Are online mobile gamers really happy? On the suppressor role of online game addiction

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Abstract:

Drawing upon the Stimulus-Organism-Response Theory and Flow Theory, this study aims to investigate the effects of environmental stimuli that are unique to the mobile multiplayer online battle arena (MOBA) environment (i.e., immediacy, social interaction, and competition) in inducing the state of flow, which is expected to be the basis of online game addiction and subjective happiness among the online mobile gamers. Besides, this study explores the uncharted role of addiction in suppressing the effect of flow on happiness through the theoretical lens of Rational Addiction Theory. The results indicate that all environmental stimuli are directly and positively related to the state of flow, which relates directly and positively to online game addiction and subjective happiness. Online game addiction is found to have a direct and negative association with subjective happiness, on top of its suppressor role that negatively mediates the relationship between flow and subjective happiness.

Keywords:

online game addiction; hedonic information systems; Stimulus-Organism-Response Theory; Flow Theory; Rational Addiction Theory; competitive mediation.

1.0 Introduction

> *Playing video games in an online world is unlikely to be a source of real fulfilment. The pleasure derived from a video game may last for weeks or even months. But it will not last many years… Happiness comes from fulfilment, from living up to your potential, which means more than playing online video games (Leonard, 2016, p.119).*

For decades, video games have been a popular form of entertainment worldwide (Tang et al., 2020), with online video games accounting for a significant share of growth and revenues (Hyeong et al., 2020; X. Wang et al., 2021). Given this, online games have been continuously evolving to provide gamers with different kinds of experience. In recent years, on account of the advancement of the mobile Internet and the proliferation of smart mobile devices, mobile games have become mainstream in the online game industry (Baabdullah, 2020). This is especially the case with the release of mobile multiplayer online battle arena (MOBA) games that feature the elements of cooperation and competition between online mobile gamers (L. Wang et al., 2021). League of Legends and Mobile Legends are some popular examples under this game genre (T'ng & Pau, 2021).

From the perspective of information systems (IS), online games including the mobile MOBA games are one of the many pleasure-oriented IS, which Heijden (Heijden, 2004) termed as hedonic IS (Z. Wang & Scheepers, 2012). The primary objective of the hedonic IS, according to Turel (2016), is to provide a sense of fun to the users during their interactions with the systems. In this manner, hedonic IS users usually seek emotions such as happiness rather than utility in their usage (Lim et al., 2017). Nonetheless, the excessive use of hedonic IS could result in negative consequences that could become a threat eventually (Turel, 2015b). One of the notable consequences is technology-related addictions that cause the users to disregard other important activities and excessively use the hedonic IS (Kloker, 2020; Turel, 2015a).

One of the main drivers of hedonic IS addiction, as reported by M. Gong et al. (2020), is the state of flow experienced by the users. This is particularly true in the context of online mobile games, as Laffan et al. (2016) argued that online games do provide a suitable structure that is capable of optimally inducing the state of flow among the gamers. While it is also acknowledged that the state of flow could elicit a sense of happiness among the online mobile gamers who are experiencing it (Su et al., 2016), it remains questionable whether the addicted online mobile gamers are enjoying the

greatest level of happiness over their excessive playing (Chou & Ting, 2003; Leonard, 2016). This defeats the purpose of hedonic IS and online mobile games, which seek to provide self-fulfilling values such as happiness and enjoyment to the users (Heijden, 2004; H. Y. Wang et al., 2021; Z. Wang & Scheepers, 2012).

Against this backdrop, it is crucial to ascertain if online game addiction is acting as a suppressor that negatively mediates the positive effect of flow on happiness among the online mobile gamers. To achieve this objective, this study draws upon the Stimulus-Organism-Response (SOR) Theory (Mehrabian & Russell, 1974) and Flow Theory (Csikszentmihalyi, 1990) to investigate the antecedents and consequences of the state of flow, on top of exploring the suppressor role of online game addiction through the theoretical lens of Rational Addiction Theory (Becker & Murphy, 1988).

Specifically, this study enhances the current state of knowledge on online game addiction by investigating the effects of environmental stimuli that are unique to the mobile MOBA environment (i.e., immediacy, social interaction, and competition) in inducing the state of flow, which is expected to be the basis of online game addiction and subjective happiness among the online mobile gamers. Additionally, this study sheds light on the implication of online game addiction towards online mobile gamers' happiness, which is considered rare among the literature on online game addiction. On the other hand, this study contributes towards the broad hedonic IS literature by exploring the uncharted role of addiction in suppressing the effect of flow on happiness. Although hedonic IS are not a novel research avenue, it is surprising that the notion of happiness, the main objective that hedonic IS seek to achieve, has received less attention thus far. According to Ke et al. (2022), both people and technology are the key elements of IS research. This study addresses both IS elements by investigating how do people (i.e., online mobile gamers) develop addictions with technology (i.e., online mobile games) and how does technology affect their well-being.

2.0 Literature Review and Theoretical Background

2.1 Online Game Addiction

Playing online games is widely regarded as an activity that could induce addictive behaviours (Triberti et al., 2018), hence scholars are devoting efforts to understand this particular phenomenon. Nonetheless, among the online game addiction literature (as shown in Appendix A), the effects of environmental stimuli within the online games have rarely been investigated thus far. Moreover, most of these studies

researched online game addiction as an outcome and did not contemplate the potential effects of online game addiction on online gamers' well-being, which is happiness in this case.

Besides, online games are constantly evolving, resulting in many new genres such as massively multiplayer online role-playing game (MMORPG) and massively multiplayer online game (MMOG) (Shen et al., 2014; Tung & Lan, 2017; Q. H. Wang et al., 2013). Thus far, as shown in Appendix A, it is noticed that MMORPG and MMOG have received much attentions in the literature as compared to MOBA, a relatively new genre and less explored in terms of online game addiction (Aggarwal et al., 2020). As clearly defined by Mora-Cantallops and Sicilia (Mora-Cantallops & Sicilia, 2018), MOBA games are "a subgenre of real-time strategy games in which two teams, typically consisting of five players each, compete against each other with each player controlling a single character" (p.128). Accordingly, immediacy, social interaction, and competition are deemed to be defining characteristics of MOBA games. In many eSports tournaments, MOBA games represent the main choice (Xia et al., 2019) and have attracted a huge number of players, making this game genre a worthy subject of investigation (Matsui et al., 2020). Furthermore, as indicated in Appendix A, the extant literature on online game addiction does not consider the main characteristics of online games as the drivers of online game addiction, making this an interesting literature gap that deserves attention.

Contemplating these current research gaps, this study applies the SOR Theory (Mehrabian & Russell, 1974) as the overarching theory in researching an underexplored yet popular MOBA game named Mobile Legends (Hairollizam et al., 2020). Specifically, unique environmental stimuli presented under the mobile MOBA environment (i.e., immediacy, social interaction, and competition) should induce the state of flow, a form of organism that is drawn upon the Flow Theory (Csikszentmihalyi, 1990). Subsequently, the state of flow shall lead to two distinct forms of response, namely online game addiction and subjective happiness.

2.2 Hedonic IS

The concept of pleasure-oriented hedonic IS was first differentiated from the productivity-oriented utilitarian IS by Heijden (2004) to recognise that IS are not always utilitarian. Since then, scholars have been devoting efforts to further understand this distinct field of IS and Appendix B showcases a comprehensive review of empirical

studies conducted on hedonic IS. Notwithstanding that many efforts have been devoted to the field of hedonic IS, the addiction behaviours and well-being of users (e.g., happiness) are not receiving much attention as the empirical studies on hedonic IS mainly sought to understand the behaviours of users during their first use or subsequent use. In this manner, the suppressor role of addiction on happiness has also been neglected thus far. Contemplating that the main purpose of hedonic IS is to provide self-fulfilling values such as happiness to the users (Heijden, 2004; Z. Wang & Scheepers, 2012), this study seeks to fill in these gaps through the theoretical lens of Rational Addiction Theory (Becker & Murphy, 1988). In particular, this study expects addiction has a suppressor role to play in the triangular relationship between flow, addiction, and subjective happiness.

2.3 Applying the SOR Theory

The SOR Theory (Mehrabian & Russell, 1974) is an established theory that has been used to associate input (i.e., stimulus), process (i.e., organism), and output (i.e., response) across various disciplines. Specifically, the SOR Theory posits that the environmental stimuli have effects on individuals' cognitive and affective processes, which would then shape their response (Loh et al., 2021). As Kamboj et al. (2018) explained, stimuli are a set of sensory variables presented in a given environment that should trigger the cognitive and affective reactions of individuals, which respectively represent the mental processes and emotional responses that arise within individuals (Hew et al., 2018). In this manner, individuals attempt to process stimuli into meaningful information that leads to their response (Kamboj et al., 2018), either in the forms of behavioural or attitudinal reactions (Tuncer, 2021).

In this study, the unique elements of mobile MOBA games, namely immediacy, social interaction, and competition (L. Wang et al., 2021) are constituting the environmental stimuli that should trigger the cognitive and affective reactions of online mobile gamers. Since the state of flow could be cognitive (Sandoval-Henríquez & Badilla-Quintana, 2021) and affective (Yuan et al., 2020), it represents the organism of online mobile gamers after their exposure to the stimuli. Consequently, after the stimuli have been processed into meaningful information, online mobile gamers would be showing behavioural and attitudinal reactions in the forms of online game addiction (Niu et al., 2016) and subjective happiness (Muthuri et al., 2020).

2.4 Flow Theory

The Flow Theory (Csikszentmihalyi, 1990) considers the state of flow as a psychological state experienced by individuals when they are totally involved in certain activities. In essence, as expressed by Leung (2020), when individuals are experiencing the state of flow in an activity, they would be fully indulged in that activity and neglect the sense of time. In the gaming context, the implications of flow have been long acknowledged (Kaye et al., 2018). As an illustration, gamers experiencing the state of flow would spend more time gaming due to their altered time perceptions (Nuyens et al., 2020). Deliberating this, it is opined that the state of flow resembles a good proxy for the organism in the context of this study. Following Sepehr and Head (2018), this study conceptualises flow as a second-order construct that is formatively measured by heightened enjoyment, focused immersion, and temporal dissociation. As defined by Karahanna and Agarwal (2006, p.673), temporal dissociation refers to the "inability to register the passage of time while engaged in interaction", focused immersion represents "the experience of total engagement where other attentional demands are, in essence, ignored", and heightened enjoyment captures "the pleasurable aspects of the interaction".

2.5 Rational Addiction Theory

Through the Rational Addiction Theory, Becker and Murphy (1988) argued that all addictions to addictive goods or activities are rational, suggesting that individuals who maximise utility are rational in consuming addictive goods or activities after they have deliberated the present and future consequences of their consumption. Nonetheless, the Rational Addiction Theory acknowledges that not all addicts are necessarily happy for being rationally addicted (Fogarty, 2009). The reason is that the addicts would get less pleasure from their continuous consumption, yet they have to continue consuming as refraining from doing so would result in unpleasant withdrawal symptoms (O'Donoghue & Rabin, 2000). As such, the Rational Addiction Theory provides foundation support to the suppressor role of online game addiction on subjective happiness in this study. For this study, online game addiction is defined as "uncontrollable, excessive, and compulsive use of online games that causes social and/or emotional problems" (Zhao et al., 2020, p.1), while subjective happiness refers to "the psychological state of well-being, joy, and contentment" (Akın, 2012, p.405).

3.0 Hypotheses

Mobile MOBA gamers get to enjoy their game immediately regardless of their position and time, given that the games are playable via smart mobile devices (Tanuar et al., 2018). In this manner, immediacy that refers to the extent to which mobile MOBA games are accessible by gamers when they want to (Han et al., 2016) resembles one of the unique environmental stimuli to the mobile MOBA realm. In a study of mobile commerce, Zhou and Lu (2011) found that ubiquitous connectivity is positively related to the flow experience. Identically, Okazaki and Mendez (2013) discovered that the ubiquitous nature of mobile services is positively related to the flow experienced by the users. Applying the same notion to this study, when mobile MOBA gamers get to play the games immediately at their desired moments, they would easily get indulged and immersed in the gaming world. With this, the following hypothesis is formed:

H1: Immediacy is directly and positively related to flow.

Besides, mobile MOBA gamers have to cooperate with their team members in order to compete with another team (Mora-Cantallops & Sicilia, 2018), hence social interaction and competition are other unique environmental stimuli of mobile MOBA games (L. Wang et al., 2021). Social interaction, a term that is defined by A. Chen et al. (2016) as the interaction between two or more gamers in the online gaming world, could lead online gamers to involve intensely in the games, to an extent to which nothing else seems to matter (H. Chen et al., 2017). In online gaming, social interaction has been widely recognised as a factor that could induce the state of flow among the gamers (Alzahrani et al., 2017; C. C. Liu & Chang, 2016). On the other hand, defined as the "need to be the best in the eyes of one's competitors" (Dwyer & Kim, 2011, p.75), competition is another crucial factor that could entice online gamers to immerse into the state of flow (Weibel et al., 2008). Cairns et al. (2013) supported this notion and stressed that in competitive video games, immersion should increase with the number of players. Furthermore, Schmierbach et al. (2012) found that the gamers reported a greater enjoyment in playing a competitive video game. Accordingly, these environmental stimuli should induce the state of flow among the mobile MOBA gamers, hence the following hypotheses are offered:

H2: Social interaction is directly and positively related to flow.

H3: Competition is directly and positively related to flow.

The state of flow, according to Merhi (2016), is often observed in activities that require high concentration and attention, for instance, gaming. Zhou (2013) further shared that when online mobile gamers are experiencing the state of flow, they would immerse in the games and this subsequently encourages their playing intention. Apparently, the more immense is the state of flow, the more attractive a video game appears (Sanjamsai & Phukao, 2018). This is especially true, as the state of flow experienced by online gamers is leading to online game addiction (Hull et al., 2013; C. C. Liu & Chang, 2016). It is, therefore, anticipated that the degree of flow experienced by mobile MOBA gamers is positively associated with their online game addiction levels. With this, the following hypothesis specifies that:

H4: Flow is directly and positively related to online game addiction.

When individuals are experiencing the state of flow, they would significantly feel happier than in any other condition (Moneta, 2004). H. Chen et al. (2000) supported this notion as they found that the flow state positively improves an individual's happiness in their study of Web users. Engeser and Baumann (2016) consented to this and further opined that the experience of flow would lead to happiness in leisure activities. In this manner, the state of flow should elicit a sense of happiness within individuals (Sanjamsai & Phukao, 2018; Su et al., 2016). In the context of video games, J. Chen (2007) believed that the flow experiences gained should be the source of happiness. In the same vein, the flow state experienced by mobile MOBA gamers shall serve as the source of their happiness. Hence, it is proposed that:

H5: Flow is directly and positively related to subjective happiness.

Generally, it was posited that addictive behaviours are associated with health concerns such as hypertension and unhappiness (Shiue, 2015). Likewise, the prolonged usage of hedonic IS has negative effects on mental health (Brailovskaia et al., 2018). Empirically, addiction to hedonic IS (Longobardi et al., 2020) and technology (Longstreet et al., 2019) were found to have negative effects on the addicts' subjective happiness. The same should apply to the addicted online gamers as the excessive time consumed by gaming leaves them with less time for important tasks such as working and studying, causing them to feel depressed (Borzikowsky & Bernhardt, 2018). It is, therefore, expected that the addicted mobile MOBA gamers would be experiencing a lower level of subjective happiness in this study. With this, it is hypothesised that:

H6: Online game addiction is directly and negatively related to subjective happiness.

The Rational Addiction Theory establishes that rational addiction happens when the positive effects gained from today's increased consumption are perceived to be greater than the negative effects anticipated from future's higher consumption, hence individuals are likely to become addicted and stay in that way if they consider their future happiness is of less importance (Fogarty, 2009). Moreover, given that addicts would get less pleasure from their continuous consumption, yet stopping the consumption would make them more painful (O'Donoghue & Rabin, 2000), addiction to addictive goods or activities with a maximised utility as the main purpose does not always warrant the happiness of addicts (Chou & Ting, 2003), especially when welfare consequences are entailed (Rogeberg & Melberg, 2011). Besides, from the perspective of video games, Laffan et al. (2016) noticed that the state of flow might not always lead to happiness, especially when the gamers have been experiencing the state of flow for a relatively long term, resulting in negative moods such as frustration and exhaustion eventually. This suggests that excessive video game playing could have intervened the effect of flow on subjective happiness of gamers. Also, Choi and Lim (2016) demonstrated the mediating roles of addiction on psychological well-being in the context of hedonic IS, such that users are experiencing deterioration of their psychological well-being when they realised their addictions. Therefore, this study infers that when mobile MOBA users realise their addiction to MOBA games, the direct and positive effect of flow on subjective happiness shall be suppressed. Based upon these, it is hypothesised that:

H7: Online game addiction negatively mediates the relationship between flow and subjective happiness, such that flow is indirectly and negatively related to subjective happiness through online game addiction.

With these hypotheses, a theoretical framework is built in Figure 1. On top of the hypothesised effects, age, experience of playing, frequency of playing, and gender are added into the framework as control variables after considering their potential confounding effects in mobile-related studies (X. Gong et al., 2020).

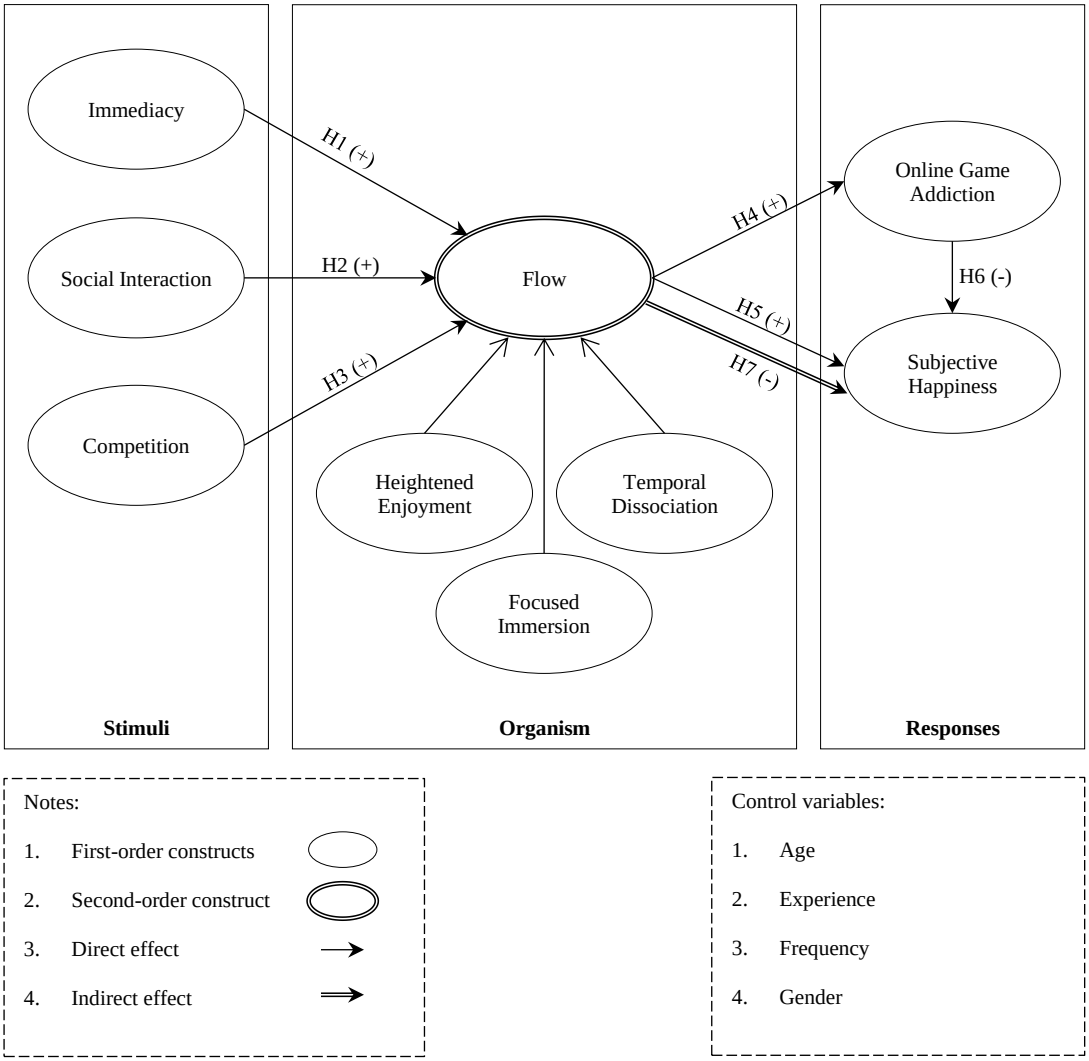

Figure 1: Theoretical Framework

4.0 Methodology

In order to validate the hypotheses proposed, a paper-and-pencil survey was conducted in Malaysia, a Southeast Asia nation in which mobile MOBA games are thriving (T'ng & Pau, 2021). Particularly, this study selects Mobile Legends as the research context. As reported by Chapple (2020), since its launch in 2016, Mobile Legends has generated a total of $502.5 million gross revenue at the end of 2019, with Southeast Asia, especially Malaysia, accounting for most of the gross revenue. These indicate that Mobile Legends resembles an appropriate context for this study. Given this, this study targeted the current Mobile Legends gamers. Since the sampling frame is unavailable, the non-probability judgemental sampling method was engaged. Also, as the gamers might be situated in private residential areas, it was more feasible to

obtain their responses in a public setting (i.e., university). Hence, emerging adults in a university setting shall constitute a representative sample.

A private university in Malaysia was selected to recruit the potential participants who have experience in playing Mobile Legends. Before the recruitment process, a list of available courses was obtained and a total of twelve courses were selected randomly. During the data collection, participants were briefed about the purpose of this study, the inclusion criterion, their right to withdraw, and the confidentiality of the collected responses. After excluding incomplete responses, a total of 561 valid responses constitute the final sample. Table 1 shows the profile of respondents.

Table 1: Profile of Respondents

Demographic Variables		Frequency	Percent
Gender	Male	366	65.2
	Female	195	34.8
Age	18 to 20	330	58.8
	21 to 23	206	36.7
	24 to 26	20	3.6
	27 to 29	4	0.7
	30 and above	1	0.2
Experience in playing Mobile Legends	> 0 month but ≤ 1 month	107	19.1
	> 1 month but ≤ 3 months	86	15.3
	> 3 months but ≤ 6 months	75	13.4
	> 6 months but ≤ 9 months	45	8.0
	> 9 months but ≤ 12 months	48	8.6
	> 12 months	200	35.7

All measurement items for the first-order constructs in the survey were carefully adapted to the context of this study and measured using seven-point Likert scales. Table 2 shows the sources of items and their scale response anchors.

Table 2: Measurement Items and Sources

First-Order Constructs	Measurement Items	Sources
Immediacy[a]	IM1 - Mobile Legends is accessible at any time and place. IM2 - Mobile Legends enables me to have a match in real time. IM3 - Mobile Legends allows me to have a match at the best moment for me. IM4 - I can play Mobile Legends anytime, anywhere.	(C. Kim et al., 2015; Ko et al., 2009; Okazaki & Mendez, 2013)
Social Interaction[a]	SI1 - Playing Mobile Legends enables me to make friends. SI2 - I enjoy meeting friends I made while playing Mobile Legends. SI3 - Communicating with others is useful for playing Mobile Legends.	(Y. Y. Kim et al., 2005)

	SI4 - Cooperating with others makes Mobile Legends more enjoyable.	
Competition[a]	CP1 - I like to play Mobile Legends to prove to my fellow competitors that I am the best. CP2 - When playing Mobile Legends, it is important to me to compare my skills with my competitors. CP3 - It is important to me to win in playing Mobile Legends. CP4 - An important reason for playing Mobile Legends is the opportunity it provides to compare my unique knowledge about the heroes with my competitors.	(Weiner & Dwyer, 2017)
Heightened Enjoyment[a]	HE1 - I have fun playing Mobile Legends. HE2 - Playing Mobile Legends provides me with a lot of enjoyment. HE3 - I enjoy playing Mobile Legends. HE4 - Playing Mobile Legends excites me.	(Sepehr & Head, 2018)
Focused Immersion[a]	FI1 - While playing Mobile Legends, I am able to block out most other distractions. FI2 - While playing Mobile Legends, I am absorbed in what I am doing. FI3 - While playing Mobile Legends, I am immersed in the task I am performing. FI4 - When playing Mobile Legends, I do not get distracted by other attentions easily. FI5 - While playing Mobile Legends, my attention does not get diverted easily.	(Sepehr & Head, 2018)
Temporal Dissociation[a]	TD1 - Time appears to go by very quickly when I am playing Mobile Legends. TD2 - Sometimes I lose track of time when I am playing Mobile Legends. TD3 - Time flies when I am playing Mobile Legends. TD4 - Most times when I play Mobile Legends, I end up spending more time than I had planned. TD5 - I often spend more time playing Mobile Legends than I had intended.	(Sepehr & Head, 2018)
Online Game Addiction[b]	GA1 - I have had difficulties controlling my playing of Mobile Legends. GA2 - I have given increasing priority to playing Mobile Legends over other life interests and daily activities. GA3 - I have continued playing Mobile Legends despite the occurrence of negative consequences. GA4 - I have experienced significant problems in life (e.g., personal, family, social, education, occupational) due to the severity of playing Mobile Legends.	(Pontes et al., 2021)
Subjective Happiness	SH1[c] - In general, I consider myself: SH2[d] - Compared to most of my peers, I consider myself: SH3[e] - Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterisation describe you? SH4[e,#] - Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterisation describe you?	(Lyubomirsky & Lepper, 1999)

Notes:
[a] Scales anchored from "1 - Strongly disagree" to "7 - Strongly agree".
[b] Scales anchored from "1 - Absolutely never" to "7 - All the time".
[c] Scale anchored from "1 - Not a very happy person" to "7 - A very happy person".
[d] Scale anchored from "1 - Less happy" to "7 - More happy".
[e] Scales anchored from "1 - Not at all" to "7 - A great deal".
[#] Negatively worded item.

5.0 Data Analysis

To analyse a theoretical framework with second-order and formatively measured constructs, the partial least squares structural equation modelling (PLS-SEM) is recommended by Hair et al. (2021). Before the PLS-SEM analysis, this study applies Harman's single-factor test to assess the severity of common method bias (Podsakoff et al., 2003). This test reveals that the single factor could only account for 29% of the

variance, suggesting that the common method bias is of minor concern in this study. To conduct the PLS-SEM analysis, this study follows the steps advocated by Hair, Hult, et al. (2017).

Firstly, the reliability of all first-order constructs is ascertained as the composite reliability values are beyond the threshold of 0.708 (Sarstedt et al., 2019). Secondly, the convergent validity of all first-order constructs is achieved given that all the measurement items are showing a factor loading estimate of 0.708 and above on their associated first-order constructs (except for SH4) and the average variance extracted values of all first-order constructs are beyond 0.50 (Hair, Matthews, et al., 2017). In view that subjective happiness has exhibited reasonable reliability and convergent validity, SH4 is retained during the data analysis despite its low factor loading estimate in order to maintain the content validity of subjective happiness (Hair, Hult, et al., 2017). Thirdly, the discriminant validity of all first-order constructs is established as the square root of the average variance extracted values are considerably higher than the correlations between constructs and the heterotrait-monotrait ratio of correlations (HTMT) do not exceed 0.85 (Hair et al., 2019). Both Table 3 and Table 4 provide the details of these steps. Fourthly, Table 5 shows the second-order construct (i.e., flow) is adequately formed as there are no collinearity issues (variance inflation factors are below the threshold of five) and the outer weights of all first-order constructs are statistically significant (Hair, Hult, et al., 2017).

Table 3: Reliability and Validity of First-Order Constructs

First-Order Constructs	1.	2.	3.	4.	5.	6.	7.	8.	Composite Reliability	Average Variance Extracted
1. Competition	***0.839***	0.451	0.413	0.501	0.496	0.145	0.437	0.436	0.905	0.704
2. Focused Immersion	0.398	***0.833***	0.220	0.500	0.536	0.262	0.428	0.436	0.919	0.694
3. Online Game Addiction	0.353	0.195	***0.821***	0.350	0.163	0.101	0.243	0.410	0.892	0.675
4. Heightened Enjoyment	0.452	0.462	0.315	***0.916***	0.566	0.235	0.607	0.522	0.954	0.839
5. Immediacy	0.419	0.459	0.139	0.502	***0.797***	0.244	0.476	0.375	0.874	0.635
6. Subjective Happiness	0.081	0.226	-0.012	0.206	0.195	***0.763***	0.242	0.132	0.831	0.582
7. Social Interaction	0.370	0.366	0.205	0.530	0.392	0.170	***0.786***	0.375	0.866	0.618
8. Temporal Dissociation	0.381	0.397	0.350	0.478	0.321	0.103	0.322	***0.822***	0.912	0.676

Note: The square root of the average variance extracted values are denoted in bold and italic along the diagonal line, while the correlations and HTMT lie below and above the diagonal line respectively.

Table 4: Item Loadings and Cross-Loadings

First-Order Constructs		1.	2.	3.	4.	5.	6.	7.	8.
1. Competition	CP1	***0.856***	0.325	0.356	0.406	0.360	0.069	0.361	0.316
	CP2	***0.880***	0.346	0.276	0.371	0.352	0.058	0.275	0.337
	CP3	***0.765***	0.301	0.215	0.298	0.304	0.044	0.199	0.270
	CP4	***0.850***	0.358	0.326	0.429	0.383	0.095	0.383	0.348
2. Focused Immersion	FI1	0.328	***0.829***	0.158	0.369	0.381	0.195	0.326	0.363
	FI2	0.358	***0.854***	0.179	0.462	0.433	0.185	0.352	0.377
	FI3	0.369	***0.864***	0.210	0.440	0.440	0.175	0.347	0.386
	FI4	0.295	***0.815***	0.120	0.323	0.325	0.203	0.228	0.261
	FI5	0.297	***0.801***	0.136	0.304	0.314	0.187	0.250	0.244
3. Online Game Addiction	GA1	0.253	0.154	***0.776***	0.275	0.098	0.022	0.143	0.385
	GA2	0.311	0.164	***0.873***	0.295	0.124	-0.027	0.182	0.300
	GA3	0.298	0.203	***0.854***	0.290	0.145	-0.016	0.205	0.257
	GA4	0.301	0.112	***0.779***	0.153	0.085	-0.019	0.136	0.192
4. Heightened Enjoyment	HE1	0.402	0.438	0.251	***0.907***	0.477	0.193	0.484	0.451
	HE2	0.424	0.424	0.263	***0.943***	0.491	0.179	0.499	0.438
	HE3	0.401	0.418	0.290	***0.947***	0.466	0.172	0.515	0.450
	HE4	0.431	0.411	0.355	***0.865***	0.403	0.213	0.440	0.409
5. Immediacy	IM1	0.275	0.368	0.082	0.318	***0.787***	0.131	0.249	0.266
	IM2	0.370	0.374	0.047	0.348	***0.790***	0.158	0.260	0.252
	IM3	0.383	0.372	0.167	0.526	***0.827***	0.182	0.420	0.288
	IM4	0.298	0.352	0.137	0.381	***0.781***	0.146	0.296	0.211

6. Subjective Happiness	SH1	0.041	0.180	-0.013	0.156	0.193	***0.869***	0.165	0.071
	SH2	0.083	0.215	-0.007	0.199	0.175	***0.920***	0.157	0.111
	SH3	0.120	0.204	0.029	0.191	0.157	***0.812***	0.152	0.082
	SH4	-0.098	0.012	-0.147	0.012	-0.005	***0.265***	-0.061	0.029
7. Social Interaction	SI1	0.304	0.284	0.214	0.437	0.323	0.085	***0.786***	0.307
	SI2	0.306	0.303	0.216	0.420	0.306	0.149	***0.828***	0.251
	SI3	0.261	0.278	0.098	0.334	0.271	0.129	***0.781***	0.182
	SI4	0.284	0.282	0.102	0.457	0.323	0.174	***0.747***	0.258
8. Temporal Dissociation	TD1	0.304	0.426	0.196	0.462	0.324	0.154	0.340	***0.819***
	TD2	0.320	0.305	0.289	0.369	0.256	0.091	0.295	***0.853***
	TD3	0.326	0.366	0.230	0.419	0.254	0.087	0.248	***0.827***
	TD4	0.272	0.259	0.365	0.334	0.219	0.027	0.192	***0.825***
	TD5	0.347	0.254	0.386	0.364	0.258	0.050	0.236	***0.785***

Table 5: Quality of the Second-Order Construct

Second-Order Construct	First-Order Constructs	Outer Weights	Variance Inflation Factors
Flow	Focused Immersion	0.303***	1.340
	Heightened Enjoyment	0.673***	1.462
	Temporal Dissociation	0.238***	1.366

Note: *** $p < 0.001$

Because the measurement model is of satisfactory quality, the structural model is evaluated next to ascertain if the hypotheses are supported. A step-wise model analysis is performed in Table 6 for this purpose, with two hierarchical models being evaluated (X. Gong et al., 2020). The baseline model includes only the control variables, whereas the full model incorporates the direct effects of exogenous constructs into the baseline model. It is evident that the control variables alone could only account for a limited portion of the endogenous constructs' explained variance (i.e., R^2). The control variables respectively explain 17.1%, 6.2%, and 1.9% of the variance in flow, online game addiction, and subjective happiness. When the exogenous constructs are added, the explained variance of flow, online game addiction, and subjective happiness raise to 53.1%, 15.5%, and 7.7% respectively. Moreover, the effect size f^2 values indicate that the exogenous constructs have a large effect size on flow (0.768), close to medium effect size on online game addiction (0.110), and small effect size on subjective happiness (0.063), according to Hair, Hult, et al. (2017). All these suggest that the control variables could not confound the results severely even if some of them have significant effects over the endogenous constructs.

Table 6: Step-Wise Model Analysis

	Flow		Online Game Addiction		Subjective Happiness		Remarks
	Baseline	Full	Baseline	Full	Baseline	Full	
Control Variables:							
Age	0.045^{ns}	-0.016^{ns}	-0.075^{ns}	-0.094*	-0.008^{ns}	-0.032^{ns}	
Experience	0.219***	0.114***	0.026^{ns}	-0.047^{ns}	0.143**	0.087^{ns}	
Frequency	0.239***	0.122***	0.232***	0.159***	-0.035^{ns}	-0.071^{ns}	
Gender	0.092*	0.087**	-0.034^{ns}	-0.063^{ns}	-0.041^{ns}	-0.068^{ns}	
Exogeneous Constructs:							
Immediacy	-	0.302***	-	-	-	-	H1 supported
Social Interaction	-	0.282***	-	-	-	-	H2 supported
Competition	-	0.247***	-	-	-	-	H3 supported
Flow	-	-	-	0.333***	-	0.274***	H4 and H5 supported
Online Game Addiction	-	-	-	-	-	-0.108*	H6 supported
R^2	0.171	0.531	0.062	0.155	0.019	0.077	
Change in R^2		0.360		0.093		0.058	
Effect size f^2		0.768		0.110		0.063	

Notes:
1. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ^{ns} $p > 0.05$.

2. Effect size $f^2 = {R^2_{full\ model} - R^2_{baseline\ model}} / {1 - R^2_{full\ model}}$

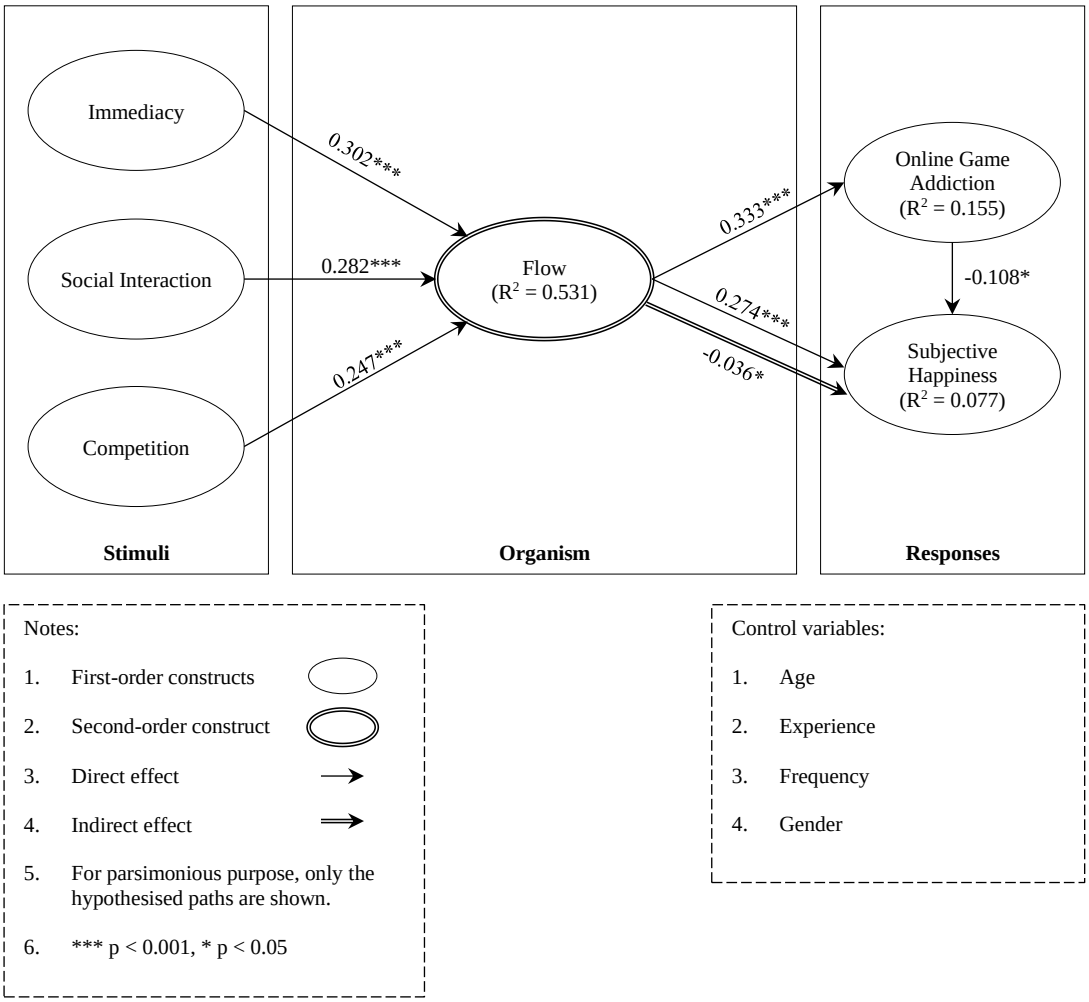

Figure 2: Hypotheses Testing Results

The results in Table 6 and Figure 2 further reveal that all the hypotheses receive support. Specifically, immediacy ($\beta = 0.302$, $p < 0.001$), social interaction ($\beta = 0.282$, $p < 0.001$), and competition ($\beta = 0.247$, $p < 0.001$) are directly and positively related to the state of flow, which relates directly and positively to online game addiction ($\beta = 0.333$, $p < 0.001$) and subjective happiness ($\beta = 0.274$, $p < 0.001$). Accordingly, H1, H2, H3, H4, and H5 are all supported. Besides, the state of flow is indirectly and negatively related to subjective happiness ($\beta = -0.036$, $p < 0.05$) through online game addiction, which relates directly and negatively to subjective happiness ($\beta = -0.108$, $p < 0.05$). Moreover, Table 7 provides further support towards the suppressor role of online game addiction. The specific indirect effect exerted by flow over subjective happiness ($\beta = -0.036$, $p < 0.05$) through online game addiction is in opposite direction

compared to the direct effect exerted by flow over subjective happiness ($\beta = 0.274$, $p < 0.001$), indicating the presence of competitive mediation (Hair, Hult, et al., 2017). These results support the suppressor role played by online game addiction, hence H6 and H7 are confirmed too.

Table 7: Mediation Analysis

Hypothesis and Path	Specific Indirect Effect	Direct Effect	Total Effect	Type of Mediation	Remark
H7: Flow to Subjective Happiness via Online Game Addiction	-0.036*	0.274***	0.238***	Competitive Mediation	Supported

Note: *** $p < 0.001$, * $p < 0.05$.

6.0 Discussion

This study investigates the effects of environmental stimuli in inducing the state of flow, a foundation of online game addiction and subjective happiness among mobile MOBA gamers. Additionally, this study explores the mediating role played by addiction in suppressing the effect of flow on subjective happiness among online mobile gamers. The empirical results support the hypotheses, which suggest that the unique environmental stimuli under the mobile MOBA environment, namely immediacy, social interaction, and competition, are inducing mobile MOBA gamers into the state of flow. Subsequently, the higher the flow experienced by mobile MOBA gamers, the likely they will develop online game addiction and yield subjective happiness. However, their subjective happiness would be suppressed when mobile MOBA gamers realise that they have spent excessive time playing, supporting the suppressor role of online game addiction.

7.0 Implications

7.1 Theoretical Implications

Theoretically, this study enriches the current state of knowledge on online game addiction by employing the SOR Theory and Flow Theory to understand the effects of the unique mobile MOBA environmental stimuli in inducing the state of flow, which then serves as the antecedent of online game addiction and subjective happiness. Furthermore, by employing Rational Addiction Theory as the underpinning theory, this study verifies the suppressor role played by online game addiction in the triangular relationship between flow, online game addiction, and subjective happiness. In a broad

sense, this study reveals the uncharted role of addiction in suppressing the effect of flow on happiness and, therefore, contributes towards the hedonic IS literature. It is also worth mentioning that this study addresses the notion of happiness, the main purpose that hedonic IS seek to provide, yet has received less attention thus far.

Moreover, this study advances the Rational Addiction Theory by validating the suppressor role of addiction on happiness, confirming that rational addicts are not necessarily happy even if they are rational in developing their addiction with the aim of utility maximisation. This is crucial as it helps to understand further the behaviours and well-being of rational addicts.

7.2 Practical Implications

The findings of this study suggest that game developers could consider the elements of immediacy, social interaction, and competition to stimulate the state of flow among gamers. In single-player games, game developers are advised to incorporate social interaction and competition, giving the gamers a choice to switch from solo mode to competition mode with other gamers. For multiplayer games, developers are suggested to follow the current trend of cross-play, which enables gamers to play with others even if they are on different gaming platforms. Moreover, allowing gamers to connect to their accounts across the gaming platforms is recommended so that the gamers could interact and compete with other gamers whenever and wherever they are.

Although it is important to keep gamers playing, game developers should be aware of the negative consequences of excessive gaming on gamers' well-being. It would be good if the game developers could keep track of the gaming time of gamers, showing it under the gamers' account profile page. Perhaps, game developers could also consider letting the gamers control their gaming time through an option that permits gamers to specify the maximum gaming time in a week. Gamers would then be reminded if they have reached the maximum gaming time. Also, game developers could consider placing some mild health-related messages during the game loading time, for instance, "Playing excessively could cause health issues, take a break!", "Be kind to your eyes and try the 20-20-20 rule: look at something 20 feet away for 20 seconds in every 20 minutes.", etc. so that the gamers could be more aware of the potential consequences of excessive gaming and how should they minimise the undesired consequences.

8.0 Limitations and Recommendations

Firstly, it should be aware that this study has a cross-sectional research design that neglects the temporal differences. The suppressor role played by addiction might differ over time, hence it would be good if time could be incorporated in future studies through a longitudinal research design. Secondly, this study validates the suppressor role of addiction in a mobile MOBA game context and infers that the same would apply to other hedonic IS. Future studies should, therefore, validate this under the context of different hedonic IS. Thirdly, the explained variance of subjective happiness is relatively tiny, suggesting other important antecedents at play. Future studies are then recommended to address this through different theoretical underpinnings to further the current state of knowledge.

9.0 Conclusion

Online games serve as an oasis for everyone to take shelter from the cruel world, injecting a sense of happiness into the dull life. However, excessive playing always comes with consequences. Enough is as good as a feast. Happiness should be gained from other prospects of life, not just from playing online games. The current state of knowledge seems to have neglected what arouses or suppresses happiness among online gamers. The same goes for other IS and technology users. Too little is known as to how IS and technology could affect the well-being of users. It is, therefore, hoped that this study could inspire other similar works in the future.

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Appendix A: A Summary of Empirical Studies on Online Game Addiction

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
Present study	To investigate the effects of environmental stimuli that are unique to the mobile MOBA environment (i.e., immediacy, social interaction, and competition) in inducing the state of flow, which is expected to be the basis of online game addiction and subjective happiness among the online mobile gamers. Moreover, the present study seeks to ascertain if online game addiction is acting as a suppressor that negatively mediates the positive effect of flow on happiness among the online mobile gamers.	Immediacy, social interaction, competition, and flow.	Subjective happiness.	MOBA.	***Yes.***	***Yes.***
Başol and Kaya (2018)	To develop the Online Game Addiction Scale and examine its properties.	None.	None.	MMORPG.	No.	No.
Batmaz and Celik (2021)	To examine the roles of sensation-seeking behaviour and loneliness levels in predicting online game addiction.	Sensation-seeking behaviour and loneliness levels.	None.	None.	No.	No.
Baysak et al. (2016)	To evaluate the reliability and validity of "The Game Addiction Scale" as an instrument to assess online game addiction in an online game players sample in Turkey and examine the game addiction levels in these players.	None.	None.	MMOG.	No.	No.
Baysak et al. (2018)	To investigate the change in gaming behaviours and addiction rates of online gamers within two years.	None.	Self-esteem, perceived social support, and life satisfaction.	None.	No.	***Yes.***

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
Bekir and Çelik (2019)	To examine the level of online game addiction in terms of need for relatedness, need for autonomy, need for competence, and sensation seeking.	Need for relatedness, need for autonomy, need for competence, and sensation seeking.	None.	None.	No.	No.
Borzikowsky and Bernhardt (2018)	To examine the prognostic value of grit for online game addiction.	Grit, gender, and age.	None.	MMOG.	No.	No.
C. C. Liu and Chang (2016)	To clarify player addiction to online games.	Entertainment, pass time, escape, co-playing, social interactivity, and flow.	None.	None.	No.	No.
C. Lee and Kim (2017)	To analyse the effect of online gaming on addiction.	Demographic variables, average online gaming time, game use after midnight, game genre, parental variables, play and leisure environment, and satisfaction of relationship with others.	None.	None.	No.	No.
Cui et al. (2018)	To cross-culturally compare the impact gaming time, game genre, leisure environment, parental attachment, parental mediation and relationships with significant others have on psychosocially problematic gaming.	Gender, gaming time, gaming genre, parental attachment, parental mediation, play and leisure environment, and satisfying relationships with others.	None.	MMORPG.	No.	No.
Duman and Ozkara (2021)	To investigate the mediating role played by the fear of missing out between social identity and online game addiction on top of ascertaining the moderating role of the need to belong in the indirect relationship between social identity and online game addiction.	Social identity and fear of missing out.	None.	MMORPG.	No.	No.
Durak (2019)	To determine the relationship between online game addiction and the state of providing personal cybersecurity and representing cyber human values.	Providing personal cybersecurity, respect-oriented behaviours, tolerance-oriented behaviours, truth-	None.	None.	No.	No.

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
		oriented behaviours, peace-oriented behaviours, and solidarity-oriented behaviours.				
Durak et al. (2022)	To determine the risk factors that predict online game addiction of gifted and nongifted high school students.	Gender, age, parental supervision, preferred online game type, contingencies of self-worth, academic grade point average, academic self-efficacy, and metacognitive awareness levels.	None.	None.	No.	No.
E. J. Kim et al. (2008)	To explore the relationship between online game addiction and aggression, self-control, and narcissistic personality traits.	Aggression, self-control, and narcissistic personality traits.	None.	None.	No.	No.
H. P. Lu and Wang (2008)	To explore the factors that affect the online game addiction and the role played by online game addiction in the relationship between online satisfaction and loyalty.	Perceived behavioural control, descriptive norms, and perceived playfulness.	Loyalty.	None.	No.	No.
Huanhuan and Su (2013)	To examine the role of cognitive distortions in the development of online game addiction.	Male, age, educational level, rumination, all-or-nothing thinking, online comfort, and short-term thinking.	None.	None.	No.	No.
Hyun et al. (2015)	To identify factors that may influence the development of online gaming addiction.	Gender, age, IQ, perseverative errors, attention deficit hyperactivity disorder, depression, anxiety, impulsivity, family environment, social anxiety, and self-esteem.	None.	None.	No.	***Yes.***
I. B. Mun and Lee (2021)	To examine the impact of parents' depression on their children's online gaming addiction and investigates the mediating roles of intrusive	Parents' depression, intrusive parenting, and children's social motivation for playing online games.	None.	None.	No.	No.

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
	parenting and children's social motivation for playing online games on this relationship.					
I. H. Chen et al. (2020)	To explore the potential role of adolescents' time management tendency in mediating the relationship between parenting style and adolescent internet gaming disorder.	Emotional warmth, rejection, over-protection, and time management tendency.	None.	None.	No.	No.
J. Y. Lee et al. (2019)	To investigate the predictors of game addiction based on loneliness and regulatory focus while taking into consideration the moderating effect of inter-personal competence.	Loneliness and regulatory focus.	None.	None.	No.	No.
J. Y. Kim et al. (2017)	To explore why adolescents become addicted to online games and how their immersion in online games affects school violence perpetration.	Self-esteem and child abuse.	School violent perpetration.	None.	No.	No.
Jap et al. (2013)	To develop a measure of online game addiction for Indonesian children and adolescents.	None.	None.	None.	No.	No.
K. Chen et al. (2010)	To investigate antecedents affecting MMOG dependency.	Multimedia realism, aesthetics, virtual community, and diversion.	None.	MMOG.	No.	No.
Labana et al. (2020)	To evaluate the association between online game addiction and depression.	None.	Depression.	None.	No.	***Yes.***
Li et al. (2016)	To explore the incidence of online game addiction and the roles of stressful life events, avoidant coping styles, and neuroticism in online game addiction.	Stressful life events and avoidant coping strategy.	None.	None.	No.	***Yes.***
Naaj and Nachouki (2021)	To determine the impact of playing online games on students' academic performance.	Gender and age.	Academic performance	None.	No.	No.

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
P. C. Wu (2013)	To determine whether or not being a materialist is a factor that influences online game addiction.	Materialism.	None.	None.	No.	No.
Park et al. (2016)	To determine whether the genre of the online game is associated with impulsivity and sociality in individuals with online game addictions.	Self-esteem, impulsiveness, comorbidity, social interaction status, and cognitive function.	None.	MMORPG, RTS, and FPS.	No.	***Yes.***
Payam and Mirzaeidoostan (2019)	To investigate the roles of cognitive distortion, parenting style, and narcissistic personality traits in online game addiction.	Cognitive distortion, parenting style, and narcissistic personality traits.	None.	None.	No.	No.
Son et al. (2013)	To explore the association between MMORPG addiction and mental health status, and between self-control ability and mental health status among young male MMORPG players.	None.	Mental disorders and self-control ability.	MMORPG.	No.	***Yes.***
T. C. E. Wu et al. (2013)	To explore specialization among online gamers and its possible effects on two important online-game experiences namely flow and addiction.	Flow experiences.	None.	MMORPG.	No.	No.
Vukosavljevic-Gvozden et al. (2015)	To determine whether the symptoms of psychopathology are mediators between irrational belief and Internet gaming addiction.	Irrational belief and psychopathology symptoms.	None.	None.	No.	***Yes.***
X. Wang et al. (2021)	To examine the effects of psychological ownership, gaming motivation, and primary–secondary control on online game addiction.	Achievement motivation, social motivation, escapism motivation, psychological ownership, primary control, and secondary control.	None.	None.	No.	No.
Y. Wang (2021)	To investigate the effect of interparental conflicts on online game addiction symptomatology among adolescents and to explore mediating effects of	Interparental conflicts, parent-adolescent relationship, and adolescent loneliness.	None.	None.	No.	No.

Empirical Studies	Objectives	Antecedents of online game addiction	Consequences of online game addiction	Online game genres covered	Focused on environmental stimuli within the online game?	Focused on online gamers' well-being?
	parent-adolescent relationship and adolescent loneliness.					
You et al. (2017)	To examine the relationship of various psychosocial variables to online game addiction, and the mediation effect of avatar identification on the relationship.	Self-esteem, depression, social skills, and avatar identification.	None.	MMORPG.	No.	***Yes.***
Z. W. Y. Lee et al. (2015)	To develop and validate an instrument for massively multiplayer online game (MMOG) addiction.	None.	None.	MMOG.	No.	No.
Z. Xu et al. (2012)	To propose and test a balanced model of online game addiction, which simultaneously focuses on motivating, and prevention and harm reduction forces.	Relationship, escapism, mechanics, advancement, game playing, attention switching, dissuasion, rationalization/education, parental monitoring, resource restriction, and perceived cost.	None.	None.	No.	No.
Zhao et al. (2020)	To explore presence of meaning and search for meaning as underlying mediating and moderating variables in explaining the link between bullying victimization and online game addiction.	Bullying victimization, presence of meaning, and search for meaning.	None.	None.	No.	No.
Zhong and Yao (2013)	To explore the effects of gaming motivations and avatar self-identification on symptoms of online game addiction.	Motivation to relax, motivation to socialize, motivation to escape, motivation to achieve, and avatar self-identification.	None.	None.	No.	No.

Notes: MOBA = multiplayer online battle arena, MMORPG = massively multiplayer online role-playing game, MMOG = massively multiplayer online game, RTS = real-time strategy, FPS = first person shooter.

Appendix B: A Summary of Empirical Studies on Hedonic IS

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
Present study	To investigate the effects of environmental stimuli that are unique to the mobile MOBA environment (i.e., immediacy, social interaction, and competition) in inducing the state of flow, which is expected to be the basis of online game addiction and subjective happiness among the online mobile gamers. Moreover, the present study seeks to ascertain if online game addiction is acting as a suppressor that negatively mediates the positive effect of flow on happiness among the online mobile gamers.	Stimulus-organism-response theory, flow theory, and rational addiction theory.	Immediacy, social interaction, competition, flow, and game addiction.	Subjective happiness.	***Yes.***
A. Chen et al. (2016)	To explore both social and gaming factors of social games and investigate their roles on enhancing perceived enjoyment.	Social influence theory.	Shared identity, social interaction, diversion, perceived enjoyment, intention to play, subject norm, and perceived critical mass.	Actual playing behaviour.	No.
Ammar and Barki (2016)	To examine factors that influence individuals' intentions to continue the use of social network sites.	Social presence theory and social exchange theory.	Enjoyment, perceived frequency of feedback received, perceived frequency of feedback sent, perceived social presence, attitude, and perceived usefulness.	Intention.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
Barnes (2011)	To examine why people continue to use virtual worlds.	Habit theory.	Frequency of prior usage, perceived usefulness, habit, and enjoyment.	Continuance intention.	No.
C. C. Hsiao and Chiou (2012)	To investigate how a player's network centrality in an online gaming community (i.e., a guild) affects his/her attitude and continuance intention toward a massive multiplayer online game.	Social capital theory.	Network centrality, non-guild interaction, access to within guild resources, perceived enjoyment, and attitude.	Continuance intention.	No.
C. H. Hsiao and Tang (2016)	To proposes a post-acceptance model of mobile movie-themed games from the perspective of experiential marketing with five experiential elements of movie-themed games.	None.	Thematic attractiveness, perceived enjoyment, flow, act, and relate.	Loyalty and movie-watching intention.	No.
Choi and Lim (2016)	To examine the effects of social and information technology overload on psychological well-being.	Cognitive load theory, bounded rationality theory, and human interruption theory.	Social overload, technology overload, and social network service addiction.	Psychological well-being.	***Yes.***
C. L. Hsu and Lu (2004)	To predict users' acceptance of online games.	Technology acceptance model, flow theory, reference group theory, and social exchange theory.	Social norms, critical mass, perceived usefulness, perceived ease of use, flow experience, and attitude.	Intention to play.	No.
C. P. Lin and Bhattacherjee (2010)	To examine which system determinants would influence interactive hedonic system usage.	Theory of reasoned action and theory of planned behaviour.	Technical quality, interaction quality, perceived enjoyment, social image, and attitude.	Usage intention.	No.
C. Xu et al. (2012)	To study why do people use social networking sites.	Uses and gratifications theory and social presence theory.	Stylishness, coordination, immediate access, affection, escape, disclosure, entertainment/relaxation,	Social networking sites usage.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
			social presence, and loneliness.		
Cocosila and Igonor (2015)	To report on a value-based empirical investigation of the adoption of Twitter social networking application.	None.	Utilitarian value, hedonic value, social value, image, social presence, critical mass, and social norm.	Behavioural intention.	No.
Constantiou et al. (2012)	To investigate user behaviour in massively multiplayer online games from the perspective of their intentions to engage in real money trading.	None.	Perceived enjoyment, competitive advantage, anticipated regret, social status, perceived fairness, online disinhibition, other people reactions, operator's indirect costs, seller's uncertainty, consequences' uncertainty, and unplanned item scarcity.	Intentions towards real money trading.	No.
Constantiou et al. (2009)	To explores the relationship between young adults' perceptions of value elements and their adoption intentions of mobile TV.	Theory of reason-based choice.	Perceived benefits and perceived costs.	Adoption intentions.	No.
D. Liu et al. (2013)	To understand how different digital game designs impact players' behaviours and emotional responses.	Tournament theory.	Competition.	Number of game attempts, playing time, enjoyment, and arousal.	No.
Goel et al. (2011)	To predict users' intentions to return to a virtual world.	Interactionist theory of place attachment.	Social awareness, location awareness, task awareness, and cognitive absorption.	Intention to return.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
Goel et al. (2013)	To provide an alternate explanation for why people return to virtual worlds.	Spatial model of interaction and awareness-attention theory.	Social perception, social awareness, focused immersion, and temporal dissociation.	Intention to return.	No.
Gu et al. (2016)	To understand users' multi-homing on social networking sites.	Optimum stimulation level theory and uses and gratifications theory.	Optimum stimulation level, complementarity in interpersonal communication, complementarity in self-presentation, complementarity in information, and complementarity in entertainment.	Intention to multi-home.	No.
Guo and Barnes (2012)	To explore the factors influencing purchase behaviour in virtual worlds by empirically developing and testing a conceptual model of purchase behaviour in virtual worlds.	Transaction cost theory and unified theory of acceptance and use of technology.	Advancement, customisation, perceived enjoyment, perceived social status, perceived value, effort expectancy, performance expectancy, social influence, and habit.	Actual purchase behaviour.	No.
H. J. Mun et al. (2010)	To understand digital multimedia broadcasting users' usage intentions.	IS success model.	System quality, content quality, enjoyment, ubiquitousness, time pressure, and satisfaction.	Intention to use.	No.
H. Lin et al. (2014)	To examine the determinants that impact users' social networking sites continuance.	Self-regulation framework and social presence theory.	System quality, awareness, connectedness, pleasure, sense of belonging, and satisfaction.	Continuance intention.	No.
Ha et al. (2007)	To analyse the factors that influence potential users' adoption of Mobile Broadband Wireless Access technology-	Technology acceptance model.	Perceived ease of use, perceived usefulness, perceived enjoyment, flow	Attitude.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
	based games using an extension of technology acceptance model.		experience, perceived lower sacrifices, and perceived attractiveness.		
Heijden (2004)	To study the differences in user acceptance models for productivity-oriented (or utilitarian) and pleasure-oriented (or hedonic) IS.	Motivational theory and technology acceptance model.	Perceived usefulness, perceived enjoyment, and perceived ease of use.	Intention to use	No.
Holsapple and Wu (2007)	To explore the potential of imaginal and emotional responses in explaining user acceptance of virtual worlds.	Hedonic theory.	Fantasy, role projection, escapism, enjoyment, emotional involvement, and arousal.	Behaviour.	No.
Hu et al. (2015)	To develop an aggregate construct of online social value, which could be used to predict predicting satisfaction and continued use.	Social exchange theory.	Satisfaction, relational benefits, informational benefits, enjoyment, curiosity fulfilment, information risk, and effort.	Continued use.	No.
Hu et al. (2011)	To focus exclusively on what might motivate non-adopters to accept online social network services.	Status quo bias theory and technology acceptance model.	Ease of use, effort, information risk, social norm, usefulness, and work full time.	Behavioural intention.	No.
Hung et al. (2016)	To investigate the actual effect of the distinct sub-dimensions of perceived playfulness across various contexts.	Theory of reasoned action and flow theory.	Perceived concentration, perceived enjoyment, perceived curiosity, social norms, and attitude.	Intended use.	No.
J. Wu and Holsapple (2014)	To examine the effects of six types of imaginal and emotional experiences on using pleasure-oriented IT.	Hedonic consumption perspective.	Fantasy, escapism, role projection, emotional involvement, enjoyment, arousal, and behavioural intention.	Usage.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
J. Y. Kim et al. (2011)	To explore factors of users' motivation using social networking services via mixed methods.	None.	Networking, relieving stress, recording one's history, collecting information, and pleasure.	Behavioural intention to use.	No.
Junglas et al. (2013)	To examine the construct of sociability and its antecedents in a popular virtual social environment.	IS theories of technology acceptance, IS success model, and social interaction theory.	Usefulness, ease of use, enjoyment, information quality, system quality, sociability, context support, activity support, representation support, and insight support.	Intentions to use.	No.
Kondo and Ishida (2014)	To propose a model for cross-national analyses of intention to use multiple mobile entertainment services.	Technology acceptance model and the theory of planned behaviour.	Perceived behavioural control, perceived value, attitude towards mobile services, and subjective norm.	Behavioural intention.	No.
Krasnova et al. (2010)	To examine the motivating and discouraging factors for information disclosure on online social networks platforms.	Social exchange theory and privacy calculus theory.	Convenience in relationship maintenance, relationship building, self-presentation, enjoyment, perceived privacy risk, trust in online social network provider, trust in other online social network members, perceived control.	Self-disclosure.	No.
Lowry et al. (2013)	To explain the role of intrinsic motivations in systems use and propose the hedonic-motivation system adoption model to improve the understanding of hedonic-motivation systems adoption.	Cognitive evaluation theory.	Perceived ease of use, joy, control, curiosity, perceived usefulness, and immersion.	Intention to use.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
Lowry et al. (2015)	To explain and predict the discrete cognitive processes through which systems fulfil a range of motives and expectations and how this fulfilment leads to continuance intentions.	None.	Usefulness, attitude, disconfirmation, satisfaction, design expectations fit, ease of use, and design aesthetics.	Intention to continue.	No.
Luarn et al. (2015)	To develop and refine a conceptual framework from social word-of-mouth motivations and the mobile perspective to provide a theoretical understanding of the motivations that induce consumers to engage in check-in behaviour.	None.	Altruism, narcissism, image building, achievement, documenting life details, tie strength, subjective norms, expressiveness, social support, relationship management, information sharing, rewards, donations, perceived social benefit, perceived user friendliness, perceived enjoyment, perceived value, customer satisfaction, involvement of communicator, and commitment.	Engage in check-in behaviour.	No.
M. H. Hsu et al. (2015)	To identify what may drive users' decision to use social media continuously.	Uses and gratifications theory.	Entertainment, information seeking, socialisation, and self-presentation.	Continuance intention.	No.
Ma et al. (2014)	To explore how cumulative outcomes, recent outcomes, and prior use affect online gambling behaviour differently.	Gambling theory and theory of repeated behaviour.	Cumulative gain, cumulative loss, immediate gain, immediate loss, current online gambling, regular use, and extended use.	Subsequent online gambling.	No.
Maier et al. (2015)	To explore the development of discontinuous usage intentions, namely	None.	Complexity, uncertainty, invasion, pattern, disclosure,	Discontinuous usage behaviour.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
	the behavioural intention in the termination phase, in the context of social networking services.		social overload, transition costs, sunk costs, replacement overload, social networking services-exhaustion, and switching-exhaustion.		
Manthiou et al. (2014)	To investigate the dual routes of consumers' decision-making processes on behavioural change toward purchase on Facebook fan pages using the prototype willingness model.	Prototype willingness model.	Information source, social interaction ties, fan page design characteristics, entertainment, attitude toward fan page, subjective norms, prototype image, behavioural intention toward fan page, and behavioural willingness toward fan page.	Behavioural change toward purchase.	No.
N. Liu et al. (2013)	To examine the drivers to virtual worlds learning continuance.	Balanced thinking-feelings model and social-constructivist theory.	Virtual worlds efficacy, self-reported learning, social presence, group cohesion, utilitarian value, and hedonic value.	Continuance Intention on virtual world learning.	No.
Nah and Eschenbrenner (2016)	To understand gender differences in media perceptions of hedonic systems.	Theory of spatial gender differences and theory of psychological types on gender differences.	Skill, challenge, and telepresence.	Satisfaction with online experience.	No.
Nah et al. (2011)	To investigate if the three-dimensional virtual world environment is more effective than the two-dimensional environment in creating hedonic experiences of customers' interaction with a brand and whether such experiences	Flow theory, telepresence theory, brand equity theory, and broaden-and-build theory of positive emotions.	Telepresence, enjoyment, and brand equity.	Behavioural intention.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
	help to enhance brand equity, or the added value of a brand.				
Pagani and Mirabello (2011)	To understand how social media is transforming consumer engagement and redefining commercial marketing strategies using video on the Web, mobile devices, and traditional TV.	None.	Stimulation and inspiration, temporal, intrinsic enjoyment, participation and socializing, utilitarian, self-esteem and civic-mindedness, community, and social facilitation.	Active usage and passive usage.	No.
Pelet et al. (2017)	To investigate the relationships between telepresence, flow experience, and user behaviour during social media use.	Flow theory.	Telepresence, flow, enjoyment, concentration, challenge, control, curiosity, and time distortion.	Social media use.	No.
Pöyry et al. (2013)	To distinguish between consumers' hedonic and utilitarian motivations for using company-hosted Facebook pages and relate them to two types of community usage behaviour: browsing and participation.	Theory of web usage and flow theory.	Hedonic motivations, utilitarian motivations, participation, and browsing.	Purchase intention, referral intention, and membership continuance intention.	No.
Salehan et al. (2017)	To analyse how motivation, participation, and performance are related to each other in the social networking services context.	Motivation-participation-performance framework.	Vertical social motivation, horizontal social motivation, hedonic motivation, utilitarian motivation, sharing, and collaboration.	Personal and job performance.	No.
Seol et al. (2016)	To explain the continuance of corporate social network services pages.	Communicative ecology theory.	Platform quality, content quality, service quality, exchange information, social support, friendship, perceived usefulness, perceived	Continuance intention.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
			enjoyment, satisfaction, network size, and incentive.		
Shang et al. (2017)	To probe into how and how much the situational field factors interact with motivational factors and affect the sharing-continuance decisions on social media platforms.	Field theory.	Perceived usefulness, community identification, social interaction, altruism tendency, perceived enjoyment, and self-efficacy.	Information sharing continuance.	No.
Shin (2012)	To present a predictive model of attitudes toward 3DTV.	Technology acceptance model and theory of reasoned action.	Perceived ease of use, perceived usefulness, perceived system quality, perceived content quality, social presence, flow, attitude, and intention.	Usage.	No.
Sledgianowski and Kulviwat (2009)	To empirically investigating factors influencing user adoption of social network sites.	Technology acceptance model.	Perceived playfulness, critical mass, perceived trust, normative pressure, perceived ease of use, perceived usefulness, and intention.	Actual use.	No.
Sun et al. (2014)	To explore users' continuance intention in online social networks.	IS continuance theory, flow theory, social capital theory, and unified theory of acceptance and use of technology.	Usage satisfaction, perceived usefulness, perceived enjoyment, shared norms, trust, tie strength, effort expectancy, and social influence.	Continuance intention.	No.
Torres et al. (2014)	To empirically examine the adoption of mobile eBook readers in order to better understand the role of content in the adoption decision making process.	Technology acceptance model and motivation theory.	Perceived usefulness, perceived ease of use, perceived playfulness, hedonic content availability,	Behavioural Intention to use.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
			and utilitarian content availability.		
Turel (2015)	To explore hedonic IS discontinuance.	Social cognitive theory.	Addiction to using, habit of using, satisfaction, self-efficacy, and guilt feelings.	Discontinuance intentions.	No.
Turel (2016)	To propose and examine a model that explicates the complex effects of guilt and theory of planned behaviour predictors on the discontinuance of an instance of mostly hedonic IS.	Theory of planned behaviour.	Subjective norms, attitude, perceived behavioural control, and guilt feelings.	Discontinuance intentions.	No.
Turel and Serenko (2012)	To test and validate the dual effect of enjoyment on the use of the IT artifact.	Theory of intrinsic motivation.	Time spent per-day, comprehensiveness of usage, perceived enjoyment, and habit.	Addiction and high engagement.	No.
Turel et al. (2010)	Other than focusing solely on behavioural intentions to use a hedonic digital artifact, this study also examined the willingness of users to provide positive word-of-mouth about the artifact.	Theory of consumption values.	Escapism, enjoyment, musical appeal, social value, and value-for-money.	Behavioural intention and positive word-of-mouth.	No.
Weiss and Schiele (2013)	To examine competitive virtual worlds in terms of eSports services intrinsically tying cooperation and competition.	Uses and gratifications theory.	Competition, challenge, and escapism.	Continuous eSports use.	No.
X. Lin et al. (2017)	To explain and analyse gender differences in users' social networking sites continuance decisions.	IS continuance theory and social role theory.	Perceived usefulness, satisfaction, perceived enjoyment, privacy risk, community identification, reputation, and confirmation.	Continuance intention.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
X. Lu et al. (2011)	To explain the effects of factors related to usability and sociability on virtual community members' continuous participation through the motivational beliefs of perceived usefulness, perceived enjoyment, and sense of belonging.	None.	Information service quality, interaction support quality, incentive policy, event organization, leaders' involvement, usefulness, enjoyment, and sense of belonging.	Intention of continuous participation.	No.
X. Xu et al. (2010)	To investigate whether the fit between the media platform and the content application could function as the key factor that determines user evaluation and acceptance of media convergence.	Task-technology fit framework.	Characteristics of contents, characteristics of media platform, attentional involvement, and emotional enjoyment.	Satisfaction with mobile video entertainment.	No.
Y. C. Xu et al. (2014)	To explore why users switch from a primary social networking service to others.	Push–pull–mooring human migration framework, IS success model, and social penetration theory.	Dissatisfaction with technical quality, dissatisfaction with information quality, dissatisfaction with entertainment value, dissatisfaction with socialization support, dissatisfaction with member policy, setup cost, continuity cost, dissatisfaction with the current social networking service, attraction from the alternative social networking service, switching costs, and peer influence.	Intention to switch.	No.
Yang and Lin (2014)	To examine the influence of perceived values on individual's stickiness to use Facebook, on top of exploring how	None.	Epistemic value, social value, hedonic value, and trust.	Stickiness.	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
	"trust" affects the personal usage behaviours.				
Yin and Zhu (2014)	To investigate the antecedents and effects of users' habit in the context of social networking websites.	None.	Satisfaction, enjoyment, prior usage, social interaction ties, habit, and post-adoption online self-presentation.	Social networking websites continued usage.	No.
Yin et al. (2013)	To extend the theoretical understanding of social networking adoption from initial acceptance to subsequent continuance usage.	IS continuance theory.	Confirmation, perceived usefulness, satisfaction, perceived enjoyment, structural embeddedness, perceived privacy risk, and prior usage.	Continuance usage intention.	No.
Yoon and Rolland (2015)	To explore the role of enjoyment and subjective norms in continuance use of social networking services.	IS continuance theory.	Perceived usefulness, perceived enjoyment, confirmation, subjective norm, satisfaction, and continuance intention.	Continuance usage.	No.
Z. Liu et al. (2016)	To examine the effect of perceived social costs, and benefits, of self-disclosure on self-disclosure in microblogging using Chinese data.	Social exchange theory.	Perceived privacy risk, trust in service provider, perceived anonymity self, convenience of relationship maintenance, relationship building, enjoyment, and self-presentation.	Self-disclosure.	No.
Z. Wang and Scheepers (2012)	To explore the intrinsic motivations of hedonic IS acceptance from a unique perspective.	Hedonic theory, pleasure, arousal, and dominance emotion model, flow theory, and technology acceptance model.	Pleasure, arousal, dominance, role projection, escapism, perceived ease of use, attitude towards using, and flow experience.	Behavioural intention	No.

Empirical Studies	Objectives	Theories/Models	Antecedents	Ultimate endogenous constructs	Focused on the well-being of users?
Zhou et al. (2012)	To explain customer continuance intention with respect to social virtual world services.	Dedication-constraint theory of commitment.	Utilitarian value, hedonic value, personalisation, learning, relational capital, satisfaction, calculative commitment, and affective commitment.	Continuance intention.	No.
Zhou et al. (2015)	To investigate the contingent effects of indulgence and individualism, which are two cultural values that affect the relationships between users' perceived benefits (i.e., utilitarian value, hedonic value, and relational capital) and affective commitment, and that between affective commitment and continuance intention in social virtual worlds.	Hofstede's theory of national culture	Utilitarian value, hedonic value, relational capital, and affective commitment.	Continuance intention.	No.
Zhou et al. (2014)	To investigate the effects of the three types of perceived benefits, moderated by gender, on satisfaction in relation to social virtual world continuance.	None.	Utilitarian benefit, hedonic benefit, social benefit, and satisfaction.	Continuance intention.	No.