0.044, p-value = 0.242	
		STR_RS	Direct effect	β = 0.034, p-value = 0.214	
H1b	Media will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the mobile group	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		CoLa	Direct effect	β = 0.020, p-value = 0.300	
		MoTa_RS	Direct effect	β = 0.037, p-value = 0.078	
H1c	Gender will moderate the effect of performance expectancy on gameplay intention, such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		Male	Direct effect	β = 0.036, p-value = 0.105	
		Female	Direct effect	β = 0.045, p-value = 0.0501	

5.2.2 Discussion of Effort Expectancy Factors (H2, H2a, H2b, H2c)

Effort expectancy refers to the ease with which consumers can play the game. Games that are easy to play attract new consumers and are adopted more easily, while complex game rules discourage new players and make it more likely that they quit early (Jang & Byon, 2020a). In the context of Chinese student gamers, EE refers to the extent to which university students perceive the game's interface and operations as simple or easy to learn.

All hypothesis tests and path analysis results related to EE are summarized in Table 5.2 at the end of the section. This study found that among all Chinese university student gamer samples, EE had a statistically significant direct effect on GI as well as an indirect effect on IGD. This statistically significant direct path was also observed in some subgroups. However, the relationship between EE and GI showed no notable variation across subgroups.

In terms of effect size, the explanatory power of EE on GI did not reach the threshold of 0.02 in either the full sample or any subgroup. The practical impact of EE among Chinese university student gamers is weak. Beyond the influence of large sample size, this weak effect may also be explained by other factors that reduce the strength of EE and by the generally low sensitivity of this group to the difficulty of games. This study suggests a theoretical limitation in UTAUT2, where EE’s explanatory role is weak in affective or high experience hedonic context.

5.2.2.1 Contextual Factors

Venkatesh et al. (2003) demonstrated in a longitudinal study that the effect of EE tends to weaken among experienced users of information technologies. This finding suggests that as users become more familiar with a system’s interface and operation, the perceived ease of use becomes less critical in shaping their behavioral intentions (Davis, 1989; Karahanna et al., 1999; Szajna, 1996; Venkatesh & Davis, 2000; Venkatesh & Zhang 2010). The diminishing influence of EE over time reflects the skill acquisition process, in which users shift from cognitively processing each operation to executing actions more automatically, thereby reducing the ease-related considerations (Anderson, 1982). Today’s university students in China, as digital natives, have grown up surrounded by digital technology. They generally possess high levels of digital literacy and are proficient in navigating across platforms (Blocksidge & Primeau, 2023; Buzzetto-

Hollywood & Quinn, 2024; Jiang & Qiang, 2021; Liu et al., 2024; Qiao et al., 2021; Zhou et al., 2025). Most members of this group have moved beyond the early cognitive and associative stages. They are already familiar with various interface designs and can quickly adapt to different types of games and rule systems. As a result, the weight of EE in their decision-making naturally declines.

Experience also helps explain the results related to moderation effects. This study found no moderating effect of gender on the relationship between EE and GI. While some previous studies have suggested that gender may play a role, the conceptual model did not support this. For example, empirical research has shown that female players are more likely to feel frustrated by games that require high levels of cognitive effort or complex mechanics, making them more sensitive to ease of use (Denden et al., 2021; Gisbert-Pérez et al., 2024; Ye et al., 2020). Denden et al. (2021) found that women rely more heavily on in-game feedback and show lower participation willingness when faced with unclear goals or complicated controls. Gisbert-Pérez et al. (2024) further noted that females scored lower on challenge motivations, indicating reduced perceived appeal in difficult tasks.

However, in the context of UTAUT2, the moderating role of gender on the EE to GI path appears to be weak. Studies by Jang & Byon (2021) and Harborth & Pape (2017, 2020) found no significant moderating effects of gender on this path, aligning with this study's results. One possible explanation is that the participants in this sample were experienced gamers who had already entered the associative or autonomous stages of skill development (Anderson, 1982; Jang et al., 2021a; Zhou et al., 2025). At this skill level, both male and female gamers have acquired a certain level of digital literacy. Gaming experience may neutralize gender sensitivity in the EE to GI relationship, resulting in similar path effects for both male and female players.

This study also examined whether media platform moderated the relationship between EE and GI. However, no significant difference was found between the two groups. This contrasts with earlier studies that indicated PC gamers tend to be more sensitive to game complexity or usability issues (Adiputra & Arief, 2024; Hattingh et al., 2024; Jang & Byon, 2020a; Kesuma & Princes, 2024). For instance, Jang et al., (2021b) highlighted that PC games often require higher levels of cognitive engagement, faster reaction times, and sustained attention, which could make players more sensitive to changes in usability and task complexity.

Nonetheless, the moderation of media was not observed in this study. One possible reason is that the university student participants, regardless of platform preference, showed similar levels of technological fluency and gaming experience. They have adapted to the core mechanics of both PC and mobile games and have internalized the required skills (Jiang & Qiang, 2021; Jang et al., 2021a; Zhou et al., 2025). These players may have entered the autonomous stage, where their skill of system operations no longer depends on perceived ease of use (Anderson, 1982). As a result, the influence of EE is weakened, and platform-based differences become less relevant due to high overall technical experience.

Lastly, two studies analysed the moderating effects of game genres and found a statistically significant difference in the influence of effort expectancy on gameplay intention between physical enactment games and imagination games (Jang et al., 2021b; Jang & Byon, 2020b). However, the present study did not find a significant group difference in the effect of effort expectancy on gameplay intention between the Strategy_RS group and the Action group, which is inconsistent with their findings.

The physical enactment games in their study primarily consisted of shooter games, which correspond to the Action group in the present research. In their classification, imagination games primarily included Multiplayer Online Battle Arena (MOBA) games and Real-Time Strategy (RTS) games, which correspond to the Strategy group in this study. However, Jang & Byon (2020b) also included some shooter games set in fictional worlds in the imagination game category, whereas in this research, such games were categorized under the Action group based on their gameplay mechanics. This difference in classification standards may help explain the result variation.

This study argues that Jang & Byon (2020b)'s game classification has certain issues, as shooting games with similar gameplay mechanisms appeared in different groups. The only distinction between the imagination games and the physical enactment games lies in that the former are based on fictional game environments while the latter simulate real-world settings. However, both types of shooting games share similarities in terms of action controls, gameplay mechanics, and interface design (Warburton et al., 2023; Xu, 2024). The differences in game classification may be a reason for the variations in research findings.

From a theoretical standpoint, this discrepancy can be understood in light of two systematic issues in game research: the failure to account for multi-dimensional overlap in genre classification and the lack of verifiable data sources for how games are categorized (Starosta et al., 2024). Many classification frameworks in psychological and behavioral game research continue to use rigid, mutually exclusive genre labels that do not reflect the hybrid nature of modern digital games (Vargas-Iglesias, 2020). In such cases, the same game may be labeled differently depending on the subjective judgment of the researcher, which undermines construct validity.

Therefore, the observed misalignment in shooting game classification may not only limit the interpretability of subgroup analyses but also affect the reliability of genre-based effect comparisons. A more robust, feature-based classification system that accounts for gameplay mechanics, player perspective, and interaction intensity would provide stronger validity in capturing gameplay variability across genres.

5.2.2.2 Conceptual Factors

In the conceptual model of this study, EE, similar to PE, may also be influenced by other intrinsic factors. In systems centered on entertainment, the ease of operation and the sense of fun often play a stronger role in determining acceptance than perceived usefulness (van der Heijden, 2004). When players find a game easy to start, they are more likely to focus on the enjoyment derived from it and to experience pleasure through perceptions of difficulty and control (Lowry et al., 2013; Merikivi et al., 2017; Nguyen, 2015). When game design provides an appropriate level of challenge and novelty, players more easily feel enjoyment during interaction, and this perceived enjoyment further strengthens their intention to continue playing (Corcos, 2018; Deterding et al., 2022; Merikivi et al., 2017; Nguyen, 2015). Therefore, in the context of gaming research, the role of EE may be weakened or replaced by perceived enjoyment. Future studies could explore the potential mediating path of hedonic motivation on EE within the UTAUT2 framework.

In addition, earlier studies have shown that in online games, perceived ease of use can indirectly influence attitudes and intentions by enhancing immersion and enjoyment (H. Chen et al., 2017; Hsu & Lu, 2004). When game difficulty matches player skills, players are more likely to enter a state of immersion, which strongly increases their motivation to continue playing (Corcos, 2018; Qin et al., 2010;

Sigailov-Lanfranchi, 2019). Other research has found that when flow and enjoyment are considered together, the effect of perceived ease of use on behavioral intention is almost entirely replaced (Lowry et al., 2013). In this case, HM as an intrinsic motivation becomes the dominant predictor of intention, while the introduction of flow further weakens the independent role of EE. Therefore, when both HM and flow are included in UTAUT2, the predictive power of EE may be weakened or even replaced. In future extensions of the model, flow experience can also serve as an important mediator between EE and intention, making the direct effect of EE less prominent.

Finally, in studies of technology acceptance, habit is often understood as an automated response that develops gradually through repeated use, and this process is closely tied to user experience (Limayem et al., 2007; Ouellette & Wood, 1998; Venkatesh et al., 2012). Habit has been shown to have a strong positive relationship with perceived ease of use. The stronger the habit, the easier users perceive the system to be, which in turn enhances their intention to use it (Alsharo et al., 2020; Rafique et al., 2020; Xu et al., 2025; Yen & Wu, 2016). However, this effect changes in groups that are more experienced or have already formed stable usage habits. As operation experience accumulates, users become more familiar with system operations, behaviors become more automatic, and the cognitive load of difficulty decreases (Alsharo et al., 2020; Limayem et al., 2007). For experienced users, intention is more directly driven by habit rather than by perceived ease of use (Yen & Wu, 2016). In this way, habit partly weakens the predictive role of perceived ease of use in the model, reducing its independent effect on intention. Future research could take user experience level into account and examine habit as a mediating or moderating factor in the relationship between effort expectancy and use intention within the UTAUT2 framework.

Table 5.2 Results of Effort Expectancy Hypotheses

No.	Effort Expectancy Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H2	Higher effort expectancy will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.097, p-value = 0.000, f^2= 0.011	Statistically significant but with minimal practical impact.
		All	Indirect effect to IGD	β = 0.013, [0.008, 0.020], p-value = 0.000	
H2a	Game genres will moderate the effect of effort expectancy on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed; significant direct effect within the subgroup but with minimal practical impact.
		ACT	Direct effect	β = 0.052, p-value = 0.135	
		ACA	Direct effect	β = 0.056, p-value = 0.200	
		ROP	Direct effect	β = 0.035, p-value = 0.319	
		STR_RS	Direct effect	β = 0.131, p-value = 0.005, f^2= 0.019	
H2b	Media will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the computer group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	
		CoLa	Direct effect	β = 0.082, p-value = 0.029, f^2= 0.007	
		MoTa_RS	Direct effect	β = 0.113, p-value = 0.000, f^2= 0.016	
H2c	Gender will moderate the effect of effort expectancy on gameplay intention, such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	
		Male	Direct effect	β = 0.084, p-value = 0.006, f^2= 0.008	
		Female	Direct effect	β = 0.110, p-value = 0.001, f^2= 0.016	

5.2.3 Discussion of Social Influence Factors (H3, H3a, H3b, H3c)

Social influence (SIF) is defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2012, p. 159). Players' intentions and behaviors in using games can be influenced to some extent by others' opinions, peer recommendations, or the need for social recognition (Adiputra & Arief, 2024; Buenaseda et al., 2025). Chinese university students are often influenced by family, friends, gaming communities, dorm mates, and livestream trends, which help shape their ideas about what games are fun or socially accepted (Cao et al., 2025; Jiang & Qiang, 2021; H. Zhang & Xie, 2008).

All hypothesis tests and path analysis results related to SIF are summarized in Table 5.3 at the end of the section. In the relationship between SIF and GI, statistically significant direct and moderating effects were found only within specific game genre subgroups and subgroup comparisons. No significant or effective path was identified in the full sample. The absence of social influence effects suggests that communal or normative pressures may not operate in the same way in hedonic systems, particularly among experienced users with strong autonomy. This highlights a contextual boundary in the predictive scope of UTAUT2.

5.2.3.1 Gender Factors

Although gender has often been hypothesized as a significant moderator of the relationship between SIF and GI, findings across studies remain inconsistent. For instance, both this study on Chinese university student gamers and Harborth and Pape's (2017, 2020) study on German Pokémon Go players reported no significant moderating effect of gender. In contrast, research conducted in the United States with eSports players found a significant gender-based moderation, where male players appeared more susceptible to social influence when forming gameplay intentions (Jang & Byon, 2021).

Venkatesh & Zhang (2010) incorporated Hofstede's cultural dimensions theory into UTAUT to conduct cross-cultural research and examined differences in technology user behaviors between China and the United States. The individualism-collectivism dimension of Hofstede provides a key explanation for the contrast in information technology user behaviors between the two countries (Hofstede, 2001; Komisarof & Akaliyski, 2025; Markus & Kitayama, 1991;

Venkatesh & Zhang, 2010; C. Zhang & Jiang, 2024). Individuals are gradually influenced by culturally shaped gender behavior patterns from an early age (Markus & Kitayama, 1991). In the individualistic culture of the United States, male players tend to pursue competitiveness and social status through gaming, and are thus more likely to form a sense of identity based on whether others recognize their gameplay behavior (L. S. Davis & Williamson, 2019; Hartmann & Klimmt, 2006; Venkatesh & Zhang, 2010).

In contrast, among Chinese university students in a collectivist cultural context, behavioral patterns between male and female players have gradually become more similar (De La Hera et al., 2024; Tang et al., 2025; Venkatesh & Zhang, 2010; Z. Wang et al., 2023). The widespread availability of digital education, diverse platform gaming experiences, and the strengthening of gender equality values have contributed to a more unified enhancement of digital literacy among Chinese university students, which in turn shapes their motivations for game choice and usage intention (De La Hera et al., 2024; Jiang & Qiang, 2021; Margaryan et al., 2011; Tang et al., 2025; Z. Wang et al., 2023). This circumstance has weakened the moderating role of gender in the relationship between SIF and GI.

In addition, according to Emerging Adulthood Theory, university students are in an important stage of exploring their identity and developing their social roles (Arnett, 2000). During this period, their behavior is more likely to be shaped by personal choices rather than the opinions of others (Koivisto & Hamari, 2014; Lucas & Sherry, 2004; H. Zhang & Xie, 2008). Forming usage intentions based on one's own judgement and preferences leaves less room for gender to play a meaningful role. It also helps explain why SIF does not show a significant effect on GI among either group in the Chinese university context.

5.2.3.2 Media Factors

This study found no moderating effect of media on the relationship between SIF and GI. Whether players use personal computers or mobile devices, SIF showed little impact on their intention to play. Venkatesh et al. (2003) noted that the impact of social pressure tends to decline as users gain more experience, with system use intentions becoming grounded in functional rather than social reasoning. Today’s university students have grown up in an environment filled with digital technology (Jiang & Qiang, 2021; Qiao et al., 2021). They have used digital products across many types of platforms and can now handle

technological operations in a highly automatic manner (Anderson, 1982; De La Hera et al., 2024; Jiang & Qiang, 2021; Tóth et al., 2022; Zhou et al., 2025). At this point, players are already familiar with interfaces, operating rules, and interaction patterns across platforms. As a result, the platform they use is no longer a meaningful obstacle or learning challenge. Players show little concern about whether a game is easy to operate or whether it receives approval from others.

In addition, although to the best of current knowledge there has been no direct research on the relationship between habit and related dimensions of social influence, the automated and autonomous behavioral patterns represented by habit imply an experiential state that may weaken the impact of social influence (Limayem et al., 2007; Ouellette & Wood, 1998; Venkatesh et al., 2012). In the context of this study, Chinese university student gamers already show a certain strength of gaming habit ($f^2_{HA_CoLa}$=0.131, $f^2_{HA_MoTa_RS}$=0.137), which reflects established gaming experience. Their gaming behavior is therefore less influenced by the opinions of others. This may directly reduce the effect of SIF on GI and help explain why the moderating role of gaming device did not yield meaningful differences.

5.2.3.3 Game Genres Factors

This study found that the relationship between SIF and GI exhibited a statistically significant group difference under the moderating effect of game genres. Specifically, players of strategy games and action games showed notably different behavioral patterns in response to others' opinions and societal expectations. Among the Strategy_RS group, the effect of SIF on GI showed a significantly negative trend. For these players, the more they perceived that others did not want them to play games, the stronger their intention to play became.

One possible explanation is that Strategy games are generally regarded as cognitively demanding and time-consuming. Players are required to invest considerable time and cognitive resources in order to perform complex strategic thinking and in-game operations (Chai & Liu, 2021; Hallmann & Giel, 2018; Z. Li et al., 2004; Vinyals et al., 2019). For the people around these players, such as family members, classmates, or friends, this kind of gameplay is often not positively perceived. It is sometimes seen as a waste of time or as something that interferes with academic performance or career development (Yi, 2018).

Therefore, SIF and external evaluations are more likely to discourage GI in this group.

When players experience external pressure that conflicts with their internal motivation, this dissonance may lead to psychological reactance (Jang et al., 2021b; Quick & Kim, 2009). Rather than complying with others' expectations, players may develop a stronger desire to assert their autonomy through continued or increased engagement with games. This resistance to social pressure may explain the negative relationship between SIF and GI observed in the strategy game group.

In contrast, action games place fewer demands on players' time and have a relatively limited impact on their daily lives. These games typically offer a high degree of flexibility, allowing players to pause or exit at any point without significantly disrupting overall game progress or the experience of other players. This design lowers the time commitment required for gameplay and reduces interference with real-life routines (Alexandrovsky et al., 2024; Alsheail et al., 2023). Consequently, the players' social environments tend to view action gaming more positively or with greater acceptance. When players feel encouragement or approval from others, they are more likely to increase their motivation to play (Adiputra & Arief, 2024; Ong et al., 2023). This suggests that, in the context of action games, social expectations and players' internal motivations often align, and positive external feedback reinforces the intention to engage in gameplay.

Further analysis reveals that although the path coefficients from social influence to gameplay intention reach statistical significance in certain subgroups, the effect sizes across the overall sample and all subgroups remain small. This indicates that the actual explanatory power of SIF is weak. It also highlights the distinction between statistical significance and effect size. Especially in large samples, small effects may still appear statistically significant (Hair et al., 2017). From a theoretical perspective, however, effect size more accurately reflects the practical influence of a variable and its contribution to the model (Lakens, 2013; Schuele & Justice, 2006). Therefore, this study concludes that SIF has limited explanatory power in the current context. Its observed significance in a few subgroups is likely due to specific sample characteristics or local conditions, rather than reflecting a generalizable or robust effect.

Table 5.3 Results of Social Influence Hypotheses

No.	Social Influence Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H3	Higher social influence will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.008, p-value = 0.340,	Rejected
		All	Indirect effect to IGD	β = 0.001, [-0.004, 0.006], p-value = 0.344	
H3a	Game genres will moderate the effect of social influence on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	$diff_{ACT\text{-}STR_RS}$ = 0.230, Šidák's p-value = 0.000; $diff_{ACA\text{-}STR_RS}$ = 0.137, Conventional p-value=0.039	Moderation observed; significant direct effect within the subgroup, but with minimal practical impact.
		ACT	Direct effect	β = 0.122, p-value = 0.006, f^2= 0.019	
		ACA	Direct effect	β = 0.029, p-value = 0.300	
		ROP	Direct effect	β = 0.014, p-value = 0.416	
		STR_RS	Direct effect	β = -0.108, p-value = 0.003, f^2= 0.016	
H3b	Media will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the mobile group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed
		CoLa	Direct effect	β = 0.036, p-value = 0.196	
		MoTa_RS	Direct effect	β = 0.034, p-value = 0.103	
H3c	Gender will moderate the effect of social influence on gameplay intention, such that the effect will be stronger in the male group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed
		Male	Direct effect	β = 0.016, p-value = 0.310	
		Female	Direct effect	β = 0.0003, p-value = 0.496	

5.2.4 Discussion of Facilitating Conditions Factors (H4, H4a, H4b)

Facilitating conditions (FC) is defined as users' perceptions of the resources and support available for playing games (Lee & Tsai, 2010; Venkatesh et al., 2012). For Chinese university student gamers, FC refers to the configuration of the computer or mobile device and the player's knowledge of gaming skills.

The statistical results related to FC are summarized in Table 5.4 at the end of the section. In the path relationship between FC and GI, no meaningful significant effects were found in either the full sample or any of the subgroup sample. Although some subgroup path coefficients reached statistical significance, their effect sizes were extremely weak, indicating that the explanatory power of FC for GI was negligible. This phenomenon can also be observed by comparing the path coefficients, p-values, and effect size values across the full sample group (n_{All} = 1883), the MoTa_RS group (n_{MoTa_RS} = 944), and the CoLa group (n_{CoLa} = 576). As the sample size increases, the path coefficients, p-values, and effect size values all show a declining trend. This does not match the expected pattern for valid significant paths, where smaller coefficients should be accompanied by larger p-values. This further reflects the existence of spurious significance in the path between FC and GI.

The negligible role of FC supports the idea that infrastructure or technical readiness plays a reduced role in hedonic digital use. UTAUT2's original inclusion of FC may therefore be more applicable to early adoption or utilitarian systems rather than leisure technologies like games.

5.2.4.1 Contextual Factors

The findings of this study on the path between FC and GI are consistent with previous research, which has shown that among experienced gamer groups, the explanatory power of FC is generally weak (Brigido et al., 2019; Gupta et al., 2024; Ramírez-Correa et al., 2019). For users who are new to a particular game or platform, however, FC may still provide some guidance (Baabdullah, 2018, 2020). This pattern is supported by the moderating role of usage experience in the UTAUT model (Venkatesh et al., 2003, 2012). Skill Acquisition Theory further supports this interpretation (Anderson, 1982). As skill levels improve, users' mastery of operational processes becomes more automated, and their reliance on external material resources and knowledge support naturally decreases.

Chinese university students, as typical digital natives, have long been immersed in educational and social environments where technology is highly prevalent. They already possess solid foundations in device operation, network configuration, and cross-platform capability (Agárdi & Alt, 2024; Lin et al., 2022; L. Wang & Liu, 2021). This makes their perception and response to FC in gaming relatively insensitive, which helps explain the lack of significant FC effects observed in this study.

In addition, FC may also be influenced by regional economic characteristics. Jang & Byon (2020a), when designing the ESC model, assumed that gamers generally possess sufficient material support and technical capability. Hattingh et al. (2024) applied the ESC model to Generation Y in South Africa to analyse motivations for gaming intention. Unlike other studies using the ESC model, their research explicitly considered structural constraints in South Africa's economic development, including the scarcity of resources for university students in device configuration, network access, and information technology education (Ajani, 2025; Miah, 2024; Mkhonto & Mubangizi, 2024). For this reason, FC was reintroduced into the analysis. When economic conditions in a country or region are less favorable, reliance on and sensitivity to technological infrastructure become significantly higher, especially for young users in higher education (Korkmaz et al., 2022; Miah, 2024; van de Werfhorst et al., 2022).

The sample of this study consisted mainly of Chinese university student gamers, whose information literacy is already secured by social and economic conditions (Lin et al., 2022; L. Wang & Liu, 2021). When Jang & Byon (2020a) first designed the ESC model with American gamers as the sample group, they argued that the FC construct in UTAUT2 could be omitted. In the social and economic context of the United States, access to gaming devices and knowledge is relatively easy and does not create significant pressure (Jang & Byon, 2020a; Jenny et al., 2017). To some extent, technology users in China and the United States share similar environments of access and social resources (Venkatesh & Zhang, 2010). It can therefore be inferred that the influence of FC is geographically dependent. In regions where resources are widespread and digital education environments are well developed, FC is more likely to be internalized as a default condition and is less likely to play a predictive role in behavioral decision-making.

5.2.4.2 Conceptual Factors

Venkatesh et al. (2012) emphasized that the role of FC should always be

examined with attention to the adoption stage of information technology users, which usually includes adoption, initial use, and post-adoption. Post-adoption generally involves a certain level of usage experience. The relationship between FC and GI is highly sensitive to the level of user experience and may also be disturbed by the habit dimension (Venkatesh et al., 2012). The findings of this study are consistent with the theoretical expectation of Venkatesh et al. (2012). Groups with high habit levels generally also have high levels of experience, which reduces their need for external material and knowledge support. Although no studies have yet been found that directly examine the relationship between habit and FC, future research could explore this potential path.

In addition, studies in the automobile market and higher education sectors have examined the relationships of FC with PE, EE, and SIF (Acheampong & Cugurullo, 2019; Bervell & Umar, 2017; Nordhoff et al., 2020). Most of these studies focused on new or potential technology users, where FC and related utilitarian factors were shown to exert significant influence on one another in the absence of prior experience. Venkatesh et al. (2003) also noted at the early stage of UTAUT that the influence of FC on GI would be fully mediated by PE and EE. However, it should be noted that the FC measurement items used in these three studies were not fully consistent with those in Venkatesh et al. (2003) and Venkatesh et al. (2012), which may limit the generalizability of their results.

This study found that as usage experience accumulates, the effects of PE, EE, and SIF on intention become significantly weaker. Post-adoption generally involves a certain level of usage experience, and in such groups users rely more on habitual behavior and intrinsic motivation rather than external support or utilitarian evaluations. It can be inferred that the role of FC also declines in these groups, gradually losing its position as a key predictor. At the same time, the interactions among these utilitarian dimensions also weaken, with FC, PE, EE, and SIF no longer showing significant interrelations in high-experience groups. Nevertheless, PE, EE, and SIF remain important in low-experience or novice user groups. This highlights the need for future research on UTAUT2 to distinguish user experience levels in order to better understand how FC and other utilitarian factors operate at different stages.

Table 5.4 Results of Facilitating Conditions Hypotheses

No.	Facilitating Conditions Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H4	Higher facilitating conditions will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.054, p-value = 0.016, f^2= 0.003	Statistically significant but with minimal practical impact.
		All	Indirect effect to IGD	β = 0.007, [0.002, 0.014], p-value = 0.020	
H4a	Game genres will moderate the effect of facilitating conditions on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		ACT	Direct effect	β = 0.027, p-value = 0.315,	
		ACA	Direct effect	β = 0.042, p-value = 0.248	
		ROP	Direct effect	β = 0.063, p-value = 0.192	
		STR_RS	Direct effect	β = 0.028, p-value = 0.303	
H4b	Media will moderate the effect of facilitating conditions on gameplay intention, such that the effect will be stronger in the computer group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed;
		CoLa	Direct effect	β = 0.070, p-value = 0.098, f^2= 0.005	significant direct effect within the subgroup, but with minimal practical impact.
		MoTa_RS	Direct effect	β = 0.059, p-value = 0.029, f^2= 0.005	

5.2.5 Discussion of Price Value Factors (H5, H5a, H5b, H5c)

Price value (PV) is defined as “consumers’ cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them” (Venkatesh et al., 2012, p. 161). In gaming, this refers to whether the benefits gained from paying for access to a game or purchasing in-game products exceed the cost of consumption (Jang & Byon, 2020a). In the path relationship between PV and GI, this study found a statistically significant effect only in the MoTa_RS group, which showed a negative correlation, but the result was not supported by a meaningful effect size. In addition, a significant group difference was observed between the CoLa group and the MoTa_RS group. The statistical results related to PV are summarized in Table 5.5.

This study found that in the formation of gameplay intention, the influence of PV is not as stable and significant as in traditional utilitarian technologies. Instead, PV in gaming contexts shows clear contextual dependence. Its impact is mainly shaped by three mechanisms: platform pricing strategies, players’ emotional responses, and users’ habitual behavior patterns. This study explored these aspects to uncover the psychological mechanisms and usage patterns behind them. Together, these factors reshape the role of PV within the UTAUT2 framework, making its effect on gameplay intention less stable and more dependent on the platform.

5.2.5.1 Contextual Factors

Although both computer and mobile games mainly adopt the freemium model, their revenue mechanisms differ in essential ways. In PC games, paid content is usually optional or designed to enhance the experience rather than to advance progress, so it does not disrupt the continuity or completeness of the core gameplay (Hattingh et al., 2024; Jang & Byon, 2020a). Examples include cosmetic items, skins, extra costumes, extended maps, or story packs. Such payments serve to enrich the experience rather than act as tickets to core content. Mobile freemium games often operate on a model where entry is free but progress depends on continuous payments, creating artificial barriers that push players toward frequent small transactions (Baabdullah, 2018, 2020; Syvertsen et al., 2022). Common features include microtransactions, time limits, or paid shortcuts. These designs may cause players to feel a mismatch between their progress and the pricing system, which can trigger negative emotions of being

manipulated or perceiving poor value (Boghe et al., 2020; Lee et al., 2025; Niknejad et al., 2024).

The negative direct effect of PV on GI in the mobile group may result from pricing strategies in mobile games that trigger perceptions of unfairness and emotional backlash (Chapuis, 2012; Malc et al., 2021). Studies have shown that such emotional responses can weaken players' willingness to remain engaged, even when the game content itself has entertainment value (Boghe et al., 2020; Malc et al., 2021). The findings of this study also suggest that the emotional cost of pricing mechanisms can be activated in mobile games and may suppress gameplay intention.

5.2.5.2 Conceptual Factors

In digital gaming environments centered on entertainment, consumer perceptions of price may not primarily come from monetary returns or economic utility, but rather from the emotional satisfaction, immersive experience, and social value gained through using or purchasing game products (Jang et al., 2021a; Rita et al., 2024; Yoo, 2015). In making consumption decisions, players often focus on whether the game brings enjoyment, whether it allows play with friends, or whether it provides sufficient immersion. When emotional satisfaction is high, players show greater tolerance toward pricing mechanisms and may even interpret payment as part of the gaming experience rather than a simple monetary exchange (Lee et al., 2025; Yoo, 2015). PV in games is therefore better understood as subjective experiential value created through spending, rather than as a rational cost assessment, with its monetary dimension significantly weakened. This unique value structure may cause perceptions of PV to be dispersed across other dimensions in UTAUT2, such as social factors, HM, and FE (Rita et al., 2024; C.-I. Teng, 2018; T. Wu et al., 2025; Yoo, 2015).

In addition, high levels of habit weaken players' sensitivity to price value. Habit can directly predict use behavior and intention, as frequent users shift from rational evaluation to automated behavioral patterns (Liao et al., 2020). When gaming becomes part of daily life, behavioral decisions are no longer based on calculations of price, convenience, or utility, but instead occur naturally along established habit pathways (Liao et al., 2020). This mechanism reduces the influence of PV on GI, especially in user groups with high usage experience and behavioral automaticity, where this path is often not significant (Jang et al., 2021a).

Overall, the explanatory power of PV in gaming environments is limited, as its performance is strongly shaped by players' psychological structures and platform mechanisms. Future research could examine dimensions that capture players' emotions as potential mediators between PV and intention, offering a more detailed explanation of the mechanisms behind PV. Another direction is to build layered models across different platforms to distinguish the heterogeneous effects of compulsory versus voluntary payment mechanisms in freemium strategies. In addition, usage frequency and habitual behavior could be introduced as moderating variables in an extended UTAUT2 framework to better reflect the actual decision-making processes of users in gaming contexts.

Table 5.5 Results of Price Value Hypotheses

No.	Price Value Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H5	Higher price value will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = -0.003, p-value = 0.436	Rejected.
		All	Indirect effect to IGD	β = -0.0004, [-0.005, 0.004], p-value = 0.437	
H5a	Game genres will moderate the effect of price value on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		ACT	Direct effect	β = 0.038, p-value = 0.189	
		ACA	Direct effect	β = -0.056, p-value = 0.149	
		ROP	Direct effect	β = -0.025, p-value = 0.342	
		STR_RS	Direct effect	β = 0.046, p-value = 0.147	
H5b	Media will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the computer group.	1 pair among 2 subgroups	Moderate effect	diff = 0.078, Conventional p-value=0.041	Moderation observed; significant direct effect within the subgroup, but with minimal practical impact.
		CoLa	Direct effect	β = 0.036, p-value = 0.189	
		MoTa_RS	Direct effect	β = -0.041, p-value = 0.045, f^2= 0.003	
H5c	Gender will moderate the effect of price value on gameplay intention, such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		Male	Direct effect	β = -0.0003, p-value = 0.497	
		Female	Direct effect	β = -0.001, p-value = 0.482	

5.2.6 Discussion of Hedonic Motivation Factors (H6, H6a)

Hedonic motivation (HM) refers to "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012, p. 161). Using consumption technologies allows users to experience pleasure, relaxation, and satisfaction. The more people anticipate pleasure from a consumption technology before using it, the more likely they are to adopt it to meet their leisure requirements.

In this study, HM showed a significant positive influence on GI across all the subgroups of university student gamers and also had an indirect positive effect on IGD. In every group, the effect size of HM on GI exceeded 0.02, indicating a small but meaningful explanatory power. No moderation effect was observed across game genres. All statistical results are presented in Table 5.6.

The findings of this study further confirm the stability of HM as a key driving factor in hedonic technology acceptance contexts. This result is consistent with previous literature, in which numerous studies applying the UTAUT2 model to gaming behavior have identified HM as one of the core predictors of GI (Gupta et al., 2024; Jang et al., 2021a, 2021b; Jang & Byon, 2020a; Kesuma & Princes, 2024; Ong et al., 2023). Moreover, HM has demonstrated a consistently stable influence on GI across different moderator conditions (Jang et al., 2021a, 2021b). These results once again highlight the critical role of enjoyable experiences in shaping users' behavioral intentions within entertainment-driven usage scenarios.

However, this study found that in hedonic technology contexts such as gaming, HM is not only an important predictor of behavioral intention but also shows structural interference or psychological substitution effects on other utilitarian constructs in UTAUT2. When players base their intention to play on enjoyment or immersion, concerns with usefulness, ease of use, or price value become relatively marginal (Lowry et al., 2013; Rita et al., 2024; van der Heijden, 2004; Ye et al., 2020; Yoo, 2015). Specifically, functional benefits in games are no longer defined mainly as efficiency gains or problem-solving, but rather as emotional relaxation, fun, or social entertainment (Ghazali et al., 2019; Gosztonyi, 2023; H. Li et al., 2015; Vahlo & Tuuri, 2025). When the expected performance of a game itself equals the experience of enjoyment, HM essentially absorbs or replaces the outcome expectations measured by PE.

Similarly, the role of EE in assessing ease of use is often weakened by enjoyment in gaming contexts, where operational barriers are not perceived as obstacles and moderate challenges can even enhance enjoyment (Corcos, 2018; Deterding

et al., 2022; Merikivi et al., 2017; Nguyen, 2015). As a result, the meaning and explanatory power of EE are easily weakened by HM in immersive contexts focused on enjoyment.

PV faces a similar form of structural weakening. In utilitarian technologies, price value is a key dimension of rational evaluation, but in games the value assessment is shaped more by emotional judgments (Jang et al., 2021a; Rita et al., 2024; Yoo, 2015). Thus, PV as an economically rational dimension often loses central importance under the strong influence of HM and may even be replaced by players' emotional responses and subjective sense of value (Lee et al., 2025; Yoo, 2015).

In summary, HM in gaming contexts is not only an essential intrinsic motivational factor in UTAUT2, but its strong influence may also cause psychological transfer or structural marginalization of several original dimensions in the model. Future extensions of UTAUT2 should take into account the structural reshaping role of HM, shifting the perspective from a single path predictor toward recognizing its central position as a core psychological mechanism.

Table 5.6 Results of Hedonic Motivation Hypotheses

No.	Hedonic Motivation Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H6	Higher hedonic motivation will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.208, p-value = 0.000, f^2=0.051	Accepted.
		All	Indirect effect to IGD	β = 0.029, [0.022, 0.038], p-value = 0.000	
H6a	Game genres will moderate the effect of hedonic motivation on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		ACT	Direct effect	β = 0.253, p-value = 0.000, f^2=0.075	Significant direct effect within all the subgroup, with low level practical impact.
		ACA	Direct effect	β = 0.209, p-value = 0.002, f^2=0.058	
		ROP	Direct effect	β = 0.262, p-value = 0.001, f^2=0.069	
		STR_RS	Direct effect	β = 0.153, p-value = 0.005, f^2=0.027	

5.2.7 Discussion of Habit Factors (H7, H7a, H7c)

Habit (HA) is defined as “the extent to which people tend to perform behaviors automatically because of learning” (Venkatesh et al., 2012, p. 161). When individuals use technology, their behavior can become spontaneous and automatic after repeated exposure and experience.

All statistical results are presented in Table 5.7. Similar to hedonic motivation, habit showed a significant positive effect on gameplay intention across all the sample groups within the university student gamer population. It also had an indirect positive effect on internet gaming disorder. Moreover, in all sample groups, the effect size of the path from HA to GI exceeded 0.02. In the female group, Action Adventure group, Role-Playing group, and Strategy_RS group, the effect size was greater than 0.150, indicating a medium effect. Additionally, in the analysis of the moderating effect of game genres, this study identified a potential tendency suggesting that GI in the Action group may be less influenced by habitual behavior compared to other game genres subgroups. However, no statistically significant group differences were detected under the Šidák’s adjustment. The dominance of habit over other constructs indicates that in systems with frequent or repetitive use such as games, the role of conscious intention in the UTAUT2 framework becomes less prominent.

5.2.7.1 Contextual Factors

In theoretical studies of information system use, habit is generally viewed as an automated behavioral tendency that develops through long-term interaction. Such behavior is often characterized as non-rational, involving low cognitive engagement, and is frequently triggered without deliberate thought (Limayem et al., 2007; Ouellette & Wood, 1998; Venkatesh et al., 2012). The concept of experience is closely related to habit. Venkatesh et al. (2012) noted that although habit and experience are closely connected in their formation mechanisms, they are not identical. Experience is a prerequisite for the development of habit, but it does not necessarily lead to habitual use. Even when users are exposed to a technology over the same period of time, differences in usage frequency and depth of interaction can result in varying levels of habit formation.

Therefore, in empirical research, the level of habit is often understood as an external expression of user experience and proficiency. Limayem et al. (2007), in a study on information system use, noted that when systems are used more

frequently and their functions are more fully explored, users are more likely to develop stable usage habits. Such habitual behavior reflects both the accumulation of experience and the characteristics of automation. Jang et al., (2021a), in a study of esports players, used weekly game time as a criterion for grouping by experience and found that the structural model of behavioral intention differed significantly between groups with high experience and groups with low experience, with certain social and content-related paths losing significance. From this perspective, habit can be considered as an indicator for distinguishing user behavior levels and can help researchers identify differences in behavioral patterns across user groups. In states of high experience or strong habit, behavior is more likely to be driven by intrinsic motivation and automated pathways rather than rational evaluations (Ouellette & Wood, 1998; Venkatesh et al., 2003; Yen & Wu, 2016). Once behavior becomes automatic, individuals gradually reduce their reliance on intention and related cognitive beliefs, with behavioral performance reflecting automated responses rather than planned assessments.

Therefore, within the research framework of gaming technology acceptance, habit can reflect not only the strength of behavioral pathways but also the experiential background of users. When the level of habit is high, behavior often shows a strong degree of automation, and the influence of utilitarian constructs originally built on rational evaluation may become relatively weaker in shaping behavioral intention. In this context, habit should not only be regarded as a predictor of behavior but also as an important theoretical dimension for constructing user contexts and explaining individual differences.

This study conducted multiple-group comparisons on the path between habit and gameplay intention across different game types. Although several group comparisons reached conventional significance at the level of p-value < 0.05, no statistically significant differences remained after the Šidák correction for multiple comparisons. Nevertheless, the trends in path coefficients still provide insights into how habit may operate differently across game types.

It is particularly noteworthy that in the Action game group, the path coefficient of habit on gameplay intention was relatively low. This phenomenon may be closely related to the interactive features of Action games. These games usually emphasize instant reactions, short-term decisions, and operational challenges, where player behavior is more strongly driven by immediate task goals and environmental signals (Jang et al., 2021b; Jang & Byon, 2020b; Qin et al., 2010). Compared with game types that require extended strategic planning or deep

exploration, actions in Action games rely more on judgments made in real-time rather than on automated patterns formed through past experience. As a result, players in this type of game may be more inclined to react in the moment rather than repeat behaviors along familiar pathways, which in theory may reduce the explanatory power of habit for gameplay intention.

This trend suggests that although game type did not show a statistically significant moderating effect on the construct of habit, differences in task structure and interaction pace may influence the mechanism of habit at the behavioral and psychological level. Future research could further examine whether behavioral complexity, cognitive load, and stimulus response patterns in gaming contexts serve as boundary conditions in the relationship between habit and behavioral intention. This would not only deepen the understanding of how the UTAUT2 model adapts to gaming contexts but also help explain why user behavior in some game types is more likely to be driven by immediate motivation rather than by habitual response.

5.2.7.2 Conceptual Factors

In the structure of UTAUT2, utilitarian constructs are considered key factors influencing use intention (Venkatesh et al., 2012). However, as users gain more experience with a technology, their behavior may begin to shift away from being guided by conscious intention and instead follow patterns shaped by repetition and automatic response (Ouellette & Wood, 1998; Venkatesh et al., 2003; Zhai et al., 2020). Limayem et al. (2007) further pointed out that once behavior becomes habitual, its automatic nature significantly reduces the role of intention in predicting use. This suggests that at high levels of habit, individuals may no longer rely on utilitarian evaluations and may continue using the system based on conditioned behavioral patterns (Jang et al., 2021a). Yen & Wu (2016), in a study on mobile financial services, found that stronger habit not only directly influences use intention but also enhances users' perceptions of usefulness and ease of use, thereby reducing their reliance on external support or complexity assessment. This mechanism is also reflected in Rafique et al. (2020), which showed that once habit is formed in the use of mobile library applications, it becomes the dominant factor in behavior, while the influence of system quality on usefulness and ease of use becomes weaker. Therefore, the formation of habit not only leads to automated behavior but may also reduce or replace the explanatory power of other constructs in the UTAUT2 model. This trend is especially evident in contexts such as gaming, where usage is frequent and

immersive, suggesting that future model extensions should pay closer attention to the dynamic influence of habit on other dimensions.

Table 5.7 Results of Habit Hypotheses

No.	Habit Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H7	Higher habit will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.360, p-value = 0.000, f^2=0.142	Accepted.
		All	Indirect effect to IGD	β = 0.050, [0.039, 0.065], p-value = 0.000	
H7a	Game genres will moderate the effect of habit on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	$diff_{ACT-ROP}$ = -0.217, Conventional p-value= 0.024; $diff_{ACT-STR_RS}$ = -0.193, Conventional p-value=0.013	Moderation not observed. Significant direct effect within all the subgroup, with low level and moderate level practical impact.
		ACT	Direct effect	β = 0.245, p-value = 0.000, f^2=0.070	
		ACA	Direct effect	β = 0.358, p-value = 0.000, f^2=0.162	
		ROP	Direct effect	β = 0.462, p-value = 0.000, f^2=0.197	
		STR_RS	Direct effect	β = 0.438, p-value = 0.000, f^2=0.191	
H7c	Gender will moderate the effect of habit on gameplay intention, s such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		Male	Direct effect	β = 0.337, p-value = 0.000, f^2=0.120	Significant direct effect within all the subgroup, with low level and moderate level practical impact.
		Female	Direct effect	β = 0.375, p-value = 0.000, f^2=0.158	

5.2.8 Discussion of Flow Experience Factors (H8, H8a, H8c)

Flow experience (FE) is defined as the extent to which an individual is fully immersed or absorbed in the virtual world of a game (Jang & Byon, 2020a). This study follows the ESC framework, focusing solely on immersion as a key aspect of FE. All statistical results related to FE are presented in Table 5.8.

In this study, FE showed a statistically significant positive effect on GI in the overall sample as well as in most game genre subgroups. FE also exhibited an indirect effect on IGD through its influence on GI. However, across all groups, the effect sizes of the path from FE to GI were very low, indicating limited practical explanatory power. The only exception was found in the Action Adventure group, where the influence of FE on GI was relatively stronger (β = 0.243, p-value = 0.000, f^2 = 0.082), representing a small-level effect size. This group also demonstrated consistently higher path coefficients between FE and GI compared to the other three game genre groups, though the differences reached significance only under the conventional threshold of p-value < 0.05. FE contributes to intention in certain game types, but its influence is conditional. UTAUT2 may benefit from incorporating experiential constructs that reflect immersive emotional states.

5.2.8.1 Contextual Factors

The differentiated effect of FE on GI across game genres can be explained by two contextual factors: task structure and interaction mode. First, action adventure games often offer structured gameplay built around a story, with gradually increasing difficulty and clearly defined objectives for the player (Z. Liu, 2024; Meakin, 2024). These structural elements align closely with the psychological conditions required to induce flow, such as a balanced relationship between challenge and skill and the presence of clearly defined goals (Durcan et al., 2024; Larche & Dixon, 2020). In contrast, fast-paced action or strategy games tend to involve rapid feedback cycles and external competition, which can disrupt immersive psychological states and reduce the likelihood of maintaining a stable flow experience (Durcan et al., 2024; Hamari et al., 2016; Laconi et al., 2017; Park et al., 2016).

Second, the mode of player engagement also varies significantly between game genres. Action adventure games usually keep players mentally engaged for a longer time because they need to follow the story, explore the game world, and

complete tasks step by step. These features help players feel more emotionally involved and enjoy the game more deeply (Junnila, 2025; Vahlo & Tuuri, 2025). In contrast, action games focus more on quick actions and fast reactions. Players have to constantly respond to changing situations, which creates short periods of intense focus. This kind of fast and reactive gameplay can be exciting, but it does not easily lead to a deep and lasting sense of immersion (Durcan et al., 2024; Laconi et al., 2017). These contextual conditions help explain why the influence of flow on gameplay intention was most prominent in the action adventure group in this study, and remained weak or negligible in other genre groups.

5.2.8.2 Conceptual Factors

Flow is not a typical pre-behavioral motivational construct. It is better understood as an immediate emotional state that emerges during the activity itself. According to Lowry et al. (2013), flow is a type of process experience that emphasizes immersion during task execution, a balance between skills and challenges, and a sense of self-control, rather than an anticipated benefit present at the stage of behavioral decision-making (Larche & Dixon, 2020; Meakin, 2024). As an optimal experience driven from within, flow is not based on external rewards or expectations of pleasure. It stems from deep concentration on the task and a sense of personal alignment with the activity itself (Csikszentmihalyi, 1991).

This distinction makes flow a weaker predictor of behavioral intention than hedonic motivation or habit in structural models. This is especially true in contexts where gameplay is fragmented or not continuous. In such cases, the threshold for entering flow becomes higher, and its path effects tend to be less stable (Adiputra & Arief, 2024; Durcan et al., 2024; Harnadi, 2017; Jang & Byon, 2020b). In contrast, hedonic motivation refers to the anticipated enjoyment that occurs before the behavior takes place. It reflects a user's early judgment and begins to influence decisions at the start. Therefore, it often shows a stronger direct effect on intention within the UTAUT2 framework (Venkatesh et al., 2012).

Durcan et al. (2024) have emphasized that the occurrence of flow relies more on conditions such as self-determined motivation, clear task goals, and an appropriate level of challenge. The experience of flow often depends on timing and specific situations, which makes it difficult to appear consistently among different users or in all usage environments. In comparison, hedonic motivation represents a more stable emotional intention that consistently shows strong influence in models based on large samples. As a result, although flow

contributes meaningfully to the gaming experience, its effect is more likely to depend on the surrounding context.

Table 5.8 Results of Flow Experience Hypotheses

No.	Flow Experience Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H8	Higher flow experience will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.095, p-value = 0.000, f^2=0.010	Statistically significant but with minimal practical impact.
		All	Indirect effect to IGD	β = 0.013, [0.008, 0.020], p-value = 0.000	
H8a	Game genres will moderate the effect of flow experience on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	$diff_{ACT-ACA}$ = -0.152, Conventional p-value= 0.041; $diff_{ACA-ROP}$ = 0.191, Conventional p-value=0.032; $diff_{ACA-STR_RS}$ = 0.169, Conventional p-value=0.037	Moderation not observed. Significant direct effect within subgroup, with low level practical impact.
		ACT	Direct effect	β = 0.091, p-value = 0.021, f^2=0.009	
		ACA	Direct effect	β = 0.243, p-value = 0.000, f^2=0.082	
		ROP	Direct effect	β = 0.052, p-value = 0.202, f^2=0.003	
		STR_RS	Direct effect	β = 0.074, p-value = 0.071, f^2=0.006	
H8c	Gender will moderate the effect of flow experience on gameplay intention, s such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		Male	Direct effect	β = 0.09, p-value = 0.005, f^2=0.009	
		Female	Direct effect	β = 0.093, p-value = 0.001, f^2=0.010	

5.2.9 Discussion of Attitude Factors (H9)

Attitude refers to the extent to which playing a game is considered positive or negative by the player (Davis, 1989). In the context of university student gamers in this study, performance expectancy and effort expectancy showed only a partial interactive mediating effect on the link between attitude and gameplay intention. In other words, these two factors did not form a stable and complete mediating mechanism between attitude and gameplay intention. The statistical results are presented in Table 5.9.

The results indicate a potential shift in how users evaluate technology in gaming contexts. Attitude may be shaped less by the utilitarian constructs central to UTAUT2 and more by experiential or affective factors emerging from intrinsic engagement. This suggests that the rational evaluation logic underlying traditional technology adoption models may lose its explanatory strength in hedonic digital environments.

5.2.9.1 Contextual Factors

In the process of UTAUT modeling, although attitude showed a significant influence on behavioral intention in several classical theories and was even the strongest predictor in some models, this path became insignificant once performance expectancy and effort expectancy were included in the model (Venkatesh et al., 2003). As a result, attitude was excluded from the final UTAUT model, since its influence was regarded as a related effect that was mediated or absorbed by the two cognitive variables.

However, this logical premise exists only in usage settings that are task-oriented and utility-oriented (Taylor & Todd, 1995; Venkatesh et al., 2003). In such contexts, performance expectancy and effort expectancy are the main standards for judging use behavior. When the focus shifts to hedonic information systems such as games, the situation changes in a fundamental way. Based on the structural model analysis of university student gamers in this study, performance expectancy and effort expectancy showed almost no significant effect on use intention, with very low path coefficients and limited explanatory power. This result diverges from the assumptions of UTAUT, suggesting that in systems centered on enjoyment and experience, the influence of traditional cognitive variables is weakened (Hamari & Keronen, 2017).

The main driving forces of game use are often emotional satisfaction, enjoyable experience, and daily habit rather than task completion or efficiency improvement (Hattingh et al., 2024; Jang & Byon, 2020a). Even when a game is difficult to learn or lacks functional value, users may continue to engage with it because they appreciate its art style, storyline, or community atmosphere (Cao et al., 2025; Corcos, 2018; Melhart et al., 2021; Qin et al., 2010; Vahlo & Tuuri, 2025). In this context, attitude does not necessarily rely on performance expectancy or effort expectancy but may arise from users' direct emotional responses during the process of play. This aligns with the view that attitude is usually understood as an overall internal emotional reaction toward the act of use (Davis, 1989; Kostopoulos et al., 2022; Venkatesh et al., 2003). In such cases, attitude is not simply shaped by utilitarian cognition but may come from players' subjective responses to artistic design, control experience, and immersive atmosphere. Therefore, the role of attitude in hedonic systems shows structural properties that differ from the original assumptions of UTAUT. Excluding it from the model may conceal the more complex emotional mechanisms behind technology use.

5.2.9.2 Conceptual Factors

Venkatesh et al. (2003) pointed out that attitude is a general emotional evaluation of the behavior itself, which includes subjective feelings such as liking, enjoyment, and pleasure. This definition largely overlaps with motivational constructs that are widely applied in hedonic information systems. For example, attitude shows strong structural similarity with hedonic motivation and flow. Hedonic motivation highlights the fun and satisfaction experienced during use, while flow reflects immersion and concentration in the process. These intrinsic factors are key sources of behavioral intention for many game users (Hamari & Keronen, 2017; Jang & Byon, 2020a, 2020b; Lowry et al., 2013). In this study, both flow and hedonic motivation showed predictive power for gameplay intention.

In addition, within the technology acceptance path of university student gamers, behavioral intention is mainly driven by hedonic motivation and habit. The model analysis showed that these two variables had much stronger predictive effects on intention than performance expectancy and effort expectancy, which were almost insignificant in the model. This indicates that in strongly emotion-oriented contexts, utilitarian cognitive variables cannot capture the real motives of users. As a result, attitude is no longer grounded in such cognition but is more likely to emerge from emotional experience (Hamari & Keronen, 2017).

Therefore, this study suggests that in the context of game-based information systems, the influence of attitude mainly comes from the drive of intrinsic motivation, meaning that its impact is largely mediated by intrinsic motivation. The emotional evaluation reflected by attitude is more a psychological reaction triggered by motivational arousal, and its effect on behavioral intention is better understood as an extension of the motivational path. The functional role of attitude in such systems should be regarded as the external expression of intrinsic motivation, with its behavioral influence realized mainly through motivational mediation. This understanding is consistent with the dominant role of hedonic motivation, flow, and habit observed in the structural model of this study, and provides a theoretical foundation for more clearly distinguishing motivation, attitude, and emotional evaluation in future model development.

Table 5.9 Results of Attitude Hypothesis

No.	Attitude Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H9	The effect of attitude on gameplay intention will be fully mediated by performance expectancy and effort expectancy.	All	Mediate effect	$\beta_{ATT \rightarrow PE} * \beta_{PE \rightarrow GI} + \beta_{ATT \rightarrow EE} * \beta_{EE \rightarrow GI} = 0.028$, p-value = 0.001; $\beta_{ATT \rightarrow GI}=0.263$, p-value = 0.000	Partial mediating effect

5.2.10 Discussion of Self-efficacy Factors

Self-efficacy (SEY) is defined as the belief or self-confidence in one's ability to play a game (C. Chen et al., 2019). In the context of this study involving university student gamers, the positive effect of self-efficacy on gameplay intention was found to be non-significant under the mediating influence of effort expectancy. The statistical results are presented in Table 5.10. The effect of SEY on GI is fully mediated by effort expectancy, therefore H10 is accepted. This result aligns with the original hypothesis of this study and is consistent with findings from previous research.

This study successfully replicates the mediating pathway in the context of gaming, a representative form of hedonic technology. The result indicates that although the motivational structure behind user behavior in hedonic contexts differs from that in the utilitarian technology, self-efficacy, as a key predictor reflecting users' perceived capability, demonstrates a certain degree of cross-contextual stability in its influence mechanism.

SEY primarily reflects users' confidence in their own abilities, while effort expectancy (EE) directly measures users' perception of the amount of effort required during the use of a technology (C. Chen et al., 2019; Venkatesh et al., 2012). When SEY influences use intention indirectly through EE and the direct path from SEY to intention is no longer significant, it implies that users' confidence in their abilities is first converted into a perception of ease of use, which subsequently shapes their behavioral intention. In this process, EE plays an essential mediating role, with sufficient explanatory power to absorb the impact of SEY.

Over the years, SEY has been widely applied in game behavior research as a key psychological construct measuring users' confidence in performing specific actions. SEY significantly predicts general gameplay intention, problematic gaming behaviors, and internet gaming disorder, and is recognized as a crucial explanatory factor in player behavior (Brand et al., 2014; C. Chen et al., 2019; Sharma et al., 2022; C. I. Teng et al., 2022). Within the UTAUT2 framework, effort expectancy, which reflects users' perceived ease of use, is capable of absorbing much of the effect of SEY and can directly predict behavioral intention. This finding further underscores the central role of effort expectancy within the UTAUT2 model.

As a core variable reflecting users' perceived effort required to use technology, effort expectancy not only directly predicts behavioral intention but also serves an important function in integrating and transmitting the effects of self-efficacy. When encountering a new technology or platform, users typically begin by evaluating their own capabilities. The key cognitive factor that ultimately influences their behavioral intention is their perception of how easy or effortful the usage process will be. Therefore, effort expectancy functions as both a bridge and a central node in the technology acceptance process, linking users' self-perceptions of competence with their intention to act.

Table 5.10 Results of Self-efficacy Hypothesis

No.	Self-efficacy Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H10	The effect of self-efficacy on gameplay intention will be fully mediated by effort expectancy.	All	Mediate effect	$\beta_{SEY \rightarrow EE} * \beta_{EE \rightarrow GI} = 0.026$, p-value = 0.006; $\beta_{SEY \rightarrow GI}=0.034$, p-value = 0108	Fully mediating effect

5.2.11 Discussion of Social Interaction Factors (H11, H11a, H11c)

Social interaction (SIT), an in-game user-to-user interaction, refers to the requirement of interaction among two or more players within the game (Alzahrani et al., 2017; H. Chen et al., 2017; Dindar, 2018; Lee & Tsai, 2010). Among the university student gamer sample, SIT showed no significant effect on GI in any subgroup, and no significant moderating effects were found. A group difference appeared between the Action Adventure and Strategy_RS groups, but it reached significance only at the conventional 0.05 level and did not meet stricter criteria. The statistical results are presented in Table 5.11.

Previous studies have shown that for highly addicted groups, social interaction in online games is often regarded as a compensatory space for the lack of real-life social contact (Brand et al., 2014; M. Liu & Peng, 2009; Park et al., 2016; P. Wu et al., 2024; Zhao et al., 2021). For players with problematic use or dependency traits, in-game social interaction often becomes a primary motive and can strongly drive their intention to play (H. Chen et al., 2017; Lee & Tsai, 2010; H. Li et al., 2015; H. Wang & Lee, 2020; Zhao et al., 2021). In such groups, social interaction can partly replace real world relationships, providing continuous social satisfaction that sustains gaming behavior.

However, in this study the university student sample showed overall low scores on internet gaming disorder and only very weak demand for online friendship. The data indicate that this group does not rely on virtual settings to compensate for social gaps, as their social needs are more grounded in real life rather than in online spaces. As a result, interaction within games is unlikely to become a significant driver of use intention.

In campus settings, university students generally have abundant offline social resources, such as dormitories, classrooms, and student organizations, which provide them with stable and frequent opportunities for face to face interaction (Fang & Brown, 2024). Research has shown that Chinese university students rely more on real-life relationships for the formation of social support, and when offline interaction channels are stable, the added value of online interaction is limited (Han Mo et al., 2024; Yang et al., 2021). Longitudinal studies have also indicated a bidirectional link between loneliness and problematic internet use, with online social interaction showing compensatory effects mainly when offline contact is

insufficient (P. Wu et al., 2024). These findings suggest that for university students with adequate offline social connections, online social interaction does not serve as a primary driving force.

In addition, the group comparison revealed a difference at the conventional significance level between the Action Adventure group and the Strategy_RS group. Although the direct path effects within each group were not significant, the directional patterns remain noteworthy. In the Action Adventure group, the path coefficient was negative, suggesting that social interaction may be perceived as a distraction in game types centered on immersion and personalized experience. In the Strategy group, the coefficient was positive, indicating that in contexts emphasizing cooperation and competition, interaction may to some extent support intention. While these trends did not produce robust statistical effects, they point to the possibility that social interaction may function in different directions across game types.

Table 5.11 Results of Social Interaction Hypotheses

No.	Social Interaction Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H11	Higher social Interaction will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.008, p-value = 0.358	Rejected
		All	Indirect effect to IGD	β = 0.001, [-0.004, 0.006], p-value = 0.363	
H11a	Game genres will moderate the effect of social Interaction on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	$diff_{ACA\text{-}STR_RS}$ = -0.156, Conventional p-value= 0.047;	Moderation not observed.
		ACT	Direct effect	β = 0.015, p-value = 0.374	
		ACA	Direct effect	β = -0.086, p-value = 0.078	
		ROP	Direct effect	β = -0.031, p-value = 0.337	
		STR_RS	Direct effect	β = 0.069, p-value = 0.079	
H11c	Gender will moderate the effect of social Interaction on gameplay intention, such that the effect will be stronger in the female group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed.
		Male	Direct effect	β = 0.002, p-value = 0.480	
		Female	Direct effect	β = 0.024, p-value = 0.208	

5.2.12 Discussion of Emotion Coping Factors (H12, H12a, H12c)

Emotion coping (EC) is defined as an individual's tendency to regulate and recover from emotional stress through gaming behaviors (Lazarus & Folkman, 1987; Reinecke, 2009). In this study, the measurement of EC was limited to three specific stressors: depression, anxiety, and impulsivity. The observed relationship between EC and GI primarily reflects the motivational mechanism by which players engage in gaming as a strategy to cope with these negative emotional stressors.

The statistical results are presented in Table 5.12. In the overall sample, EC showed a significant positive effect on gameplay intention, and also indirectly contributed to internet gaming disorder. However, the effect size of this direct path was below the 0.02 threshold, indicating limited practical significance. When accounting for the moderating effects of game genre and gender, the significant positive relationship between EC and GI was only observed in the Action group, as well as in both the male and female subgroups. Among these, only the Action group demonstrated a small level effect size, exceeding the 0.02 level. The result suggests that users' psychological regulation needs partly shape their gaming behavior. This highlights a gap in UTAUT2, which lacks constructs for stress relief and emotional need fulfillment.

5.2.12.1 Conceptual Factors

In the context of this study, emotion coping was not intended to identify participants experiencing emotional disorders. Rather than functioning as a diagnostic construct, EC was designed to assess players' belief that gameplay serves as a tool for managing emotional stress. It reflects a motivational orientation, meaning a cognitive tendency in which individuals perceive games as helpful for navigating emotional difficulties (Burleigh et al., 2022; Reinecke, 2009). This belief may be present even in the absence of clinically significant distress and is often shaped by prior experiences or by environmental factors that encourage using games to relax or cope (Brand et al., 2014; Lewinson et al., 2023; Schneider et al., 2018). Therefore, EC reflects a functional expectation that gameplay can provide psychological benefits, even when users are not experiencing actual emotional distress.

The relatively weak effect size of EC on gameplay intention aligns with its conceptualization in this study as a functional expectation rather than a reactive behavior. Since EC captures players' belief in the emotional utility of games rather than their actual emotional distress, its influence is likely to be more diffuse and dependent on context. This framing supports the observed statistical pattern where EC demonstrated significance at the general level but only reached meaningful effect size in specific subgroups, such as Action game players.

Although EC showed statistical significance in the model, the effect size remained below the 0.02 threshold. This may be due to the nature of digital games as hedonic systems, where hedonic motivation and habitual use often serve as more dominant drivers of behavioral intention. As a result, EC functions more as a supporting factor and may be outweighed by stronger forces such as pleasure seeking or routine engagement. The previous section has shown that enjoyment and habit are central motivators in game use, particularly among university student populations.

5.2.12.2 Contextual Factors

Action games often include features that meet players' emotional coping needs (Gradi et al., 2024). These games usually provide quick feedback, rapid actions, strong visual and sound effects, and a highly engaging experience (Cho et al., 2025; Gradi et al., 2024; Lin et al., 2022). These elements can help players feel a greater sense of control and make it easier to shift their focus away from unpleasant emotions (Villani et al., 2018). The intensity and speed of these games can interrupt stressful thoughts and help players feel better in a short time (Lin et al., 2022). This may explain why the connection between emotion coping and gameplay intention was stronger in this group than in others.

Individual traits may also help explain this result (Xi & Hu, 2022). Players who react strongly to emotions or have difficulty controlling impulses often prefer games that offer intense activity and immediate rewards (Deleuze et al., 2017; Metcalf & Pammer, 2013). Action games such as shooting or fighting titles are especially attractive to those who want to change their mood or escape negative feelings (Maroney et al., 2019; Na et al., 2017). As a result, this group may include more players who use games to manage emotional stress. The combination of these personal tendencies and the design of the games may increase the influence of emotion coping on gameplay intention within this type of game.

Table 5.12 Results of Emotion Coping Hypotheses

No.	Emotion Coping Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H12	Higher emotion coping will increase gameplay intention, contributing to gaming disorder development.	All	Direct effect	β = 0.104, p-value = 0.000, f^2 = 0.016	Statistically significant but with minimal practical impact.
		All	Indirect effect to IGD	β = 0.014, [0.009, 0.021], p-value = 0.000	
H12a	Game genres will moderate the effect of emotion coping on gameplay intention, such that the effect will vary within different types of games.	6 pairs among 4 subgroups	Moderate effect	No moderate effect	Moderation not observed. Significant direct effect within subgroup, with low level practical impact.
		ACT	Direct effect	β = 0.159, p-value = 0.000, f^2 = 0.037	
		ACA	Direct effect	β = 0.108, p-value = 0.052	
		ROP	Direct effect	β = 0.011, p-value = 0.426	
		STR_RS	Direct effect	β = 0.065, p-value = 0.062	
H12c	Gender will moderate the effect of emotion coping on gameplay intention, such that the effect will be stronger in the male group.	1 pair among 2 subgroups	Moderate effect	No moderate effect	Moderation not observed. Significant direct effect within subgroup, with minimal practical impact.
		Male	Direct effect	β = 0.115, p-value = 0.000, f^2 = 0.019	
		Female	Direct effect	β = 0.095, p-value = 0.000, f^2 = 0.014	

5.2.13 Discussion of Gameplay Intention (H_{13})

The results of this study show that among Chinese university student gamers, gameplay intention (GI) has a significant positive effect on internet gaming disorder (IGD), although the effect size is at a low level. The detailed statistical results are presented in Table 5.13. This finding provides new evidence for understanding the motivational antecedents of problematic game use.

The findings of this study are consistent with classical technology acceptance models, which regard behavioral intention as the most direct antecedent of use behavior (Venkatesh et al., 2003, 2012). In research on problematic technology use, it has been noted that stronger use intention increases the likelihood of excessive or uncontrolled use, thereby raising the risk of internet gaming disorder (Chatterjee et al., 2022; Haagsma et al., 2013; H.-Y. Wang & Cheng, 2022). Motivational factors such as gameplay intention are seen as antecedent mechanisms that gradually lead individuals toward compulsive use and addictive outcomes (Brand et al., 2014; Dong & Potenza, 2014). The results of this study further indicate that even in a non-clinical university student group, higher gameplay intention can predict an increase in internet gaming disorder symptoms.

However, in this study the distribution of gameplay intention scores was generally at a high level, while the overall scores of internet gaming disorder were relatively low. This indicates that although the group showed strong motivation to play games, the risk of addiction was not prominent. This distribution pattern is consistent with previous research showing that Chinese university students widely participate in online games but the proportion of severe addiction remains low (Gou et al., 2024; F. Liu et al., 2022; X. Tan et al., 2025). Under such conditions, the gap between the predictive value of gameplay intention for internet gaming disorder and the actual level of disorder tends to compress correlation coefficients and effect sizes (Wooldridge, 2013). Even so, gameplay intention still significantly predicted internet gaming disorder, suggesting that it remains sensitive in capturing early risk signals and subtle differences.

The conclusions of this study suggest that the explanation of internet gaming disorder should not focus only on pathological factors such as depression and anxiety but also consider the role of general motivational variables. The predictive effect of gameplay intention indicates that the shift from normal gaming motivation to problematic use may not occur suddenly but could instead be a gradual and cumulative process. In addition, gameplay intention may serve as an

early warning indicator of problematic gaming behavior among university students. Educators and mental health practitioners can monitor students' levels of gaming intention to identify individuals at potential risk and provide interventions before the behavior becomes severe. Specific measures may include strengthening time management skills, encouraging diverse leisure activities, and developing alternative emotion regulation strategies to reduce the transition from high gameplay intention to internet gaming disorder (F. Liu et al., 2022; D. Wang & Li, 2025; Xi & Hu, 2022).

In summary, this study shows that although gameplay intention is not the strongest predictor of internet gaming disorder, it still plays an important role. In a group with an overall low level of risk, the significant predictive effect of gameplay intention highlights the importance of motivational pathways and underscores the need for preventive interventions among university students.

Table 5.13 Results of Gameplay Intention Hypothesis

No.	Gameplay Intention Hypothesis	Sample Group	Effect Type	Path Analysis Results	Conclusion
H_{13}	Higher gameplay intention will contribute to generate internet gaming disorder.	All	Direct effect	β= 0.138, p-value = 0.000, f^2 = 0.020	Accepted

5.3 Summary

The conceptual model reveals a clear divergence between hedonic and utilitarian drivers of behavior in digital gaming contexts. While the original model emphasizes rational evaluation and functional outcomes, the present findings suggest that in leisure-based systems, behavioral intention is shaped primarily by intrinsic motivations, affective experiences, and automated patterns of use. Constructs grounded in utility, such as performance expectancy, effort expectancy, and facilitating conditions, played a minimal role in explaining intention. In contrast, hedonic motivation and habit emerged as dominant forces, and additional constructs related to emotional coping and experiential flow showed greater alignment with user behavior. These results point to a motivational structure that is less about planning and more about immersion, emotion, and repetition. The model therefore shifts from describing how users adopt technology for practical purposes to explaining how they become absorbed in systems that provide psychological gratification. In hedonic digital environments, user behavior cannot be fully understood through the lens of task-based efficiency, but should be framed in terms of affective engagement and self-reinforcing interaction, calling for a reconceptualization of how intention is defined in technology use.

Chapter 6

Conclusion

This study aimed to expand the use of the UTAUT2 model by applying it to the study of IGD. It built an integrated model to examine general gaming behavior and how it may relate to problematic gaming. By bridging the gap between technology acceptance and behavioral addiction, this study contributes to the refinement of theoretical models within information system research. On a practical level, the research also provides useful insights for the gaming and esports industries. The findings offer evidence that can support more targeted and thoughtful policy-making. In particular, the results highlight the need to treat different game types and player behaviors separately, suggesting that regulations should match the specific features and risks of each game genre

6.1 Theoretical Contribution

6.1.1 Reconceptualizing UTAUT2 in Hedonic Contexts

This study extends the conceptual boundaries of UTAUT2 by placing it within a hedonic, affective, and self-regulatory context. The findings reveal that the traditional utilitarian core of the model, including performance expectancy, effort expectancy, facilitating conditions and price value, provides limited explanatory strength when applied to emotionally charged systems such as digital gaming. Constructs that reflect intrinsic motivation and experiential engagement, including hedonic motivation, flow and habit, emerge as the dominant antecedents of behavioral intention.

The results indicate that the psychological hierarchy underlying UTAUT2 requires further theoretical refinement. Instead of a sequence based on cognitive utility and intention, user decisions in hedonic environments appear to follow a progressive order that begins with hedonic experience, moves through affective evaluation, develops into habitual response, and finally leads to behavioral intention. In this process, intrinsic enjoyment shapes affective judgment and gradually consolidates into stable behavioral patterns. Attitude therefore functions as an affective integration of enjoyment and behavioral consistency rather than as a redundant outcome of utilitarian judgment.

The cognitive pathway from self-efficacy to intention also presents an evolved meaning. Effort expectancy acts as a translational mechanism that converts confidence in ability into active engagement, even in leisure systems where emotional factors dominate. The persistence of this mediation in hedonic contexts demonstrates that cognitive control remains a stable foundation of user behavior, although its influence becomes secondary to affective and motivational processes.

In summary, these findings suggest a dual-layer structure within UTAUT2. The first layer represents cognitive mechanisms that capture efficacy and control. The second layer reflects affective and experiential mechanisms that determine intention formation in emotionally charged contexts. This structure better represents the interaction between emotion, cognition and habit, and provides a conceptual foundation for future refinement of UTAUT2 toward contexts involving affective engagement and problematic use.

6.1.2 Extending UTAUT2 with Experiential and Psychological Constructs

This study extended the original framework of UTAUT2 by introducing three additional constructs to better explain user behavioral intention in hedonic systems. Although these constructs originate from different theoretical sources, their performance in the model revealed several shared mechanisms, offering valuable directions for theoretical extension and adaptation.

First, these constructs all showed clear context sensitivity, meaning that their effects were moderated by use setting, game type, and individual characteristics. For example, flow experience appeared more strongly in games with clear structure and explicit goals; emotion coping showed predictive power mainly in fast paced and highly stimulating games; and the influence of social interaction was shaped by the availability of offline social resources. This indicates that in hedonic systems, the link between psychological responses and behavioral intention cannot rely solely on the universal validity of constructs, but must be understood in relation to game features and the specific circumstances of users.

Second, compared with the original constructs of UTAUT2, the three extended dimensions represent process related experiences and functional expectations of psychological needs. Flow experience is not based on utility judgments made before use but grows out of immersion during activity. Emotion coping does not necessarily stem from actual emotional disturbance but reflects the expectation that games can serve as tools for emotion regulation. Social interaction, for some groups, may represent the ability of online contact to partly fill gaps in real world relationships, while for other groups it may not act as a driver at all. These features suggest that, unlike the original model which emphasized antecedent motivations and resource evaluations, the new constructs are more closely tied to users’ subjective states and inner goals during actual use.

Finally, the introduction of these constructs shows that when UTAUT2 is applied to systems marked by high emotional engagement and diverse motivations, it needs to shift from a single path model toward models with multiple moderating and conditional paths. The formation of behavioral intention is no longer only a rational assessment of system attributes but is jointly shaped by process experience, individual emotions, and self-regulation strategies. This requires future UTAUT2 type models to incorporate a broader range of moderators and

group based modeling strategies in order to capture the diverse responses of different user groups to the same system.

Overall, the integration of flow experience, social interaction, and emotion coping not only increased the model's adaptability to hedonic technology contexts but also reflected a shift in technology acceptance research. The field is moving away from classical paradigms characterized by stable structures and single paths, toward a dynamic framework that emphasizes process, emotion, and individual differences. This shift provides clear directions for theoretical development and offers a stronger psychological basis for product design and user experience optimization.

6.1.3 Integrate and Evaluate Multiple Moderates

This study contributes to the contextualized extension of UTAUT2 by systematically integrating and evaluating multiple moderators, including gender, media type, and game genre, within a hedonic technology setting. To ensure statistical rigor in the multi-group comparison process, three methodological procedures were adopted.

First, the MICOM procedure was applied to assess measurement invariance across subgroups within the UTAUT2 framework. Second, NPT-based pairwise comparisons were conducted to examine group differences across multiple levels of moderators. To control for Type I error in these multiple comparisons, Šidák's adjustment was applied within the NPT procedure. Third, for subgroups with excessively large sample sizes, a random sampling strategy was employed to create statistically comparable groups for analysis. Although this enhanced the internal validity of the comparisons, it also reduced the representativeness of sampled data, thereby limiting external generalizability.

The results show that in the formation of gaming behavior, game type, media platform, and gender may all introduce a certain degree of path variation. However, these moderating effects mostly appeared as moderate or marginal influences, and their explanatory power depended on specific usage contexts and psychological mechanisms.

First, the structural features and interaction patterns of game types displayed clear differentiated effects on some paths. Variations in task structure, pace intensity, and social attributes across game types altered how users perceived different constructs. For example, in strategy games, social influence was more likely to be perceived as interference, conflicting with the high time and cognitive investment required and potentially triggering resistance. In contrast, in action games, where time investment was lower and the social atmosphere was more relaxed, social encouragement enhanced use intention. Similarly, constructs such as flow experience and emotion coping showed stronger predictive power in games with strong structural elements and high emotional intensity, suggesting that the design logic of games shapes the psychological structure of construct effects. Thus, game type is not only a content classification but also a theoretical boundary for the differentiation of psychological mechanisms.

Second, media platform, as the expression of the technical environment, did not significantly moderate most paths in this study. This may be related to the high

cross platform experience of university student users in the sample. For this high digital literacy group, differences in interface and operational barriers across platforms had limited influence, leading to largely consistent path effects across platforms. However, it is noteworthy that a significant moderating effect was observed in the path of price value, suggesting that differences in commercial mechanisms or payment experiences across platforms may still shape users' value assessments. Compared with operational factors, users were more sensitive to price fairness and payment inducement strategies, which were often perceived more negatively on mobile platforms. Thus, media platforms still retain some distinctiveness in influencing value evaluation, highlighting the need for future research to pay closer attention to the role of platform mechanisms in shaping the link between value perception and behavioral intention.

Third, gender, as a classical demographic factor, did not significantly moderate most paths in this study. Although some research has suggested that women may show higher sensitivity to cognitive load, operational feedback, and social evaluation, these differences were not consistently evident in the formation of behavioral intention among university students, a group marked by high digital exposure and increasingly diminished gender roles. Cultural context, educational experience, and developmental stage together contributed to a convergence of behavioral logic between genders, weakening the distinctiveness of gender in the model.

These analyses demonstrate that while the core structure of UTAUT2 remains recognizable, its internal relationships are reshaped by the interaction between user attributes, technological setting, and content design. These contextual influences do not overturn the model but reveal its capacity to stretch and adapt under different behavioral conditions.

The findings indicate that moderation effects give UTAUT2 a flexible quality. In emotionally charged or experience-centered systems, constructs do not operate as fixed causal elements. Instead, they are reweighted through situational factors that emphasize certain psychological mechanisms over others. For example, in games that are highly structured and require rapid response, emotional and experiential constructs become more dominant, whereas in games that demand greater cognitive effort or strategic planning, constructs related to cognition and control gain more influence. This pattern shows that the balance among affective, cognitive, and habitual processes shifts as users move across different types of digital experiences.

The flexibility introduced by moderating effects suggests that UTAUT2 can be interpreted as a framework that adjusts the weight of its internal pathways rather than replacing them. The stable component lies in the enduring relationships among key constructs such as hedonic motivation, habit, and intention, which form the foundation of user behavior. The flexible component lies in the contextual recalibration of construct strength, which enables the model to remain relevant when motivational structures change. UTAUT2 can therefore be reconceptualized as a layered system that adapts to contextual inputs through dynamic weighting rather than structural replacement.

Such an understanding invites a broader theoretical reformulation. Future development of the UTAUT family of frameworks may treat moderators as adaptive parameters that continuously reorganize the internal equilibrium of the model. This perspective treats technology acceptance as a dynamic process that seeks equilibrium between cognitive efficiency and emotional reward. The same model structure can thus explain both rational decision-making in utilitarian systems and emotionally reinforced engagement in hedonic systems by allowing its pathways to flex according to context.

This contextual adaptability enhances the explanatory power of UTAUT2 for complex digital behaviors. It demonstrates that behavioral mechanisms are shaped not only by constructs themselves but also by the conditions that activate or suppress them. Understanding these elastic relationships enables future research to build a more responsive theoretical framework that captures both the universality and variability of human interaction with technology across cultural, technical, and experiential environments.

6.1.4 Extend the UTAUT2 to Predict Internet Gaming Disorder

Although this study found that gameplay intention significantly predicts internet gaming disorder (IGD), the overall model explains only a minimal proportion of the variance in IGD, and other core constructs in UTAUT2 failed to contribute explanatory power. This limitation cannot be fully attributed to measurement error or sample characteristics alone, but rather points to a deeper theoretical gap within the UTAUT2 framework when applied to problematic or maladaptive technology use.

UTAUT2 was developed to explain technology adoption and continued use in rational, goal-driven contexts. It assumes that usage behavior results from motivational evaluation and behavioral planning. However, IGD involves psychological mechanisms that are often impulsive, emotionally driven, and difficult to regulate (Jo et al., 2019). Constructs such as self-control, satisfaction, intrinsic motivation, emotional dysregulation, social motivation are central to clinical and addiction models, but are not well captured within the UTAUT2 structure (Mills & Allen, 2020; H.-Y. Wang & Cheng, 2022). As a result, intention alone may not fully explain the transition from frequent use to problematic or uncontrolled behavior.

This suggests that intention, while important in predicting voluntary and habitual use, may not sufficiently account for the transition from high engagement to dysfunctional usage. The weak predictive power of the model implies that UTAUT2's boundary conditions are best suited to explain normative behavior, and its explanatory strength diminishes when applied to contexts where psychological distress, impaired self-regulation, or compulsive patterns dominate.

Future studies could address this gap by integrating constructs from psychological and clinical frameworks, such as the use and gratification theory, self-determination theory, or the I-PACE model, to more accurately represent the mechanisms underlying excessive gaming (Brand et al., 2014; Ghazali et al., 2019; Mills & Allen, 2020). These additions would allow for a more complete understanding of how initial motivation and engagement evolve into problematic use, and where behavioral intention may no longer be the central pathway.

6.2 Practical Contribution

This study examined the relationship between university students' gaming behavior and the risk of internet gaming disorder, and based on the UTAUT2 model constructed an analytical framework that integrated motivation, behavioral intention, and differences in game type. The results not only revealed the central role of intrinsic motivations and habit in driving gameplay but also showed that although behavioral intention could predict IGD, its explanatory power was limited and it did not serve as an appropriate mediating path through which other motivational factors influenced IGD. These findings have practical implications for both product design in the gaming industry and public policy development.

For policymakers, the results suggest that interventions targeting young populations such as university students cannot rely solely on risk labels or traditional measures like limiting game time. Compared with actual symptoms of addiction, the strength of behavioral intention may reflect potential risk tendencies at an earlier stage. Relevant authorities could therefore initiate early screening and educational warnings on campus, focusing on students with high levels of gaming intention. In the Chinese higher education context, such an approach is both practical and ethically feasible, as universities are already required by the Ministry of Education to conduct at least one psychological health assessment for all students each academic year. These existing institutional assessments provide a legitimate and structured channel through which indicators of gaming risk could be incorporated, ensuring that potential vulnerabilities are identified within a regulated and privacy-protected framework. Building on these institutional mechanisms, preventive efforts can move beyond identification toward intervention. Preventive programs may include training in time management, guidance in alternative ways of stress regulation, and encouragement of diverse leisure activities (Han et al., 2025; Kong, 2020; Y. Zhang et al., 2025). Such efforts can enable effective intervention before problematic behaviors take shape.

The study also highlights that for motivationally driven users, subjective experience during play outweighs concerns about utility. High frequency use does not necessarily indicate pathology, but in the absence of self-regulatory support, it may gradually evolve into irrational use (D. Wang & Li, 2025). Thus, gaming behavior cannot be judged solely on the basis of time or frequency but must be assessed in terms of motivation level, emotional state, and behavioral stability. Universities could integrate digital health education into student development

curricular, with special emphasis on building self-assessment ability among individuals who show high motivation but low self-control (Hou & Wang, 2025; Y. Zhang et al., 2025).

For the gaming industry, the findings show that among university students, gameplay is mainly driven by experiential motivation and habitual use. Users are less concerned about practical functions or platform resources and more attentive to immediate experience, emotional release, and replayability. This provides clear guidance for developers: product design should strengthen immersion and task challenge fit while avoiding excessive reliance on non-gameplay inducements such as forced payment paths or socially driven pressure, which may harm user experience and in some cases trigger negative reactions (Boghe et al., 2020; Lee et al., 2025; Z. Liu & Ye, 2018; Niknejad et al., 2024).

At the same time, under the tightening of policy regulation and growing social calls for healthy digital use among youth, gaming companies should adopt flexible and educational restriction mechanisms that support healthier user behavior without relying on rigid control. Prior studies have shown that game design can guide players toward healthier habits by combining motivational recognition with behavioral feedback (Huang et al., 2022; Liang & Li, 2025; Q. Tan et al., 2022). Features such as real name systems and behavioral data could be used to deliver personalized reminders to high motivation, high frequency users, along with feedback on gameplay time and task pacing. Such designs emphasize noncompulsive intervention, reducing harm to user experience while offering early and gentle adjustments before risks escalate. This approach helps companies build a socially responsible image while also leaving room for constructive collaboration with regulators.

In conclusion, this study supports a shift in gaming health management strategies toward recognizing user motivation and optimizing behavioral pathways. It also calls on the gaming industry to balance motivational guidance with psychological support mechanisms in product strategies, contributing to the development of a healthier and more sustainable gaming ecosystem.

6.3 Limitations and Recommendations

6.3.1 Insufficient Subgroup Sample Sizes

Although the overall sample size in this study was adequate, some game genre subgroups did not meet the minimum sample size threshold required for MGA analysis (n>160). For example, subgroups such as Miscellaneous, Puzzle, Adventure, Simulation, Racing, and Sports had noticeably insufficient sample sizes and were therefore excluded from the subsequent moderation effect analysis. As a result, this study was unable to assess the applicability and stability of the model among players of these specific game genres. This limitation also restricted the theoretical extension and empirical validation of genre-based differences within a broader gaming context. Different game genres may correspond to distinct user motivations, behavioral mechanisms, and usage scenarios. The absence of these subgroups reduces the comprehensiveness of the study and limits the generalizability of its conclusions. Future research is advised to adopt more targeted recruitment strategies during the sample collection phase to ensure a more balanced distribution across game genres. This would allow for a more complete examination of the UTAUT2 model and its extended constructs across diverse gaming ecosystems.

6.3.2 Limitations of Random Sampling Procedures

To achieve balanced subgroup sizes for PLS-MGA analysis, this study employed random sampling for the Strategy group and the Mobile/Tablet group, both of which originally had large sample sizes. Klesel et al. (2022) noted that substantial imbalances in subgroup sample sizes weaken a model's capacity to identify true group differences. For non-parametric permutation testing, the larger subgroup should be no more than double the size of the smaller one (Cheah et al., 2020; Hair et al., 2018). Although random sampling procedure improves the statistical robustness and controllability of group comparisons, it also introduces certain limitations in empirical research.

First, random sampling reduces the overall utilization of the original data, potentially omitting important structural characteristics or behavioral variations within the subgroups. This may affect the representativeness of the analysis results.

Second, the sampled subgroup structures may deviate from those of the full dataset, which limits the generalizability of the findings, particularly when applying the results to a broader player population or real-world market settings.

Moreover, the reduced sample size may weaken the ability to detect subtle effects. Therefore, future research is recommended to adopt more targeted recruitment strategies to minimize the potential biases associated with post-hoc sampling.

6.3.3 Insufficient Measurement Invariance

This study applied the Measurement Invariance of Composite Models (MICOM) procedure to systematically examine measurement models across the moderating variables of gender, media, and game genres. Full invariance, meaning both compositional invariance and equality of composite mean values and variances, was achieved only between the Action group and the Strategy_RS group, and between the Action Adventure group and the Role playing group. For constructs that reached only partial invariance, in which only compositional invariance was established, the measurement structure remained consistent across groups. However, variations in response patterns suggest that members of different groups may interpret or experience the constructs in distinct ways, leading to differences in means and variances (Hair et al., 2022). These results imply the existence of potential measurement bias across groups, which may reduce the interpretability of path coefficient comparisons and weaken the theoretical validity of the findings.

Therefore, although the study provides partial evidence supporting the existence of moderation effects, the theoretical and practical implications should be interpreted with caution. Future research should place greater emphasis on testing construct invariance during the operationalization of moderators and the design of measurement models to enhance the stability and reliability of cross-group comparisons.

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Appendices

Appendix A

Research Ethics

A.1 Research Ethics of Pilot Test

University of Nottingham
UK | CHINA | MALAYSIA

PARTICIPANT CONSENT

Faculty of Arts and Social Sciences
School of Business

Project Title: A Conceptual Model for Analysing Player Acceptance and Gaming Disorder in Online Games:UTAUT2 with Moderating Effect of Game Genres, Media, and Gender

Ethics Approval Reference Number: *NUBS-REC-2024-14*

1. I confirm I have read and understood the participant information sheet (version 1.1) and have been given the opportunity to ask questions and discuss this study. I have received satisfactory answers to my questions
2. I know how to contact the researcher if I have further questions about this study
3. I agree to answer a questionnaire.
4. I understand that my participation is voluntary and that I am free to withdraw from the study at any time without giving a reason
5. I understand that if I withdraw from the above study after submitting my questionnaire, the data collected from me will be used in analysing the results
6. I consent to the storage, including electronic, of personal information for the purposes of this study. I understand that any information that could identify me will be kept strictly confidential and that non-identifiable data from this study might be included in academic research reports or other publications.
7. I agree to the above points and I agree to participate in the above study.
8. The data collected during this study is a valuable resource for future research. I therefore agree for the data I provide to be archived and potentially made available to other researchers. To preserve the confidentiality of the information, only non-identifiable data will be included.

Name of participant _____ Date _____ Signature _____

Name of person taking consent Yixuan Liu 刘艺玄 Date 10/07/2024 Signature 

Original to be retained and filed; 1 copy to be given to the participant

"By clicking the button above/below I indicate that I understand what the study involves and that my answers are anonymous. I agree to take part and I understand that once I click 'submit' at the end of the questionnaire, it will not be possible to withdraw the data."

FASS Ethics version 30/08/2021

Research participant privacy notice

Why we collect your personal data

We collect personal data under the terms of the University's Royal Charter in our capacity as a teaching and research body to advance education and learning. Specific purposes for data collection on this occasion are investigating the motivations, intentions, and subsequent behavioral patterns of daily online game consumption among Chinese university students in China.

Legal basis for processing your personal data (Personal Data Protection Act 2010, section 6.2.)

The legal basis for processing your personal data on this occasion is *processing is necessary for the purposes of the legitimate interests pursued by the research team.*

How long we keep your data

The University may store your data for up to 25 years and for a period of no less than 7 years after the research project finishes. The researchers who gathered or processed the data may also store the data indefinitely and reuse it in future research. Measures to safeguard your stored data include encryption protocol and anonymisation of data.The research team will password-protect the stored data. Only the researchers and their supervising advisors will have access to the dataset. The data will be fully anonymized, with no personally identifiable information or sensitive information collected. The data will not be able to link or identify any specific individual.

Your rights as a data subject

You have the following rights in relation to your personal data processed by us:

Right to be informed

The University will ensure you have sufficient information to ensure that you are well informed about how and why we are handling your personal data, and that you know how to enforce your rights.

Right of access / right to data portability

You have a right to see all the information the University holds about you. Where data is held electronically in a structured form, such as in a database, you have a right to receive that data in a common electronic format that allows you to supply that data to a third party - this is called "data portability".

To receive your information in a portable form, send an email your request to nubs-rec@nottingham.edu.my

Right of rectification

If we are holding data about you that is incorrect, you have the right to have it corrected.

Right to erasure

You can ask that we delete your data and where this is appropriate we will take reasonable steps to do so.

Right to restrict processing

If you think there is a problem with the accuracy of the data we hold about you, or we are using data about you unlawfully, you can request that any current processing is suspended until a resolution is agreed.

Rights related to automated decision making including profiling

We may use a computer program, system or neural network to make decisions about you (for example, everyone that is on a particular course gets sent a particular letter) or to profile you. You have the right to ask for a human being to intervene on your behalf or to check a decision.

Withdrawing consent

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Exercising your rights, queries and complaints

For more information on your rights, if you wish to exercise any right, for any queries you may have or if you wish to make a complaint, please email nubs-rec@nottingham.edu.my

Note: The collection of your personal data is carried out in accordance with the terms stated within (i) The University of Nottingham's Royal Charter, (ii) the UK's General Data Protection Regulation (GDPR), (iii) The Malaysian Personal Data Protection Act 2010 & (iv) the University's Code of Research Conduct and Research Ethics. These collectively spell out the legal basis for processing your personal data, your rights as a data subject as well as data sharing/management arrangements.

Nottingham University Business School

Information for Research Participants

Thank you for agreeing to participate in the research project. Your participation in this research is voluntary, and you may change your mind about being involved in the research at any time, and without giving a reason.

This information sheet is designed to give you full details of the research project, its goals, the research team, the research funder, and what you will be asked to do as part of the research. If you have any questions that are not answered by this information sheet, please ask.

What is the research project called?

A Conceptual Model for Analysing Player Acceptance and Gaming Disorder in Online Games: UTAUT2 with Moderating Effect of Game Genres, Media, and Gender

Who is carrying out the research?

My name is Yixuan Liu, a Ph. D. candidate from Nottingham University Business School of University of Nottingham Malaysia. Our study aims to investigate the motivations, intentions, and subsequent behavioral patterns of daily online game consumption among Chinese university students in China. We seek to collect data on consumer behavior patterns to provide theoretical support for the development of the Chinese gaming market and policy formulation.

What is the research about?

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What groups of people have been asked to take part, and why?

The primary participation of this study are full-time Chinese university students in China who engage in gaming, regardless of their region or institution. The students will include those from freshmen to seniors, as well as post-graduate students, all above the age of 18. As one of the main consumer groups of games, the feedback from these students will help us understand the potential connection between their gaming motivations and their continued consumption behavior.

What will research participants be asked to do?

This survey will be conducted online using a questionnaire. The questionnaire will mainly consist of multiple-choice questions, and participants will answer these questions in sequence to provide their attitudes toward game consumption. Respondents are free to choose whether to participate in the survey and can exit at any time during the process. The entire questionnaire will take approximately 5-10 minutes to complete.

What will happen to the information I provide?

All information collected about you will be kept strictly confidential and stored in a database

which will be password protected. Any information collected about you will be anonymous (all identifying information removed). Your data will be saved under a number (ID), which cannot be tracked back to you. Information in hard or soft copies will be stored and maintained for a minimum of 7 years.
Only the researchers and their supervising professors will have access to the data base. The data usage and storage procedures will adhere to the UNM Data Repository's management regulations and the Malaysian Personal Data Protection Act (2010).

What will be the outputs of the research?

The data collected through the online questionnaire will be used to study the gaming consumption motivations, intentions, and continuous consumption behaviors of Chinese university students. The findings will be included in my doctoral dissertation, which will be archived in the University of Nottingham's repository. Participants will be able to find this dissertation in the University of Nottingham's public repository in the future. The research findings may also be written into a journal article for subsequent publication.

Contact details

Researcher:

Yixuan Liu (刘艺玄), +8613544775965, +60175520727, saxyl7@nottingham.edu. my

Supervisor:

Dr. Kin Boon Tang, kinboon.tang@nottingham.edu.my

Dr. Shu Han Tan, tan.shuhan@nottingham.edu.my

Complaint procedure

If you wish to complain about the way in which the research is being conducted or have any concerns about the research then in the first instance please contact the supervisor.

Or contact the NUBS REC:

Research Ethics Committee
Nottingham University Business School
The University of Notttingham Malaysia Campus
Jalan Broga 43500 Semenyih
Selangor Darul Ehsan, Malaysia
Email: nubs-rec@nottingham.edu.my

A.2 Research Ethics of Primary Data Collection

University of Nottingham
UK | CHINA | MALAYSIA

PARTICIPANT CONSENT

Faculty of Arts and Social Sciences
School of Business

Project Title: A Conceptual Model for Analysing Player Acceptance and Gaming Disorder in Online Games:UTAUT2 with Moderating Effect of Game Genres, Media, and Gender

Ethics Approval Reference Number: *NU*BS-REC-2024-21

1. I confirm I have read and understood the participant information sheet (version 1.1) and have been given the opportunity to ask questions and discuss this study. I have received satisfactory answers to my questions
2. I know how to contact the researcher if I have further questions about this study
3. I agree to answer a questionnaire.
4. I understand that my participation is voluntary and that I am free to withdraw from the study at any time without giving a reason
5. I understand that if I withdraw from the above study after submitting my questionnaire, the data collected from me will be used in analysing the results
6. I consent to the storage, including electronic, of personal information for the purposes of this study. I understand that any information that could identify me will be kept strictly confidential and that non-identifiable data from this study might be included in academic research reports or other publications.
7. I agree to the above points and I agree to participate in the above study.
8. The data collected during this study is a valuable resource for future research. I therefore agree for the data I provide to be archived and potentially made available to other researchers. To preserve the confidentiality of the information, only non-identifiable data will be included.

Name of participant _____ Date _____ Signature _____

Name of person taking consent Yixuan Liu 刘艺玄 Date 20/12/2024Signature 刘艺玄

Original to be retained and filed; 1 copy to be given to the participant

"By clicking the button above/below I indicate that I understand what the study involves and that my answers are anonymous. I agree to take part and I understand that once I click 'submit' at the end of the questionnaire, it will not be possible to withdraw the data."

FASS Ethics version 30/08/2021

Research participant privacy notice

Why we collect your personal data

We collect personal data under the terms of the University's Royal Charter in our capacity as a teaching and research body to advance education and learning. Specific purposes for data collection on this occasion are investigating the motivations, intentions, and subsequent behavioral patterns of daily online game consumption among Chinese university students in China.

Legal basis for processing your personal data (Personal Data Protection Act 2010, section 6.2.)

The legal basis for processing your personal data on this occasion is *processing is necessary for the purposes of the legitimate interests pursued by the research team.*

How long we keep your data

The University may store your data for up to 25 years and for a period of no less than 7 years after the research project finishes. The researchers who gathered or processed the data may also store the data indefinitely and reuse it in future research. Measures to safeguard your stored data include encryption protocol and anonymisation of data.The research team will password-protect the stored data. Only the researchers and their supervising advisors will have access to the dataset. The data will be fully anonymized, with no personally identifiable information or sensitive information collected. The data will not be able to link or identify any specific individual.

Your rights as a data subject

You have the following rights in relation to your personal data processed by us:

Right to be informed

The University will ensure you have sufficient information to ensure that you are well informed about how and why we are handling your personal data, and that you know how to enforce your rights.

Right of access / right to data portability

You have a right to see all the information the University holds about you. Where data is held electronically in a structured form, such as in a database, you have a right to receive that data in a common electronic format that allows you to supply that data to a third party - this is called "data portability".

To receive your information in a portable form, send an email your request to nubs-rec@nottingham.edu.my

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Appendix B

Questionnaire of Chinese Version

The corresponding English version will be displayed in parentheses, but the online Chinese version distributed to participants will not display the English version.

B.1 Chinese Questionnaire of Pilot Test

关于中国大学生网络游戏消费意图与行为的调查

(Survey on Online Game Consumption Intentions and Behaviors among Chinese University Students)

我们的研究旨在调查中国大学生日常网络游戏消费的动机、意图及其随后的行为模式。本研究的结果将为中国游戏市场的发展和政策制定提供理论支持。您的参与将为游戏产业的进步做出贡献。我们非常感谢您的参与。

您的参与是基于自愿，并匿名进行。您可以在任何时候选择退出本次调查。

谢谢，祝安好!

刘艺玄

诺丁汉大学商学院博士候选人

Our research aims to investigate the motivations, intentions, and subsequent behavioral patterns of daily online game consumption among Chinese university students in China. The outcomes of the study will provide theoretical support for the development and policy-making of the Chinese gaming industry. Your participation will contribute to the advancement of the gaming industry. We greatly appreciate your involvement.

Your participation is voluntary and anonymous. You may opt out of this survey at any point in time.

Thank you and best wish,

Yixuan Liu

Ph.D. Candidate from Nottingham University Business School,

University of Nottingham Malaysia

1、您的性别 (Your gender)

○男 (Male) ○女 (Female)

2、您所在的年级 (Your academic year)

○大一 (Freshman) ○大二 (Sophomore) ○大三 (Junior) ○大四 (Senior) ○研究生 (Postgraduate)

3、您每月的生活费（人民币） (Your monthly living expenses (RMB))

○0-1,999 ○2,000-3,999 ○4,000-5,999 ○6,000-7,999 ○8,000-9,999 ○>10,000

4、请选择并填写您最喜欢的游戏的全名（可以是来自台式或笔记本电脑，手机或平板的游戏；如果是其他平台，请填写“其他”）：_____。请根据您选择的游戏回答接下来的问题。(Please choose and enter the full name of your favorite game (either from a computer/laptop or from a mobile phone/tablet; if from other platforms, please fill in “other”):_____. Please answer the following questions according to the game you select.)

5、【PE1】我觉得我最喜欢的游戏在我的日常生活中非常有用 (I find my favorite game useful in my daily life)

○非常不同意 (Strongly Disagree) ○不同意 (Disagree) ○有些不同意 (Somewhat disagree) ○中立 (Neither agree nor disagree) ○有些同意 (Somewhat agree) ○同意 (Agree) ○非常同意 (Strongly agree)

6、【PE2】玩我最喜欢的游戏增加了我实现对我来说重要的事情的机会 (Playing my favorite game increases my chances of achieving things that are important to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

7、【PE3】玩我最喜欢的游戏帮助我更快地完成事情 (Playing my favorite game helps me accomplish things more quickly)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

8、【PE4】玩我最喜欢的游戏提高了我的生产力 (Playing my favorite game increases my productivity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

9、【EE1】学习如何操作我最喜欢的游戏对我来说很容易 (Learning how to play my favorite game is easy for me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

10、【EE2】我与我最喜欢的游戏的互动是清晰且易懂的 (My interaction with my favorite game is clear and understandable)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

11、【EE3】我觉得我最喜欢的游戏易于操作 (I find my favorite game easy to play)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

12、【EE4】熟练地操作我最喜欢的游戏对我来说很轻松 (It is easy for me to become skillful at playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

13、【SIF1】对我来说重要的人认为我应该玩我最喜欢的游戏 (People who are important to me think that I should play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

14、【SIF2】影响我行为的人认为我应该玩我最喜欢的游戏 (People who influence my behavior think that I should play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

15、【SIF3】我重视的人的意见倾向于我玩我最喜欢的游戏 (People whose opinions I value prefer that I play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

16、【FC1】我有玩我最喜欢的游戏的必要资源 (I have the resources necessary to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

17、【FC2】我有玩我最喜欢的游戏的必要知识 (I have the knowledge necessary to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

18、【FC3】我最喜欢的游戏与我玩的其他游戏相兼容 (My favorite game is compatible with other games I play)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

19、【FC4】当我在玩我最喜欢的游戏遇到困难时，我可以得到他人的帮助 (I can get help from others when I have difficulties playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

20、【PV1】我最喜欢的游戏价格合理 (My favorite game is reasonably priced)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

21、【PV2】我最喜欢的游戏物有所值 (My favorite game is a good value for the money)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

22、【PV3】按照当前的价格，我最喜欢的游戏提供了良好的价值 (At the current price, my favorite game provides a good value)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

23、【HM1】玩我最喜欢的游戏很有趣 (Playing my favorite game is fun)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

24、【HM2】玩我最喜欢的游戏很享受 (Playing my favorite game is enjoyable)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

25、【HM3】玩我最喜欢的游戏非常有娱乐性 (Playing my favorite game is very entertaining)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

26、【HA1】玩我最喜欢的游戏已经成为我的一种习惯 (The play of my favorite game has become a habit for me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

27、【HA2】我必须玩我最喜欢的游戏 (I must play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

28、【HA3】玩我最喜欢的游戏对我来说已经变得很自然了 (Playing my favorite game has become natural to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

29、【HA4】如果我在闲暇时间必须选择一个活动，那么选择玩我最喜欢的游戏对我来说是显而易见的 (If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

30、【FE1】在玩我最喜欢的游戏时，我深深地沉浸在这个活动中 (During the playing of my favorite game, I was absorbed intensely in the activity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

31、【FE2】当玩我最喜欢的游戏时，我强烈感觉自己置身于一个不同的世界 (I strongly feel that I am inside a different world when playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

32、【FE3】当玩我最喜欢的游戏时，我感觉毫无束缚 (When playing with my favorite game, I do not feel any control)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

33、【SEY1】我能够独自玩我最喜欢的游戏，不需要他人的帮助 (I am able to play my favorite game without the help of others)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

34、【SEY2】我有足够的时间让我最喜欢的游戏对我有所用处 (I have the necessary time to make my favorite game useful to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

35、【SEY3】我能够独自相当不错地玩好我最喜欢的游戏 (I am able to play my favorite reasonably well on my own)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

36、【ATT1】我对于玩我最喜欢的游戏感觉良好 (I feel good about playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

37、【ATT2】我喜欢玩我最喜欢的游戏 (I like playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

38、【ATT3】玩我最喜欢的游戏是个好主意 (Playing my favorite game is a good idea)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

39、【SIT1】玩我最喜欢的游戏让我更容易交到朋友 (Playing my favorite game has made it easier for me to make friends)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

40、【SIT2】我游戏中的朋友比其他人更能理解我 (My in-game friends understand me better than other people)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

41、【SIT3】我更喜欢在线上交流，而不是面对面的沟通 (I prefer communicating online to face-to-face communication)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

42、【EC1】我会想要通过我最喜欢的游戏来帮助我克服抑郁 (I will like to use my favorite game to help me get through depression)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

43、【EC2】我会想要通过我最喜欢的游戏来帮助我克制冲动行为 (I will like to use my favorite game to help me get through impulsivity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

44、【EC3】我会想要通过我最喜欢的游戏来帮助我客服焦虑 (I will like to use my favorite game to help me get through anxiety)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

45、【GI1】我打算将来继续玩我最喜欢的游戏 (I intend to continue playing my favorite game in the future)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

46、【GI2】我计划继续经常玩我最喜欢的游戏 (I plan to continue to play my favorite game frequently)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

47、【GI3】我会一直努力在日常生活中玩我最爱的游戏 (I will always try to play my favorite game in my daily life)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

48、【IGD1】我在控制自己玩游戏方面有困难 (I have had difficulties controlling my gaming activity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

49、【IGD2】我越来越重视游戏而不是其他生活乐趣和日常活动 (I have given increasing priority to gaming over other life interests and daily activities)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

50、【IGD3】尽管出现了不好的后果（比如对人际关系、学习或工作产生了负面影响），我仍然继续玩游戏 (I have continued gaming despite the occurrence of negative consequences (e.g., on interpersonal relationships, studies, or work))

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

51、【IGD4】玩游戏的严重度已经导致我在生活中遇到了重大问题（例如对个人、家庭、社交、教育、职业产生了严重影响）(I have experienced significant problems in life (e.g., personal, family, social, educational, and occupational) due to the severity of my gaming behavior)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

B.2 Chinese Questionnaire of Primary Data Collection

关于中国大学生网络游戏消费意图与行为的调查

(Survey on Online Game Consumption Intentions and Behaviors among Chinese University Students)

这项研究旨在调查中国大学生日常网络游戏消费的动机、意图及其随后的行为模式。本研究的结果将为中国游戏市场的发展和政策制定提供理论支持。您的参与将为游戏产业的进步做出贡献。我们非常感谢您的参与。

您的参与是基于自愿，并匿名进行。您可以在任何时候选择退出本次调查。

谢谢，祝安好！

刘艺玄

诺丁汉大学商学院博士候选人

(This research aims to investigate the motivations, intentions, and subsequent behavioral patterns of daily online game consumption among Chinese university students in China. The outcomes of the study will provide theoretical support for the development and strategy and/or policy-making of the Chinese gaming industry. Your participation will contribute to the advancement of the gaming industry. We greatly appreciate your involvement.

Your participation is voluntary and anonymous. You may opt out of this survey at any point in time.

Thank you and best wish,

Yixuan Liu

Ph.D. Candidate from Nottingham University Business School,

University of Nottingham Malaysia)

1、您的性别 (Your gender)

○男 (Male)　○女 (Gender)

2、您所在的年级 (Your academic year)

○大一 (Freshman) ○大二 (Sophomore) ○大三 (Junior) ○大四 (Senior) ○研究生 (Postgraduate)

3、您每月的生活费（人民币）(Your monthly living expenses (RMB))

○0-1,999 ○2,000-3,999 ○4,000-5,999 ○6,000-7,999 ○8,000-9,999 ○>10,000

4、请选择并填写您最喜欢的游戏的全名（可以是来自台式或笔记本电脑，手机或平板的游戏；如果是其他平台，请填写“其他”）：_____。请根据您选择的游戏回答接下来的问题。(Please choose and enter the full name of your favorite game (either from a computer/laptop or from a mobile phone/tablet; if from other platforms, please fill in “other”):_____. Please answer the following questions according to the game you select.)

5、【PE1】我觉得我最喜欢的游戏在我的日常生活中非常有用 (I find my favorite game useful in my daily life)

○非常不同意 (Strongly Disagree) ○不同意 (Disagree) ○有些不同意 (Somewhat disagree) ○中立 (Neither agree nor disagree) ○有些同意 (Somewhat agree) ○同意 (Agree) ○非常同意 (Strongly agree)

6、【PE2】玩我最喜欢的游戏增加了我实现对我来说重要的事情的机会 (Playing my favorite game increases my chances of achieving things that are important to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

7、【PE3】玩我最喜欢的游戏帮助我更快地完成事情 (Playing my favorite game helps me accomplish things more quickly)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

8、【PE4】玩我最喜欢的游戏提高了我的生产力 (Playing my favorite game increases my productivity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

9、【EE1】学习如何操作我最喜欢的游戏对我来说很简单 (Learning how to play my favorite game is easy for me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

10、【EE2】我与我最喜欢的游戏的互动是清晰且易懂的 (My interaction with my favorite game is clear and understandable)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

11、【EE3】我觉得我最喜欢的游戏易于操作 (I find my favorite game easy to play)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

12、【EE4】熟练地操作我最喜欢的游戏对我来说很轻松 (It is easy for me to become skillful at playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

13、【SIF1】对我来说重要的人认为我应该玩我最喜欢的游戏 (People who are important to me think that I should play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

14、【SIF2】影响我行为的人认为我应该玩我最喜欢的游戏 (People who influence my behavior think that I should play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

15、【SIF3】我重视的人更希望我玩我最喜欢的游戏 (People whose opinions I value prefer that I play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

16、【FC1】我拥有足够的资源去玩我最喜欢的游戏 (I have the resources necessary to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

17、【FC2】我拥有所需的知识去玩我最喜欢的游戏 (I have the knowledge necessary to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

18、【FC3】我最喜欢的游戏与我玩的其他游戏相兼容 (My favorite game is compatible with other games I play)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

19、【FC4】当我在玩我最喜欢的游戏遇到困难时，我能得到他人的帮助 (I can get help from others when I have difficulties playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

20、【PV1】我最喜欢的游戏价格合理 (My favorite game is reasonably priced)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

21、【PV2】我最喜欢的游戏物有所值 (My favorite game is a good value for the money)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

22、【PV3】按照当前的价格，我最喜欢的游戏具有良好的性价比 (At the current price, my favorite game provides a good value)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

23、【HM1】玩我最喜欢的游戏很有趣 (Playing my favorite game is fun)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

24、【HM2】玩我最喜欢的游戏的过程很享受 (Playing my favorite game is enjoyable)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

25、【HM3】玩我最喜欢的游戏非常有娱乐性 (Playing my favorite game is very entertainingv)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

26、【HA1】玩我最喜欢的游戏已经成为我的一种习惯 (The play of my favorite game has become a habit for me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

27、【HA2】我必须玩我最喜欢的游戏 (I must play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

28、【HA3】玩我最喜欢的游戏对我来说已经变得自然而然了 (Playing my favorite game has become natural to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

29、【HA4】如果我在闲暇时间必须选择一个活动，那么玩我最喜欢的游戏对我来说是显而易见的选择 (If I have to select a task in my leisure time, it is an obvious choice for me to play my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

30、【FE1】在玩我最喜欢的游戏时，我深深地沉浸在这个活动中 (During the playing of my favorite game, I was absorbed intensely in the activity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

31、【FE2】当玩我最喜欢的游戏时，我强烈地感觉自己置身于一个不同的世界 (I strongly feel that I am inside a different world when playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

32、【FE3】当玩我最喜欢的游戏时，我感觉毫无束缚 (When playing with my favorite game, I do not feel any control)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

33、【SEY1】我能够独自玩我最喜欢的游戏，不需要他人的帮助 (I am able to play my favorite game without the help of others)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

34、【SEY2】我有足够的时间让我最喜欢的游戏对我有所用处 (I have the necessary time to make my favorite game useful to me)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

35、【SEY3】我能够独自相当不错地玩好我最喜欢的游戏 (I am able to play my favorite reasonably well on my own)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

36、【ATT1】我对于玩我最喜欢的游戏感觉良好 (I feel good about playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

37、【ATT2】我喜欢玩我最喜欢的游戏 (I like playing my favorite game)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

38、【ATT3】玩我最喜欢的游戏是个好主意 (Playing my favorite game is a good idea)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

39、【SIT1】玩我最喜欢的游戏让我更容易交到朋友 (Playing my favorite game has made it easier for me to make friends)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

40、【SIT2】我游戏世界里的朋友比其他人更能理解我 (My in-game friends understand me better than other people)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

41、【SIT3】我更喜欢在线上交流，而不是面对面的沟通 (I prefer communicating online to face-to-face communication)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

42、【EC1】我会想要通过我最喜欢的游戏来帮助我克服抑郁 (I will like to use my favorite game to help me get through depression)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

43、【EC2】我会想要通过我最喜欢的游戏来帮助我克制冲动行为 (I will like to use my favorite game to help me get through impulsivity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

44、【EC3】我会想要通过我最喜欢的游戏来帮助我克服焦虑 (I will like to use my favorite game to help me get through anxiety)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

45、【GI1】我打算将来继续玩我最喜欢的游戏 (I intend to continue playing my favorite game in the future)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

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○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

47、【GI3】我会一直努力在日常生活中玩我最爱的游戏 (I will always try to play my favorite game in my daily life)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

48、【IGD1】我在控制自己玩游戏方面有困难 (I have had difficulties controlling my gaming activity)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

49、【IGD2】我越来越重视游戏而不是其他生活乐趣和日常活动 (I have given increasing priority to gaming over other life interests and daily activities)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

50、【IGD3】尽管出现了不好的后果（比如对人际关系、学习或工作产生了负面影响），我仍然继续玩游戏 (I have continued gaming despite the occurrence of negative consequences (e.g., on interpersonal relationships, studies, or work))

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

51、【IGD4】玩游戏的严重度已经导致我在生活中遇到了重大问题（例如对个人、家庭、社交、教育、职业产生了严重影响）(I have experienced significant problems in life (e.g., personal, family, social, educational, and occupational) due to the severity of my gaming behavior)

○非常不同意 ○不同意 ○有些不同意 ○中立 ○有些同意 ○同意 ○非常同意

Appendix C

Result of Measurement Model Evaluation across Moderators Subgroups

C.1 Assessment of Measurement Model across Moderators Subgroups (λ, CA, CR, AVE)

Dataset	Construct	Item	λ	CA	CR	AVE
All Gender (N=1882)	See Table 4.8					
Male (N=978)	Performance Expectancy	PE1	0.803	0.860	0.905	0.705
		PE2	0.854			
		PE3	0.866			
		PE4	0.834			
	Effort Expectancy	EE1	0.791	0.761	0.848	0.583
		EE2	0.741			
		EE3	0.709			
		EE4	0.809			
	Social Influence	SIF1	0.845	0.791	0.877	0.705
		SIF2	0.826			
		SIF3	0.846			
	Price Value	PV1	0.808	0.802	0.882	0.715
		PV2	0.864			
		PV3	0.863			
	Habit	HA1	0.803	0.779	0.857	0.602
		HA2	0.697			
		HA3	0.819			
		HA4	0.777			
	Flow Experience	FE1	0.820	0.725	0.843	0.642
		FE2	0.795			
		FE3	0.788			
	Social Interaction	SIT1	0.858	0.709	0.821	0.605
		SIT2	0.764			
		SIT3	0.705			
	Emotion Coping	EC1	0.849	0.799	0.881	0.713
		EC2	0.824			
		EC3	0.858			
	Gameplay Intention	GI1	0.815	0.756	0.860	0.672
		GI2	0.800			
		GI3	0.844			
Female (N=905)	Performance Expectancy	PE1	0.841	0.853	0.899	0.691
		PE2	0.847			
		PE3	0.833			
		PE4	0.802			

Dataset	Construct	Item	λ	CA	CR	AVE
	Effort Expectancy	EE1	0.795	0.788	0.862	0.611
		EE2	0.741			
		EE3	0.771			
		EE4	0.817			
	Social Influence	SIF1	0.863	0.798	0.881	0.711
		SIF2	0.828			
		SIF3	0.838			
	Price Value	PV1	0.821	0.832	0.897	0.743
		PV2	0.905			
		PV3	0.859			
	Habit	HA1	0.824	0.830	0.887	0.663
		HA2	0.764			
		HA3	0.872			
		HA4	0.792			
	Flow Experience	FE1	0.800	0.716	0.840	0.637
		FE2	0.802			
		FE3	0.792			
	Social Interaction	SIT1	0.822	0.740	0.849	0.653
		SIT2	0.811			
		SIT3	0.791			
	Emotion Coping	EC1	0.873	0.805	0.883	0.715
		EC2	0.803			
		EC3	0.859			
	Gameplay Intention	GI1	0.804	0.755	0.860	0.672
		GI2	0.834			
		GI3	0.820			
All Media (N=1520)	Performance Expectancy	PE1	0.819	0.855	0.902	0.696
		PE2	0.845			
		PE3	0.853			
		PE4	0.821			
	Effort Expectancy	EE1	0.808	0.778	0.857	0.601
		EE2	0.737			
		EE3	0.735			
		EE4	0.816			
	Social Influence	SIF1	0.855	0.793	0.878	0.707
		SIF2	0.818			
		SIF3	0.848			
	Facilitating Conditions	FC1	0.718	0.732	0.832	0.553
		FC2	0.782			
		FC3	0.772			
		FC4	0.700			
	Price Value	PV1	0.821	0.823	0.893	0.736

Dataset	Construct	Item	λ	CA	CR	AVE
		PV2	0.890			
		PV3	0.862			
	Gameplay	GI1	0.811	0.747	0.855	0.664
	Intention	GI2	0.810			
		GI3	0.824			
CoLa	Performance	PE1	0.787	0.844	0.895	0.681
(N=576)	Expectancy	PE2	0.842			
		PE3	0.853			
		PE4	0.817			
	Effort	EE1	0.795	0.764	0.849	0.585
	Expectancy	EE2	0.735			
		EE3	0.725			
		EE4	0.802			
	Social	SIF1	0.804	0.789	0.875	0.701
	Influence	SIF2	0.850			
		SIF3	0.856			
	Facilitating	FC1	0.771	0.747	0.840	0.569
	Conditions	FC2	0.790			
		FC3	0.767			
		FC4	0.685			
	Price Value	PV1	0.836	0.823	0.894	0.738
		PV2	0.869			
		PV3	0.872			
	Gameplay	GI1	0.806	0.743	0.853	0.660
	Intention	GI2	0.800			
		GI3	0.831			
MoTa_RS	Performance	PE1	0.834	0.860	0.905	0.704
(N=944)	Expectancy	PE2	0.847			
		PE3	0.851			
		PE4	0.823			
	Effort	EE1	0.816	0.789	0.863	0.613
	Expectancy	EE2	0.739			
		EE3	0.748			
		EE4	0.824			
	Social	SIF1	0.877	0.795	0.879	0.709
	Influence	SIF2	0.800			
		SIF3	0.846			
	Facilitating	FC1	0.689	0.723	0.827	0.545
	Conditions	FC2	0.777			
		FC3	0.775			
		FC4	0.707			
	Price Value	PV1	0.802	0.815	0.887	0.725

Dataset	Construct	Item	λ	CA	CR	AVE
		PV2	0.902			
		PV3	0.848			
	Gameplay	GI1	0.813	0.749	0.857	0.666
	Intention	GI2	0.816			
		GI3	0.819			
All Game	Performance	PE1	0.819	0.855	0.902	0.696
Genres	Expectancy	PE2	0.845			
(N=1291)		PE3	0.853			
		PE4	0.821			
	Effort	EE1	0.808	0.778	0.857	0.601
	Expectancy	EE2	0.737			
		EE3	0.735			
		EE4	0.816			
	Social	SIF1	0.866	0.793	0.878	0.707
	Influence	SIF2	0.774			
		SIF3	0.713			
	Facilitating	FC1	0.718	0.732	0.832	0.553
	Conditions	FC2	0.782			
		FC3	0.772			
		FC4	0.700			
	Price Value	PV1	0.821	0.823	0.893	0.736
		PV2	0.890			
		PV3	0.862			
	Hedonic	HM1	0.833	0.793	0.879	0.707
	Motivation	HM2	0.863			
		HM3	0.826			
	Habit	HA1	0.804	0.793	0.865	0.617
		HA2	0.710			
		HA3	0.843			
		HA4	0.778			
	Flow	FE1	0.815	0.723	0.843	0.641
	Experience	FE2	0.798			
		FE3	0.790			
	Social	SIT1	0.866	0.72	0.829	0.619
	Interaction	SIT2	0.774			
		SIT3	0.713			
	Emotion	EC1	0.858	0.801	0.882	0.714
	Coping	EC2	0.811			
		EC3	0.864			
	Gameplay	GI1	0.811	0.747	0.855	0.664
	Intention	GI2	0.810			
		GI3	0.824			

Dataset	Construct	Item	λ	CA	CR	AVE
ACT	Performance	PE1	0.809	0.854	0.902	0.696
(N=427)	Expectancy	PE2	0.828			
		PE3	0.861			
		PE4	0.838			
	Effort	EE1	0.787	0.757	0.844	0.576
	Expectancy	EE2	0.771			
		EE3	0.688			
		EE4	0.785			
	Social	SIF1	0.854	0.773	0.868	0.687
	Influence	SIF2	0.800			
		SIF3	0.833			
	Facilitating	FC1	0.761	0.756	0.845	0.577
	Conditions	FC2	0.795			
		FC3	0.773			
		FC4	0.708			
	Price Value	PV1	0.822	0.829	0.897	0.744
		PV2	0.892			
		PV3	0.873			
	Hedonic	HM1	0.867	0.817	0.891	0.732
	Motivation	HM2	0.863			
		HM3	0.837			
	Habit	HA1	0.808	0.786	0.861	0.608
		HA2	0.725			
		HA3	0.818			
		HA4	0.766			
	Flow	FE1	0.790	0.709	0.836	0.629
	Experience	FE2	0.798			
		FE3	0.792			
	Social	SIT1	0.893	0.707	0.803	0.581
	Interaction	SIT2	0.660			
		SIT3	0.713			
	Emotion	EC1	0.878	0.825	0.895	0.740
	Coping	EC2	0.829			
		EC3	0.873			
	Gameplay	GI1	0.804	0.747	0.856	0.664
	Intention	GI2	0.799			
		GI3	0.842			
ACA	Performance	PE1	0.828	0.860	0.903	0.700
(N=222)	Expectancy	PE2	0.866			
		PE3	0.835			
		PE4	0.818			

Dataset	Construct	Item	λ	CA	CR	AVE
	Effort Expectancy	EE1	0.777	0.732	0.834	0.558
		EE2	0.642			
		EE3	0.763			
		EE4	0.796			
	Social Influence	SIF1	0.846	0.804	0.884	0.718
		SIF2	0.886			
		SIF3	0.808			
	Facilitating Conditions	FC1	0.752	0.671	0.801	0.509
		FC2	0.803			
		FC3	0.750			
		FC4	0.511			
	Price Value	PV1	0.868	0.862	0.912	0.776
		PV2	0.926			
		PV3	0.847			
	Hedonic Motivation	HM1	0.736	0.753	0.857	0.668
		HM2	0.888			
		HM3	0.821			
	Habit	HA1	0.812	0.813	0.877	0.641
		HA2	0.772			
		HA3	0.830			
		HA4	0.788			
	Flow Experience	FE1	0.820	0.741	0.852	0.657
		FE2	0.819			
		FE3	0.792			
	Social Interaction	SIT1	0.811	0.718	0.841	0.639
		SIT2	0.867			
		SIT3	0.712			
	Emotion Coping	EC1	0.885	0.821	0.893	0.736
		EC2	0.850			
		EC3	0.838			
	Gameplay Intention	GI1	0.806	0.758	0.861	0.674
		GI2	0.832			
		GI3	0.824			
ROP (N=222)	Performance Expectancy	PE1	0.842	0.857	0.901	0.696
		PE2	0.864			
		PE3	0.848			
		PE4	0.780			
	Effort Expectancy	EE1	0.806	0.816	0.879	0.644
		EE2	0.807			
		EE3	0.787			
		EE4	0.810			

Dataset	Construct	Item	λ	CA	CR	AVE
	Social Influence	SIF1	0.867	0.826	0.893	0.735
		SIF2	0.813			
		SIF3	0.890			
	Facilitating Conditions	FC1	0.742	0.759	0.846	0.581
		FC2	0.805			
		FC3	0.825			
		FC4	0.667			
	Price Value	PV1	0.868	0.833	0.899	0.749
		PV2	0.867			
		PV3	0.861			
	Hedonic Motivation	HM1	0.811	0.781	0.873	0.696
		HM2	0.860			
		HM3	0.831			
	Habit	HA1	0.816	0.811	0.875	0.637
		HA2	0.737			
		HA3	0.852			
		HA4	0.784			
	Flow Experience	FE1	0.824	0.726	0.845	0.645
		FE2	0.806			
		FE3	0.779			
	Social Interaction	SIT1	0.867	0.722	0.837	0.636
		SIT2	0.860			
		SIT3	0.645			
	Emotion Coping	EC1	0.815	0.757	0.854	0.662
		EC2	0.764			
		EC3	0.859			
	Gameplay Intention	GI1	0.830	0.768	0.866	0.683
		GI2	0.823			
		GI3	0.826			
STR_RS (N=420)	Performance Expectancy	PE1	0.826	0.862	0.906	0.706
		PE2	0.854			
		PE3	0.852			
		PE4	0.829			
	Effort Expectancy	EE1	0.782	0.777	0.856	0.599
		EE2	0.732			
		EE3	0.757			
		EE4	0.822			
	Social Influence	SIF1	0.849	0.800	0.882	0.713
		SIF2	0.839			
		SIF3	0.846			
	Facilitating Conditions	FC1	0.681	0.721	0.827	0.544
		FC2	0.763			
		FC3	0.747			

Dataset	Construct	Item	λ	CA	CR	AVE
		FC4	0.757			
	Price Value	PV1	0.712	0.770	0.860	0.674
		PV2	0.870			
		PV3	0.871			
	Hedonic	HM1	0.838	0.783	0.874	0.698
	Motivation	HM2	0.861			
		HM3	0.806			
	Habit	HA1	0.819	0.827	0.885	0.659
		HA2	0.742			
		HA3	0.861			
		HA4	0.820			
	Flow	FE1	0.819	0.715	0.839	0.634
	Experience	FE2	0.793			
		FE3	0.777			
	Social	SIT1	0.810	0.743	0.847	0.649
	Interaction	SIT2	0.829			
		SIT3	0.776			
	Emotion	EC1	0.857	0.806	0.885	0.720
	Coping	EC2	0.833			
		EC3	0.854			
	Gameplay	GI1	0.797	0.765	0.865	0.681
	Intention	GI2	0.826			
		GI3	0.851			

C.2 Assessment of Measurement Model across Moderator Subgroups (HTMT)

Dataset	HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	SIT	EC	GI
All Gender (n=1882)	See Table 4.9											
Male (n=978)	**PE**											
	EE	0.402										
	SIF	0.672	0.491									
	PV	0.424	0.571	0.475								
	HA	0.486	0.624	0.581		0.487						
	FE	0.459	0.598	0.544		0.518		0.749				
	SIT	0.589	0.260	0.651		0.414		0.575	0.543			
	EC	0.445	0.324	0.386		0.353		0.520	0.506	0.629		
	GI	0.435	0.653	0.486		0.481		0.823	0.690	0.413	0.526	
Famale(n=905)	**PE**											
	EE	0.328										
	SIF	0.554	0.366									
	PV	0.329	0.409	0.308								
	HA	0.454	0.598	0.494		0.289						
	FE	0.432	0.602	0.464		0.397		0.781				
	SIT	0.541	0.184	0.503		0.221		0.452	0.543			
	EC	0.462	0.375	0.433		0.250		0.509	0.587	0.614		
	GI	0.424	0.667	0.438		0.343		0.858	0.759	0.375	0.520	
All Media (n=1520)	**PE**											
	EE	0.359										
	SIF	0.616	0.428									

Dataset	HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	SIT	EC	GI
	FC	0.462	0.719	0.574								
	PV	0.372	0.482	0.386	0.591							
	GI	0.416	0.665	0.479	0.655	0.391						
CoLa (n=576)	**PE**											
	EE	0.320										
	SIF	0.578	0.403									
	FC	0.391	0.736	0.516								
	PV	0.320	0.565	0.374	0.567							
	GI	0.347	0.588	0.426	0.620	0.478						
MoTa_RS (n=944)	**PE**											
	EE	0.390										
	SIF	0.634	0.447									
	FC	0.497	0.716	0.604								
	PV	0.386	0.467	0.386	0.604							
	GI	0.465	0.710	0.515	0.681	0.358						
All Game Genres(n=1291)	**PE**											
	EE	0.358										
	SIF	0.597	0.433									
	FC	0.477	0.727	0.544								
	PV	0.354	0.466	0.359	0.592							
	HM	0.217	0.715	0.294	0.617	0.483						
	HA	0.470	0.594	0.543	0.622	0.363	0.609					
	FE	0.445	0.615	0.528	0.646	0.468	0.622	0.747				
	SIT	0.573	0.229	0.594	0.400	0.285	0.198	0.522	0.518			
	EC	0.457	0.334	0.409	0.386	0.254	0.305	0.537	0.548	0.617		

Dataset	HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	SIT	EC	GI
	GI	0.425	0.642	0.457	0.624	0.414	0.708	0.830	0.719	0.385	0.521	
ACT (n=427)	**PE**											
	EE	0.397										
	SIF	0.612	0.497									
	FC	0.516	0.788	0.630								
	PV	0.422	0.577	0.425	0.618							
	HM	0.274	0.649	0.314	0.638	0.525						
	HA	0.459	0.534	0.575	0.648	0.455	0.613					
	FE	0.466	0.667	0.576	0.732	0.538	0.669	0.738				
	SIT	0.548	0.295	0.616	0.484	0.331	0.297	0.493	0.505			
	EC	0.397	0.292	0.407	0.411	0.283	0.317	0.490	0.521	0.651		
	GI	0.463	0.599	0.590	0.667	0.516	0.724	0.782	0.742	0.443	0.562	
ACA (n=222)	**PE**											
	EE	0.281										
	SIF	0.490	0.333									
	FC	0.399	0.560	0.479								
	PV	0.107	0.172	0.177	0.537							
	HM	0.145	0.625	0.242	0.597	0.401						
	HA	0.426	0.459	0.343	0.436	0.127	0.466					
	FE	0.335	0.556	0.316	0.53	0.301	0.519	0.628				
	SIT	0.465	0.272	0.398	0.337	0.104	0.151	0.555	0.470			
	EC	0.49	0.359	0.276	0.236	0.071	0.180	0.520	0.465	0.598		
	GI	0.427	0.574	0.353	0.519	0.114	0.641	0.813	0.746	0.343	0.510	
ROP (n=222)	**PE**											
	EE	0.357										

Dataset	HTMT	PE	EE	SIF	FC	PV	HM	HA	FE	SIT	EC	GI
	SIF	0.677	0.344									
	FC	0.461	0.714	0.496								
	PV	0.411	0.369	0.337	0.572							
	HM	0.249	0.794	0.287	0.644	0.535						
	HA	0.469	0.603	0.609	0.600	0.372	0.615					
	FE	0.452	0.551	0.544	0.616	0.453	0.555	0.813				
	SIT	0.615	0.183	0.668	0.364	0.273	0.151	0.621	0.469			
	EC	0.575	0.243	0.440	0.466	0.427	0.374	0.569	0.535	0.658		
	GI	0.374	0.627	0.434	0.594	0.375	0.740	0.850	0.665	0.334	0.436	
STR_RS (n=420)	**PE**											
	EE	0.314										
	SIF	0.592	0.455									
	FC	0.447	0.714	0.515								
	PV	0.387	0.549	0.416	0.593							
	HM	0.136	0.764	0.287	0.562	0.445						
	HA	0.487	0.682	0.564	0.679	0.500	0.650					
	FE	0.455	0.601	0.574	0.619	0.495	0.641	0.768				
	SIT	0.635	0.217	0.632	0.383	0.425	0.191	0.483	0.592			
	EC	0.445	0.404	0.472	0.392	0.302	0.329	0.586	0.635	0.573		
	GI	0.388	0.692	0.384	0.612	0.486	0.689	0.864	0.703	0.407	0.527	

Appendix D

Result of MICOM Procedure

D.1 MICOM Results for Male and Female Groups

		Compositional Invariance			Equal Mean		Equal Variances		
Male-Female	Configural Invariance	C=1	Confidence Interval	Partial Measurement Invariance Established	Difference	Confidence Interval	Difference	Confidence Interval	Full Measurement Invariance Established
PE	YES	0.998	[0.998, 1.000]	YES	0.208	[-0.079, 0.075]	0.046	[-0.094, 0.099]	NO
EE	YES	1.000	[0.998, 1.000]	YES	-0.070	[-0.077, 0.077]	-0.064	[-0.129, 0.129]	YES
SIF	YES	0.999	[0.998, 1.000]	YES	0.120	[-0.076, 0.076]	-0.079	[-0.098, 0.103]	NO
PV	YES	0.999	[0.997, 1.000]	YES	0.155	[-0.075, 0.077]	-0.115	[-0.109, 0.115]	NO
HA	YES	1.000	[0.999, 1.000]	YES	-0.040	[-0.076, 0.076]	-0.191	[-0.123, 0.120]	NO
FE	YES	1.000	[0.998, 1.000]	YES	0.018	[-0.076, 0.075]	-0.069	[-0.116, 0.116]	YES
SIT	YES	0.993	[0.990, 1.000]	YES	0.203	[-0.076, 0.075]	-0.113	[-0.099, 0.095]	NO
EC	YES	0.998	[0.998, 1.000]	YES	0.112	[-0.075, 0.075]	-0.120	[-0.127, 0.132]	NO
GI	YES	1.000	[0.999, 1.000]	YES	-0.053	[-0.077, 0.076]	-0.015	[-0.121, 0.120]	YES

D.2 MICOM Result for Computer/Laptop (CoLa) and Mobile Phone/Tablet_RS (MoTa_RS) Groups

		Compositional Invariance			Equal Mean		Equal Variances		
CoLa-MoTa_RS	Configural Invariance	C=1	Confidence Interval	Partial Measurement Invariance Established	Difference	Confidence Interval	Difference	Confidence Interval	Full Measurement Invariance Established
PE	YES	1.000	[0.997, 1.000]	YES	0.171	[-0.087, 0.086]	-0.071	[-0.112, 0.113]	NO
EE	YES	1.000	[0.998, 1.000]	YES	-0.088	[-0.088, 0.085]	-0.042	[-0.148, 0.148]	YES
SIF	YES	0.997	[0.997, 1.000]	YES	0.113	[-0.087, 0.087]	-0.128	[-0.116, 0.111]	NO
FC	YES	1.000	[0.997, 1.000]	YES	0.100	[-0.087, 0.085]	-0.092	[-0.123, 0.123]	NO
PV	YES	0.997	[0.996, 1.000]	YES	0.359	[-0.086, 0.087]	-0.109	[-0.134, 0.129]	NO
GI	YES	1.000	[0.999, 1.000]	YES	-0.040	[-0.087, 0.086]	0.054	[-0.140, 0.133]	YES

D.3 MICOM Results for Action (ACT) and Action Adventure (ACA) Groups

ACT-ACA	Configural Invariance	Compositional Invariance		Partial Measurement Invariance Established	Equal Mean		Equal Variances		Full Measurement Invariance Established
		C=1	Confidence Interval		Difference	Confidence Interval	Difference	Confidence Interval	
PE	YES	0.998	[0.992, 1.000]	YES	-0.173	[-0.216, 0.215]	0.071	[-0.276, 0.293]	YES
EE	YES	0.997	[0.986, 1.000]	YES	-0.311	[-0.218, 0.215]	0.216	[-0.354, 0.353]	NO
SIF	YES	0.997	[0.988, 1.000]	YES	-0.161	[-0.208, 0.219]	-0.038	[-0.282, 0.281]	YES
FC	YES	0.995	[0.988, 1.000]	YES	-0.291	[-0.206, 0.219]	0.272	[-0.306, 0.290]	NO
PV	YES	0.995	[0.987, 1.000]	YES	-0.056	[-0.205, 0.225]	-0.124	[-0.300, 0.319]	YES
HM	YES	0.996	[0.996, 1.000]	YES	-0.259	[-0.217, 0.222]	0.365	[-0.385, 0.406]	NO
HA	YES	0.999	[0.996, 1.000]	YES	-0.310	[-0.219, 0.212]	0.037	[-0.301, 0.311]	NO
FE	YES	0.999	[0.989, 1.000]	YES	-0.207	[-0.211, 0.223]	-0.035	[-0.330, 0.347]	YES
SIT	YES	0.963	[0.927, 1.000]	YES	-0.041	[-0.223, 0.225]	0.000	[-0.258, 0.278]	YES
EC	YES	1.000	[0.993, 1.000]	YES	-0.038	[-0.218, 0.220]	-0.004	[-0.336, 0.347	YES
GI	YES	1.000	[0.996, 1.000]	YES	-0.327	[-0.209, 0.219]	0.191	[-0.323, 0.326]	NO

D.4 MICOM Results for Action (ACT) and Role-Playing (ROP) Groups

ACT-ROP	Configural Invariance	Compositional Invariance		Partial Measurement Invariance Established	Equal Mean		Equal Variances		Full Measurement Invariance Established
		C=1	Confidence Interval		Difference	Confidence Interval	Difference	Confidence Interval	
PE	YES	0.997	[0.991, 1.000]	YES	-0.233	[-0.230, 0.206]	0.088	[-0.279, 0.280]	NO
EE	YES	0.996	[0.991, 1.000]	YES	-0.285	[-0.207, 0.220]	-0.021	[-0.351, 0.379]	NO
SIF	YES	0.995	[0.989, 1.000]	YES	-0.089	[-0.218, 0.212]	-0.145	[-0.288, 0.301]	YES
FC	YES	0.999	[0.990 1.000]	YES	-0.324	[-0.208, 0.221]	0.107	[-0.308, 0.300]	NO
PV	YES	0.999	[0.992, 1.000]	YES	-0.181	[-0.207, 0.217]	0.113	[-0.303, 0.325]	YES
HM	YES	0.999	[0.997, 1.000]	YES	-0.169	[-0.213, 0.218]	0.220	[-0.392, 0.400]	YES
HA	YES	1.000	[0.996, 1.000]	YES	-0.185	[-0.216, 0.216]	-0.084	[-0.328, 0.328]	YES
FE	YES	1.000	[0.988, 1.000]	YES	-0.118	[-0.218, 0.222]	-0.127	[-0.323, 0.340]	YES
SIT	YES	0.971	[0.928, 1.000]	YES	-0.024	[-0.210, 0.213]	-0.002	[-0.256, 0.256]	YES
EC	YES	0.996	[0.991, 1.000]	YES	-0.105	[-0.207, 0.219]	0.265	[-0.372, 0.399]	YES
GI	YES	0.999	[0.997, 1.000]	YES	-0.239	[-0.213, 0.224]	0.081	[-0.322, 0.330]	NO

D.5 MICOM Results for Action (ACT) and Strategy_RS (STR_RS) Groups

ACT-STR_RS	Configural Invariance	Compositional Invariance		Partial Measurement Invariance Established	Equal Mean		Equal Variances		Full Measurement Invariance Established
		C=1	Confidence Interval		Difference	Confidence Interval	Difference	Confidence Interval	
PE	YES	0.999	[0.994, 1.000]	YES	0.057	[-0.184, 0.178]	0.057	[-0.184, 0.178]	YES
EE	YES	0.998	[0.992, 1.000]	YES	0.048	[-0.182, 0.177]	0.048	[-0.182, 0.177]	YES
SIF	YES	0.999	[0.991 1.000]	YES	-0.002	[-0.188, 0.176]	-0.002	[-0.188, 0.176]	YES
FC	YES	1.000	[0.992, 1.000]	YES	0.002	[-0.175, 0.179]	0.002	[-0.175, 0.179]	YES
PV	YES	0.995	[0.993, 1.000]	YES	0.117	[-0.186, 0.180]	0.117	[-0.186, 0.180]	YES
HM	YES	1.000	[0.998, 1.000]	YES	0.050	[-0.178, 0.181]	0.050	[-0.178, 0.181]	YES
HA	YES	0.999	[0.998, 1.000]	YES	-0.048	[-0.173, 0.168]	-0.048	[-0.173, 0.168]	YES
FE	YES	1.000	[0.992, 1.000]	YES	0.107	[-0.182, 0.177]	0.107	[-0.182, 0.177]	YES
SIT	YES	0.982	[0.957, 1.000]	YES	-0.090	[-0.187, 0.169]	-0.090	[-0.187, 0.169]	YES
EC	YES	1.000	[0.995, 1.000]	YES	0.012	[-0.182, 0.176]	0.012	[-0.182, 0.176]	YES
GI	YES	1.000	[0.997, 1.000]	YES	-0.019	[-0.170, 0.175]	-0.019	[-0.170, 0.175]	YES

D.6 MICOM Results for Action Adventure and Strategy_RS Groups

ACA-STR_RS	Configural Invariance	Compositional Invariance		Partial Measurement Invariance Established	Equal Mean		Equal Variances		Full Measurement Invariance Established
		C=1	Confidence Interval		Difference	Confidence Interval	Difference	Confidence Interval	
PE	YES	0.999	[0.988, 1.000]	YES	0.233	[-0.218, 0.216]	-0.043	[-0.293, 0.280]	NO
EE	YES	0.999	[0.990, 1.000]	YES	0.349	[-0.231, 0.207]	-0.297	[-0.379, 0.356]	NO
SIF	YES	0.995	[0.980, 1.000]	YES	0.155	[-0.220, 0.205]	-0.060	[-0.286, 0.273]	YES
FC	YES	0.993	[0.980, 1.000]	YES	0.307	[-0.221, 0.222]	-0.156	[-0.333, 0.288]	NO
PV	YES	0.984	[0.971, 1.000]	YES	0.174	[-0.222, 0.209]	0.241	[-0.343, 0.316]	YES
HM	YES	0.997	[0.995, 1.000]	YES	0.315	[-0.223, 0.215]	-0.292	[-0.443, 0.417]	NO
HA	YES	1.000	[0.998, 1.000]	YES	0.262	[-0.235, 0.220]	-0.053	[-0.356, 0.335]	NO
FE	YES	1.000	[0.990, 1.000]	YES	0.305	[-0.216, 0.211]	-0.075	[-0.357, 0.338]	NO
SIT	YES	0.996	[0.947, 1.000]	YES	-0.061	[-0.224, 0.219]	-0.066	[-0.292, 0.265]	YES
EC	YES	1.000	[0.993, 1.000]	YES	0.050	[-0.222, 0.215]	0.073	[-0.392, 0.341]	YES
GI	YES	1.000	[0.997, 1.000]	YES	0.302	[-0.222, 0.213]	-0.240	[-0.369, 0.349]	NO

D.7 MICOM Results for Role-Playing and Strategy_RS Groups

ROP-STR_RS	Configural Invariance	Compositional Invariance		Partial Measurement Invariance Established	Equal Mean		Equal Variances		Full Measurement Invariance Established
		C=1	Confidence Interval		Difference	Confidence Interval	Difference	Confidence Interval	
PE	YES	0.999	[0.987, 1.000]	YES	0.296	[-0.218, 0.215]	-0.053	[-0.284, 0.260]	NO
EE	YES	0.998	[0.993, 1.000]	YES	0.322	[-0.222, 0.208]	-0.081	[-0.376, 0.364]	NO
SIF	YES	0.998	[0.981, 1.000]	YES	0.087	[-0.226, 0.219]	0.054	[-0.292, 0.282]	YES
FC	YES	0.998	[0.983, 1.000]	YES	0.341	[-0.216, 0.222]	0.008	[-0.321, 0.303]	NO
PV	YES	0.993	[0.984, 1.000]	YES	0.307	[-0.221, 0.212]	0.014	[-0.353, 0.319]	NO
HM	YES	1.000	[0.995, 1.000]	YES	0.223	[-0.223, 0.206]	-0.144	[-0.421, 0.424]	NO
HA	YES	1.000	[0.997, 1.000]	YES	0.133	[-0.222, 0.213]	0.071	[-0.350, 0.350]	YES
FE	YES	1.000	[0.988, 1.000]	YES	0.217	[-0.214, 0.209]	0.022	[-0.348, 0.312]	NO
SIT	YES	0.998	[0.950, 1.000]	YES	-0.050	[-0.214, 0.222]	-0.074	[-0.276, 0.261]	YES
EC	YES	0.995	[0.989, 1.000]	YES	0.122	[-0.221, 0.212]	-0.200	[-0.405, 0.373]	YES
GI	YES	0.999	[0.997, 1.000]	YES	0.216	[-0.214, 0.209]	-0.130	[-0.346, 0.345]	NO

Appendix E

NPT-based Pairwise Path Coefficient Comparison

Relationship	Comparison	Diff	Permutation Test		
			Conventional p-value: 0.05	Šidák's p-value adjustments: 0.0085	Bonferroni's p-value adjustments: 0.0083
PE -> GI	Male vs Female	-0.009	0.406		
	CoLa vs MoTa_RS	-0.017	0.348		
	ACT vs ACA	-0.061	0.433	0.430	0.424
	ACT vs ROP	-0.016	0.843	0.836	0.847
	ACT vs STR_RS	-0.006	0.921	0.925	0.928
	ACA vs ROP	0.045	0.611	0.626	0.612
	ACA vs STR_RS	0.055	0.453	0.449	0.450
	ROP vs STR_RS	0.010	0.890	0.895	0.897
EE -> GI	Male vs Female	-0.026	0.299		
	CoLa vs MoTa_RS	-0.031	0.286		
	ACT vs ACA	-0.005	0.956	0.956	0.959
	ACT vs ROP	0.017	0.845	0.838	0.832
	ACT vs STR_RS	-0.079	0.248	0.248	0.252
	ACA vs ROP	0.021	0.841	0.833	0.836
	ACA vs STR_RS	-0.074	0.400	0.390	0.397
	ROP vs STR_RS	-0.096	0.302	0.276	0.280
SIF -> GI	Male vs Female	0.015	0.354		
	CoLa vs MoTa_RS	0.002	0.492		
	ACT vs ACA	0.093	0.234	0.232	0.240
	ACT vs ROP	0.108	0.193	0.176	0.175
	ACT vs STR_RS	0.230	**0.000**	**0.000**	**0.000**

Relationship	Comparison	Diff	Permutation Test		
			Conventional p-value: 0.05	**Šidák's p-value adjustments: 0.0085**	**Bonferroni's p-value adjustments: 0.0083**
	ACA vs ROP	0.015	0.858	0.857	0.847
	ACA vs STR_RS	0.137	**0.039**	0.043	0.040
	ROP vs STR_RS	0.122	0.093	0.076	0.087
FC -> GI	CoLa vs MoTa_RS	0.011	0.423		
	ACT vs ACA	-0.015	0.871	0.878	0.873
	ACT vs ROP	-0.036	0.700	0.703	0.710
	ACT vs STR_RS	0.000	0.997	0.998	0.997
	ACA vs ROP	-0.021	0.830	0.833	0.832
	ACA vs STR_RS	0.015	0.873	0.873	0.877
	ROP vs STR_RS	0.035	0.710	0.715	0.706
PV -> GI	Male vs Female	0.001	0.484		
	CoLa vs MoTa_RS	0.078	**0.041**		
	ACT vs ACA	0.094	0.162	0.164	0.165
	ACT vs ROP	0.063	0.408	0.405	0.410
	ACT vs STR_RS	-0.008	0.897	0.892	0.891
	ACA vs ROP	-0.031	0.692	0.683	0.693
	ACA vs STR_RS	-0.102	0.142	0.137	0.135
	ROP vs STR_RS	-0.071	0.360	0.369	0.362
HM -> GI	ACT vs ACA	0.045	0.620	0.630	0.629
	ACT vs ROP	-0.009	0.928	0.929	0.917
	ACT vs STR_RS	0.100	0.207	0.218	0.231
	ACA vs ROP	-0.054	0.657	0.663	0.670
	ACA vs STR_RS	0.055	0.580	0.577	0.590

Relationship	Comparison	Diff	Permutation Test		
			Conventional p-value: 0.05	**Šidák's p-value adjustments: 0.0085**	**Bonferroni's p-value adjustments: 0.0083**
	ROP vs STR_RS	0.109	0.304	0.297	0.313
HA -> GI	Male vs Female	-0.038	0.224		
	ACT vs ACA	-0.113	0.247	0.241	0.247
	ACT vs ROP	-0.217	**0.024**	0.024	0.022
	ACT vs STR_RS	-0.193	**0.013**	0.013	0.011
	ACA vs ROP	-0.104	0.381	0.381	0.393
	ACA vs STR_RS	-0.080	0.400	0.394	0.388
	ROP vs STR_RS	0.024	0.800	0.800	0.796
FE -> GI	Male vs Female	0.002	0.484		
	ACT vs ACA	-0.152	**0.041**	0.038	0.046
	ACT vs ROP	0.039	0.640	0.624	0.621
	ACT vs STR_RS	0.017	0.798	0.803	0.811
	ACA vs ROP	0.191	**0.032**	0.035	0.030
	ACA vs STR_RS	0.169	**0.037**	0.038	0.040
	ROP vs STR_RS	-0.022	0.804	0.805	0.801
SIT -> GI	Male vs Female	-0.022	0.309		
	ACT vs ACA	0.101	0.186	0.171	0.169
	ACT vs ROP	0.046	0.569	0.579	0.563
	ACT vs STR_RS	-0.055	0.401	0.414	0.411
	ACA vs ROP	-0.055	0.581	0.574	0.588
	ACA vs STR_RS	-0.156	**0.047**	0.047	0.049
	ROP vs STR_RS	-0.101	0.231	0.242	0.244
EC -> GI	Male vs Female	0.020	0.323		

Relationship	Comparison	Diff	Permutation Test		
			Conventional p-value: 0.05	**Šidák's p-value adjustments: 0.0085**	**Bonferroni's p-value adjustments: 0.0083**
	ACT vs ACA	0.051	0.525	0.526	0.520
	ACT vs ROP	0.148	0.074	0.074	0.070
	ACT vs STR_RS	0.093	0.145	0.140	0.138
	ACA vs ROP	0.096	0.290	0.293	0.300
	ACA vs STR_RS	0.042	0.557	0.567	0.563
	ROP vs STR_RS	-0.054	0.477	0.480	0.467