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The Cost of Playing the Game: Modeling In-Game Purchase Intention and Investigating Purchase Behavior of Mobile Gamers

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THE COST OF PLAYING THE GAME: MODELING IN-GAME PURCHASE INTENTION AND INVESTIGATING PURCHASE BEHAVIOR OF MOBILE GAMERS

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Abstract

Free-to-play games typically have a monetization model that relies on players to purchase in-game items or virtual goods to generate revenue (Nguyen, 2015). There have been several empirical efforts to investigate purchase intention of virtual goods in video games with some focusing on quantitative models of purchase intention. Most of these studies tend to be with virtual worlds and lack the use of validated instruments to measure constructs (Hamari & Keronen, 2017). This research sought to gain a greater understanding of purchase intention of in-game content or virtual goods in mobile games through two studies.

Study 1 modeled purchase intention with factors including satisfaction, addiction, attitudes of virtual goods, social motivations, continuance intention, and play characteristics. A total of 284 participants who played mobile games for at least 5 hours a week completed an online survey examining the relationships between the different constructs. Several structural equation models were generated to find the best fitting model. Results of the final model explained 66.1% of the variance in purchase intention with the factors of attitudes towards virtual goods, monetary value, addiction, enjoyment, and creative freedom. Attitudes towards virtual goods (β = .767) was the most associated factor with purchase intention in the model followed by enjoyment (β = .153), monetary value (β = .148), creative freedom (β = -.127), and addiction (β = .106).

Study 2 examined purchase behavior of mobile video game players with a longitudinal diary study. Eight mobile video game players selected a game to play over the course of two weeks while logging their experience and purchases. Seven of the eight participants made a purchase of in-game content. Analyses of what game elements

contributed to purchasing behavior revealed that some participants reported associated dark patterns around their purchases such as paying for enhancements, which is paying for in-game content to make characters stronger to progress in the game. Players also encountered loot boxes that provide only a chance to earn specific items in the game. These results add to Study 1 results by demonstrating that aspects of how a game is designed may impact in-game purchase intention and should be considered in future research.

The combination of Studies 1 and 2 show that both psychological constructs of mobile gamers and aspects of game design may influence in-game purchase intention. Future research could replicate the model from this research in other in-game purchase intention or actual purchase behavior settings such as different types of games genres, platforms, or populations. Other areas of future research include further examination of the impact of dark game design patterns on purchase behavior in other situations (e.g., console, free to play vs. pay to play) and the development of ways to mitigate deceptive designs on player purchasing habits.

Keywords: mobile games, gaming, SEM, in-game content, virtual goods, purchase intention, diary study, purchase behavior

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CHAPTER 1 INTRODUCTION

Mobile Video Game Industry

In 2021, there were a reported 3 billion mobile game players worldwide with about 212 million of those reported being in the United States (Wijman, 2021). The global gaming market was estimated to be worth around $175.8 billion dollars with mobile gaming generating about 53% of that value with $93.2 billion dollars in 2021 (Wijman, 2021). The most popular type of app for users on smartphones were gaming apps (Hill, 2021). About one in two mobile app users either opened or played a game in the last seven days, with most gaming occurring during the evenings (6 - 10 p.m.). Mobile app users in the United States spend about twenty-three minutes a day playing mobile games (Luz, 2019). Netflix, an online video streaming platform, stated in an earnings report for 2018 that they are competing for "consumer screen time" with video games like Fortnite, a popular free online game (Patches, 2019).

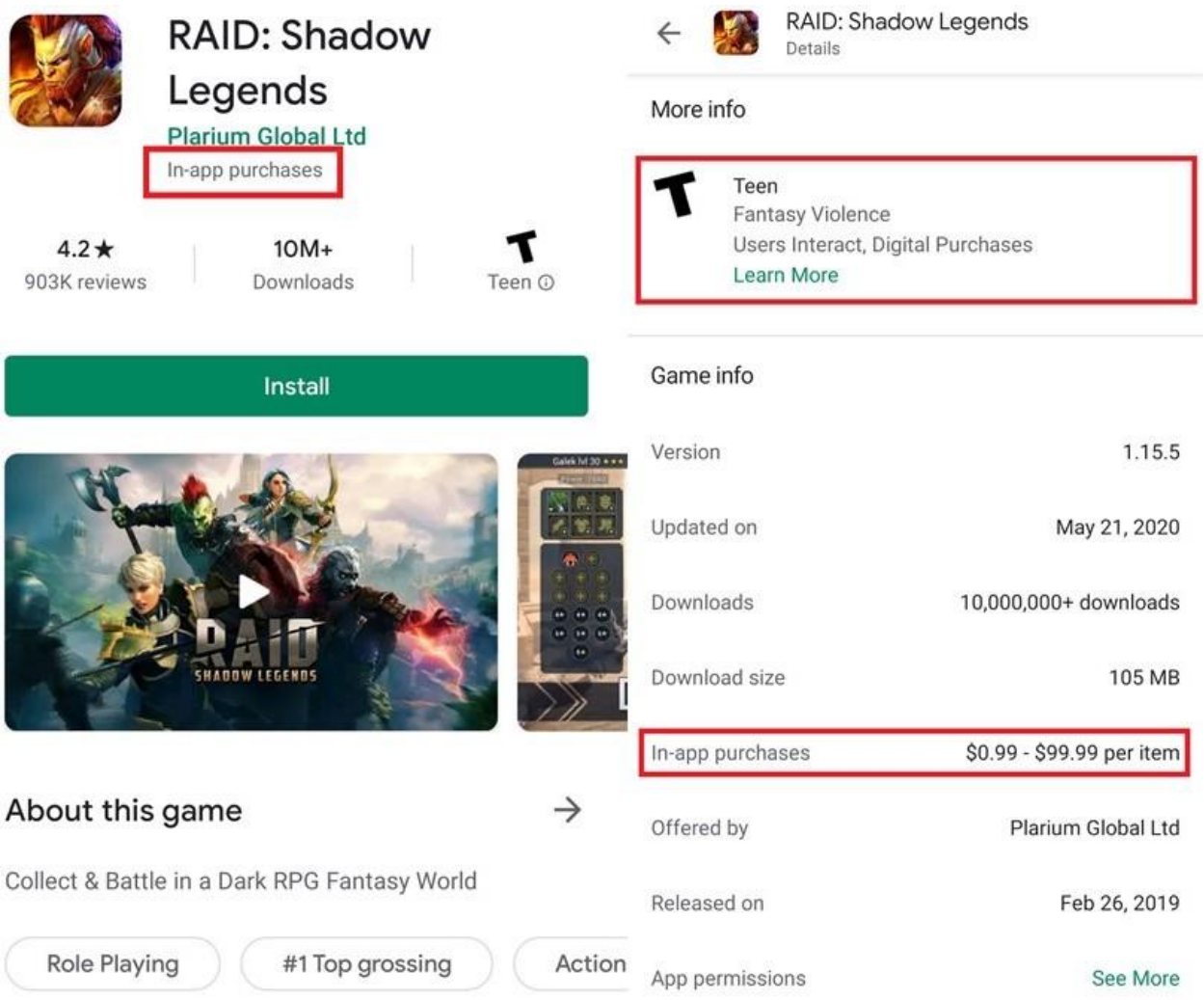
Most mobile games are free-to-play (F2P) which means that the game is free to acquire, and that the player has access to the main features of the game (Park & Lee, 2011). F2P games typically generate revenue with microtransactions, a purchase within a video game to get features, virtual goods, functions, or other in-game content (Lin & Sun, 2011; Kim et al., 2017). F2P games have a monetization model that depends on players to purchase in-game items, virtual goods, or view advertisements to generate revenue (Nguyen, 2015). The business model of a F2P game that sells additional in-game content or services is sometimes referred to as "freemium" game or service (Kumar, 2014). Some F2P games have shown success with using both microtransactions and a subscription service, where users pay a set amount for content or access to content while others may use a

combination of microtransactions and in-game advertisements. (Mantymaki & Salo, 2015; Salehudin et al., 2021).

Figure 1

RAID: Shadow Legends Google Play Store Page with Several Labels Showing It Contains In-App Purchases

How to check



The Entertainment Software Association (2019) reported 49% of video game players made a microtransaction purchase in the last year. Buying virtual goods or in-game content in F2P games usually requires real money to be converted to a virtual currency. Virtual goods can take many forms like game progressions tools (e.g., experience/resource boosters), currencies, characters/avatars, loot boxes, or cosmetic items for in-game characters (Hamari & Lehdonvirta, 2010; Lehdonvirta, 2009). Some games also allow players to acquire virtual goods through activities or completing objectives in the game (Guo & Barnes, 2012). The selling of virtual goods in games has become a standard business model for many video games and has spread to online games in general (Hamari & Keronen, 2017).

Lin and Sun (2011) divided in-game items into two categories: functional and decorative. Functional items for example, can increase character, pet, or vehicle attributes such as speed or power. Decorative items are for changing character appearance and are only cosmetic. Lehdonvirta (2009) classified virtual goods into three categories including appearance, social, and functional. Appearance goods change the aesthetics of a character or interface, social goods help build social bonds or make distinction from other players, while functional goods provide some type of in-game benefit like increased character stats. Some video games offer loot boxes, which provide a chance to get certain items that vary in rarity to players (Macey & Hamari, 2019). Loot boxes in video games gained mainstream attention as the Belgium Gaming Commission declared them “in violation of gambling legislation” (Gerken, 2018). Sony, Xbox, and Nintendo, three of the major video game console makers, have even created platform policies that require loot boxes that can be

purchased with money to disclose information related to the rarity and probability of virtual items in them (Wilde, 2019).

Currently, there are few quantitative research studies on in-game purchase intention especially in mobile F2P games (Hamari & Keronen, 2017). Understanding why users continue to play games and purchase in-game content is important to game developers as it is what generates their revenue.

Purchase Intention

According to Lin and Lu, (2010) purchase intention considers several areas such as a person's willingness to consider buying something, what a person wants to buy in the future, and the decision to purchase something again. Purchase intention has been researched in traditional commerce, but the influences of purchase intention vary in e-commerce contexts (Mertens, 2017). In this research, purchase intention will be defined as a user's intention to buy virtual goods or in-game content in a mobile game. Researchers have studied purchase intentions in gaming contexts to understand why people buy virtual goods and what motivations drive them to do so. Hamari et al., (2017) investigated concrete motivations for purchase in-game items and based on their review of the literature, industry input, and an analysis of the top-grossing F2P games found 19 reasons why people purchase in-game content. Some of these motivations included: becoming the best, continuing play, giving gifts, personalization, special offers, unlocking content, showing off to friends, and indulging the children. Hamari and colleagues (2017) then surveyed a sample of F2P gamers that have purchased in-game content narrowed down the motivations into six dimensions for purchasing in-game content: unobstructed play, social interaction, completion, economic rationale, indulging the children, and unlocking content.

The results from this research were to find concrete motivations for why players purchase in-game content but not modeling the factors that influenced it.

There have been several empirical efforts to model the factors that influence purchase intention of virtual goods in video games (See Appendix A for a table summarizing this literature). Researchers use several different theories or models in literature to explain the influences of purchase intention in gaming such as Uses & Gratifications Theory, Transaction Cost Theory, Technology Acceptance Model, and many others. These theories may be used to support the different constructs that researchers put in their models to predict purchase intention such as satisfaction, perceived value, enjoyment, subjective norms, and more. However, there is not any clear theory or model that is dominantly used in the literature especially among mobile games where purchasing is different from a traditional retail model (Hamari & Keronen, 2017; Hamari, Hanner, et al., 2019).

Table 1

Theories Applied in Virtual Good Purchase Intention Literature and Descriptions

Theory	Description
Uses & Gratifications Theory (U&G)	U&G suggests that individuals use certain forms of media to meet their needs and if those needs are fulfilled, they may repeat the experience.
Transaction Cost Theory (TCT; Coase, 1937)	TCT suggests that consumers want to carry out a transaction in the most economical way.
Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975)	TRA posits that the attitude towards a behavior and the perception of how others view a behavior are the predictors of actual behaviors.
Theory of Planned Behavior (TPB; Ajzen, 1991)	TPB indicates actual behavior has three predictors: attitudes toward a behavior, perception of how others view a behavior, and perceived behavioral control.
Technology Acceptance Model (TAM; Davis, 1989)	According to TAM, perceived usefulness and perceived ease of use influence a person's attitude towards using technology then actual use.
Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003)	UTAUT posits that user acceptance and usage behavior are influenced by performance expectancy, effort expectancy, social influence, and facilitation conditions.
Theory of Consumption Values (TCV; Sheth, Newman, & Gross, 1991)	TCV suggest there are five different consumption values that make up consumer choice: functional, social, emotional, epistemic, and conditional values.
Self-Presentation Theory (Goffman, 1959)	Self-presentation theory provides an explanation as to why individuals attempt to project a desired image of themselves to others.
Stimulus-Organism-Response (SOR) Model (Mehrabian & Russell, 1974)	The SOR model posits the aspects of an environment can cause changes to an individual's experience which can then shape behavior.
Expectancy Disconfirmation Model (EDM; Oliver, 1980)	According to EDM, satisfaction is based on the difference between expectations and perceived quality after consumption.

Uses & Gratifications Theory

The Uses and Gratifications Theory originated around the 1940s as an approach to explain why people choose one communication medium over another to satisfy certain needs (Weibull, 1985). Uses and Gratifications Theory suggests that individuals use certain

forms of media to meet their needs and if those needs are fulfilled, they may repeat the experience (Bryant & Miron, 2004). Individuals seek out specific media and content genres in that media to satisfy gratifications such as entertainment or learning (Greenberg et al., 2010). For example, with gaming, people may want to play or seek out a specific game content or genre (Greenberg et al., 2010; Patzer, 2018). Uses and Gratifications Theory has seen applications in many different media and communication technologies including television (Babrow, 1987), internet (Stafford, Stafford, & Schkade, 2004), and video games (Li et al., 2015; Wu et al., 2010). Weibull (1985) proposed a structural model of media use and Wu et al., (2010) used it as a basis of studying video game usage. Hedonic gratifications, utilitarian gratifications, and social gratifications were found to be related to game use intentions (Li et al., 2015; Wu et al., 2010). Uses and Gratifications Theory provides a user-level view in understanding media use and the motivations of hedonic information systems use such as video games (Li et al., 2015). Gamers that enjoy a video game tend to continue playing that game and gamers that continue playing a game may also be more willing to purchase things within that game as well (Ghazali et al., 2019; Hamari, Hanner, et al., 2019; Li et al., 2015; Mantymaki, 2011).

Transaction Cost Theory

Transaction Cost Theory suggests that individuals want to complete transactions in the most economical way (Coase, 1937; Williamson, 1985). Consumers want to carry out a transaction that has the lowest cost and researchers have applied this concept to virtual worlds in video games by considering how players might spend time and energy to work towards virtual items (Guo & Barnes, 2011, 2012). Depending on the game, players may have the option to spend money on virtual items or spend time, effort, or energy to earn

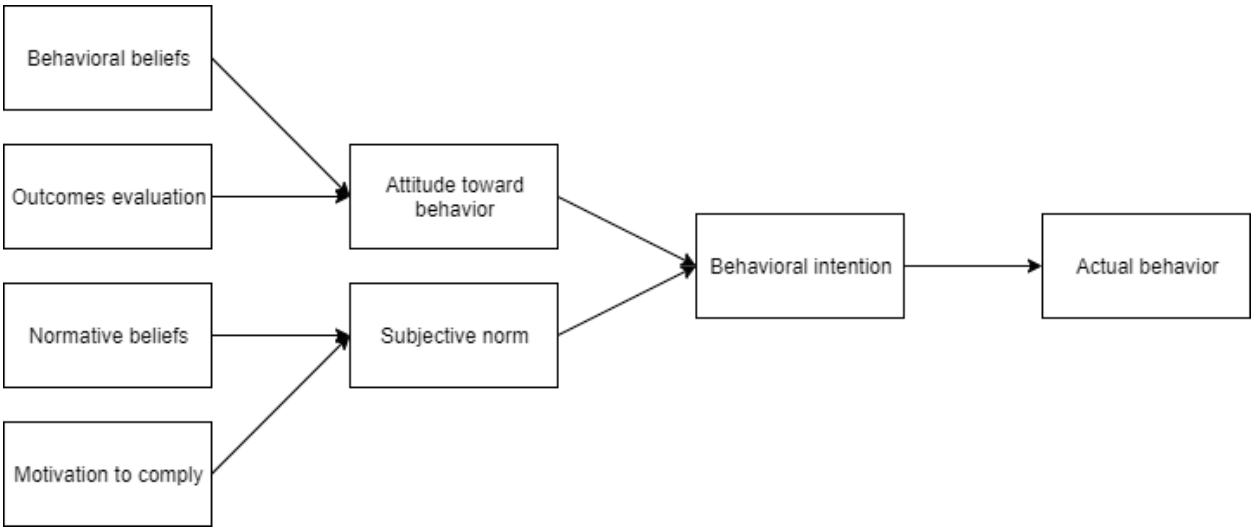
them. User perception of the benefits or drawbacks from actual purchasing behavior, price (Liao & Cheung, 2001), and cost (Foucault & Scheufelem, 2002) can impact purchase intention. Guo and Barnes (2012) incorporated aspects of Transaction Cost Theory in a model of purchasing behavior in World of Warcraft including factors such as perceived value, performance expectancy, and effort expectancy as they reflect aspects of a player's decision on monetary vs. non-monetary costs in purchase intention.

Theory of Reasoned Action

Theory of Reasoned Action explains the relationship between an individual's intentions, attitudes, and their behavior (Fishbein & Ajzen, 1975). Theory of Reasoned Action posits that an individual's feelings about doing a behavior and their perception of how others view a behavior are the predictors for actual behaviors (Fishbein & Ajzen, 1975). The Theory of Reasoned Action has been used in examining other online consumer behavior such as online grocery buying intentions (Hansen et al., 2004) and online shopping intentions (Njite & Parsa, 2005). Luo and colleagues (2011) used the Theory of Reasoned Action as a basis for studying browsing intentions, purchase intentions, and loyalty in online games such as World of Warcraft and Maple Story. If video game players have a positive experience with a video game, and view buying content in the game as acceptable, then they may be more likely to purchase within that game.

Figure 2

Theory of Reasoned Action (Fishbein & Ajzen, 1975)



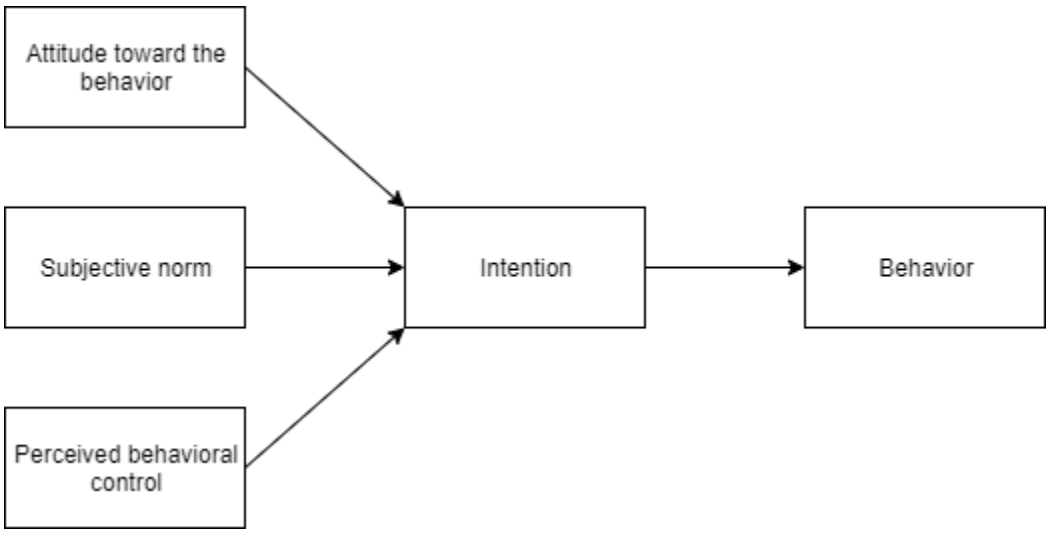
Theory of Planned Behavior

The Theory of Planned Behavior was developed to expand on the Theory of Reasoned Action by adding a dimension for perceived behavior control. This is described as how difficult an individual perceives performing the behavior, as a predictor of intentional and actual behavior (Ajzen, 1985; Ajzen, 1991; Venkatesh et al., 2003). With the additional of perceived behavioral control, the Theory of Planned Behavior has the following predictors: actual behavior, attitude, and subjective norm. A meta-analysis by Armitage and Conner (2001) supported that perceived behavioral control was a predictor of a range of intentions and actual behaviors. The Theory of Planned Behavior has seen some use in gaming continuance intention literature with Lee & Tsai (2000) integrating aspects of the Theory of Planned Behavior and the Technology Acceptance Model. In gaming contexts, the Theory of Planned Behavior considers how gamers feel about purchasing in-game content,

the social norms related to purchasing, and the perceptions of constrains on purchasing behavior in video games.

Figure 3

Theory of Planned Behavior (Ajzen, 1991)



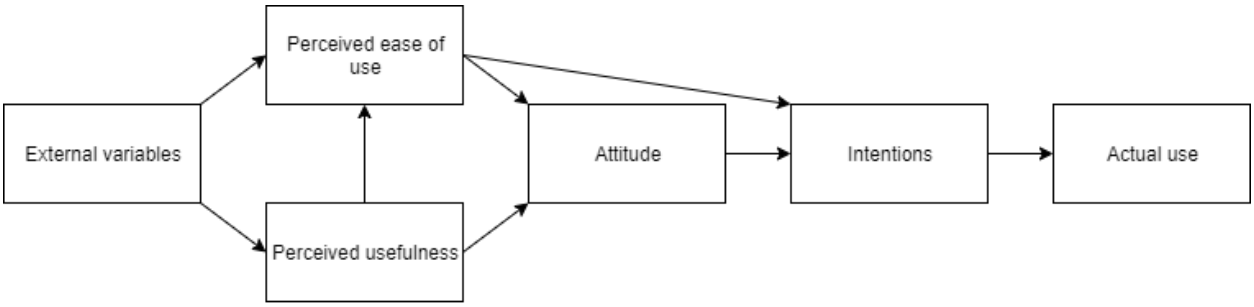
Technology Acceptance Model and Unified Theory of Acceptance and Use of Technology

Also drawing from the Theory of Reasoned Action, Technology Acceptance Model was developed as a way to explain how individuals make decisions when adopting technology (Davis, 1989). According to the Technology Acceptance Model, perceived usefulness and perceived ease of use influence a person's attitude towards using technology they actual use (Davis, 1989). The Technology Acceptance Model has seen use in various settings and has been expanded on with other factors to increase its predictive power such as trust (Gefen et al., 2003) and perceived enjoyment (van der Heijden, 2004). The Technology Acceptance Model suggests that behavioral intention predicts actual behavior so in a gaming context, in-game purchase intention can predict actual purchasing

behavior. Researchers have used the Technology Acceptance Model along with other theories to study purchase intention in virtual world environments (Mantymaki & Salo, 2011; Shin, 2008).

Figure 4

Technology Acceptance Model (Davis, 1989)

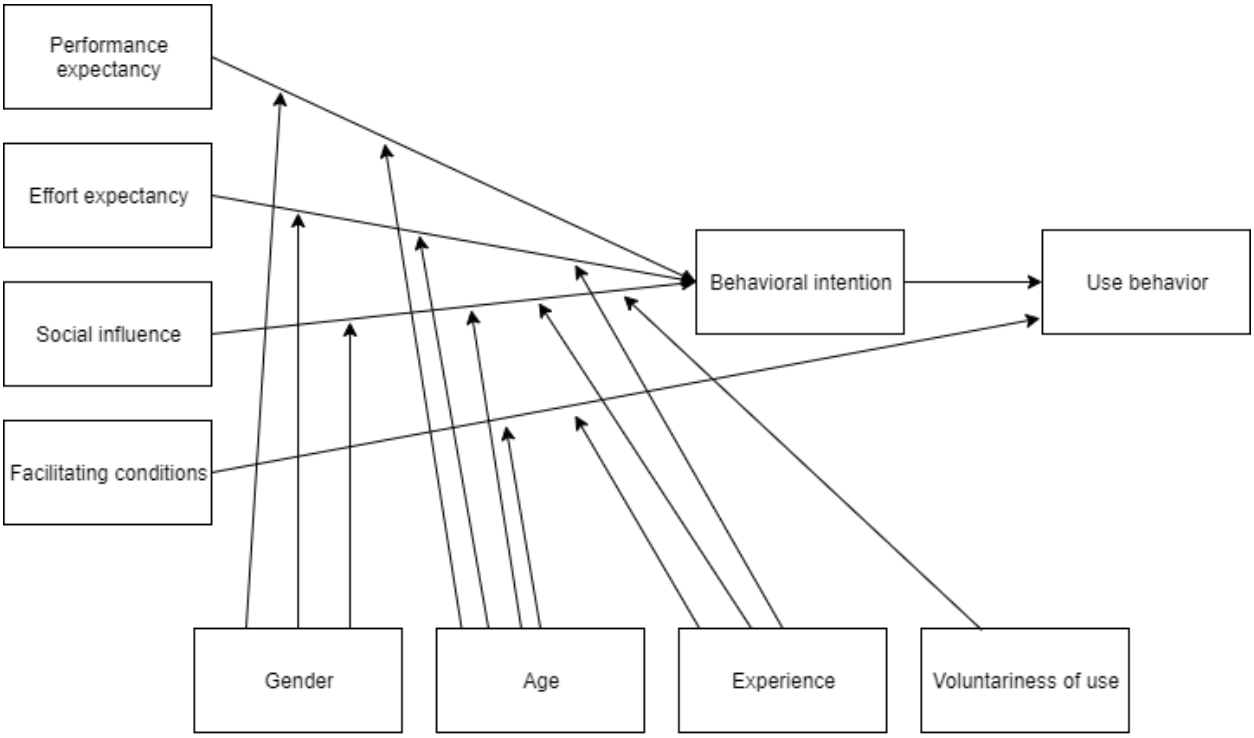


Continued research with Technology Acceptance Model has led to the development of the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003). The UTAUT was developed based on a review of eight technology acceptance models including the Theory of Reasoned Action and the Technology Acceptance Model. UTAUT posits that user acceptance and usage behavior are influenced by performance expectancy, effort expectancy, social influence, and facilitation conditions. Performance expectancy refers to how an individual believes that using a system helps their performance in a task and effort expectancy was defined as the ease of use of a system. Social influence refers to how much someone views others think they should use a system and facilitating conditions refer to the degree of support, either technical or organizational a given system has. There are also several constructs that moderate factors in the model such as age, gender, experience, and voluntariness of use. The UTAUT model has shown to

have greater power in explaining usage intention than models like Technology Acceptance Model and Theory of Planned Behavior (Venkatesh et al., 2003). Guo and Barnes (2012) used UTAUT as the basis for studying purchase intention in gaming because it includes most factors identified in information system intention and use. UTAUT builds off the Technology Acceptance Model but proposes more constructs that affect usage intention; however, both the Technology Acceptance Model and UTAUT suggest that behavioral intention predicts actual behavior so in a gaming context, in-game purchase intention can predict actual purchasing behavior.

Figure 5

Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

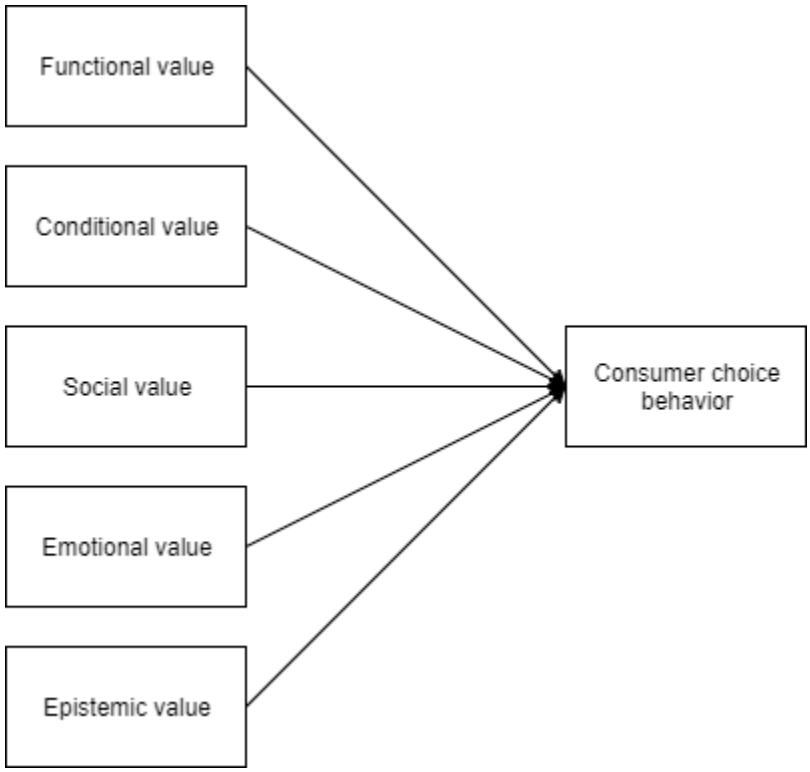


Theory of Consumption Values

The Theory of Consumption Values is made of three fundamental principles: multiple consumption values make up consumer choice, consumption values provide different contributions pending on the situation, and that consumption values are independent of each other (Sheth et al., 1991). Theory of Consumption Values defined five consumption values: functional, social, emotional, epistemic, and conditional. Previous research with the Theory of Consumption Values has included user experience with smartphones (Bodker et al., 2009), organic food purchases (Finch, 2006), and clothing purchases (Park & Rabolt, 2009). Park and Lee (2011) used the Theory of Consumption Values when researching the reasons and values of why individuals purchase in-game items. Some consumption values from the Theory of Consumption Values can be compared to features in video games, with enjoyment being similar to emotional value, but other values like conditional and epistemic values not carrying over to gaming situations.

Figure 6

Theory of Consumption Values (Sheth et al., 1991)



Self-Presentation Theory

Self-Presentation Theory provides an explanation as to why individuals attempt to project a desired image of themselves to others (Goffman, 1959, Leary, 1996). Motivations for why individuals engage in self-presentation include a want to influence others, appear likable, gain rewards, and appear competent (Schlenker, 2003). Self-presentation can include a person's behavior, appearance, language, and possessions. Online-self presentation includes symbolic, textual, and aural information (Schau & Gilly, 2003). Kim et al., (2012) applied Self-Presentation Theory with the purchase of digital items in virtual worlds as they provide ways for players to customize their possessions or avatar in the

game, which could drive purchase of these items. Not all games may have ways for players to customize their characters so Self-Presentation Theory may not be as applicable to those games.

Stimulus-Organism-Response Model

The Stimulus-Organism-Response (SOR) Model suggets that aspects of the environment can act as stimuli that cause changes to people's internal experiences. (Mehrabian & Russell, 1974). From a gaming perspective, the game's environment influences the player's experience which can affect responses such as intention to purchase in the game (Huang, 2012). Animesh et al., (2011) applied the SOR Model as their framework for examining purchasing behavior in virtual social worlds. They considered aspects of the virtual environment of the game having an influence on the player experience. Positive player experience may lead to responses such as intention to purchase virtual goods.

Figure 7

Example of Applying SOR in In-game Purchase Context

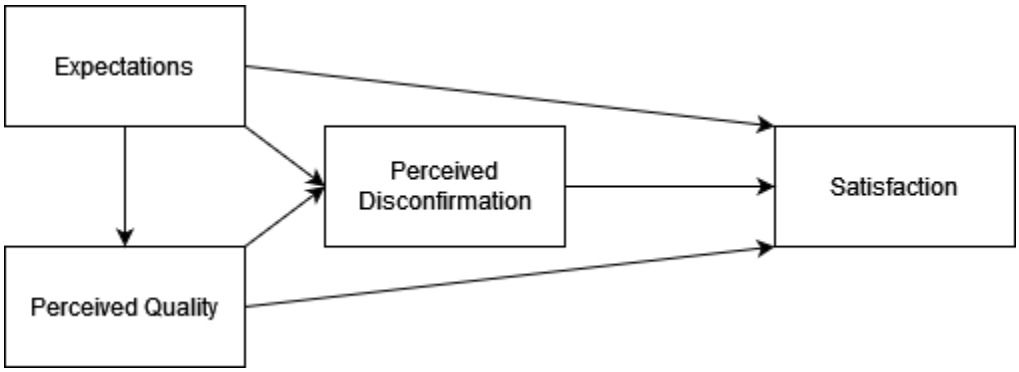
Expectancy Disconfirmation Model

The Expectancy Disconfirmation Model posits that satisfaction is based on the difference between expectations and perceived quality after consumption (Oliver, 1980).

Satisfaction may play a role in the influence of a customer's attitude, loyalty, purchase intention, and repurchase rates (Oliver, 1980; Wang & Chang, 2014). The Expectancy Disconfirmation Model has been applied to various consumer areas such as social networking sites (Chang & Zhu, 2012), online games (Liao et al., 2016), and electronic commerce services (Bhattacherjee, 2001a). Wang and Chang (2014) applied the Expectancy Disconfirmation Model along with factors of customization and symbolic-based sociability, or how a consumer expects a virtual product to support social interaction, to examine purchasing of virtual goods. The Expectancy Disconfirmation Model provided an understanding of consumer behaviors based on prior and initial expectations while symbolic sociability and customization provided insights into consumer perceptions of virtual goods.

Figure 8

Expectancy Disconfirmation Model (EDM; Oliver, 1980)



There have been several efforts to investigate purchase intention of virtual goods in video games with some focusing on modeling purchase intention (See Appendix A for a table summarizing this literature). Outcomes of previous research have revealed several

factors that may influence purchase intentions in gaming including satisfaction, social motivations, perceived value, continuance intention, attitudes, addiction, and others.

Video Game Satisfaction

Video game developers are tasked with creating video games that consumers enjoy and that can succeed in the competitive video game market. There are differing viewpoints on what is considered a "good" game. Concepts like innovation, choice, accessibility, story and replayability may be used to argue what makes up a good game (Shelley, 2001). Other concepts like challenge, feel, freedom, place, promise, and fantasy are brought up when discussing what makes games good (Francis, 2011). Game user researchers use many different techniques to help improve games like heuristic evaluation, diary studies, playtesting, and focus groups. Each of the techniques have different uses with pros and cons to each of them. Playtesting has players play a video game and provide feedback (Davis et al., 2005). The feedback about the game can be related to the controls, story, graphics, or overall fun. A questionnaire may be used to collect feedback about the game and there are many instruments available that can measure concepts like flow, enjoyment, immersion, presence, or satisfaction.

There are several instruments that can be used to measure satisfaction in video games. Phan et al., (2016) conducted a review of many video game scales and found several limitations with available instruments. Limitations with some currently available scales include measuring only one element of gaming, being limited to certain games or genres, containing questions/statements that are hard to understand, and being developed only for research and not for evaluation. Some scales did not follow "best practices" in scale development and validation or did not cover important aspects of gaming like usability.

Phan et al., (2016) addressed these limitations by developing the Game User Experience Satisfaction Scale (GUESS). The GUESS was created following scale development and validation "best practices" (literature review, expert review, piloting, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA)). The GUESS was developed and validated with 450 video game titles and 1,300 participants. The GUESS has 55 items that measure nine dimensions of video game satisfaction: usability/playability, narratives, play engrossment, enjoyment, creative freedom, audio aesthetics, personal gratification, social connectivity, and visual aesthetics (Table 2). The GUESS has been used in research of virtual reality gaming (Shelstad et al., 2017; Yildirim et al., 2018) healthcare (Manero et al., 2018; Smith et al., 2018), and social interaction (Ibarra et al., 2018). A shorter version of the GUESS (GUESS-18) was developed for a quick but comprehensive measure of video game satisfaction (Keebler et al., 2020). The GUESS-18 was created for practitioners who may find the original 55-item measure to be impractical or time-consuming.

In the gaming literature, researchers modeling purchase intention have shown that satisfaction and enjoyment have an influence (Guo & Barnes, 2011; Guo & Barnes, 2012; Hamari, Hanner, et al., 2019; Ho & Wu, 2012; Kim, 2012; Mantymaki et al., 2014). Kim (2012) investigated repurchasing intentions and recommendation intentions of digital items in social virtual worlds like Second Life, Cyworld, and Habbo Hotel. Results indicated that if users were more satisfied and perceived digital items were of good value then they were more likely to repurchase them. Ho and Wu (2012) examined purchase intention of virtual goods in online games with factors like game type, satisfaction, playfulness, aesthetics, and other factors. Results of war-strategy game users showed that satisfaction with the game may impact purchase intention, but this finding did not show for role-

playing game users. Guo and Barnes (2011; 2012) found that perceived enjoyment may have an influence on purchase intention in games like Second Life and World of Warcraft. Park and Lee (2011) found that satisfaction did not have an impact on purchase intention with video games while Hamari (2015) found that perceived enjoyment had a negative impact on purchase intention.

Table 2

Description of GUESS Subscales (Phan et al., 2016)

Subscale	Description
Audio Aesthetics	The different auditory aspects of the game (e.g., sound effects) and how much they enrich the gaming experience
Creative Freedom	The extent to which the game is able to foster the player's creativity and curiosity and allows the player to freely express his or her individuality while playing the game
Enjoyment	The amount of pleasure and delight that was perceived by the player as a result of playing the game
Personal Gratification	The motivational aspects of the game (e.g., challenge) that promote the player's sense of accomplishment and the desire to succeed and continue playing the game
Play Engrossment	The degree to which the game can hold the player's attention and interest
Narratives	The story aspects of the game (e.g., events and characters) and their abilities to capture the player's interest and shape the player's emotions
Social Connectivity	The degree to which the game facilitates social connection between players through its tools and features
Usability/Playability	The ease in which the game can be played with clear goals/objectives in mind and with minimal cognitive interferences or obstructions from the user interfaces and controls
Visual Aesthetics	The graphics of the game and how attractive they appeared to the player

Social Motivations

Researchers have examined social motivations or social values in gaming literature about involving purchase intention (Hamari, Malik, et al., 2019; Hamari, Hanner, er al., 2019; Ho & Wu, 2012; Jimenez et al., 2019; Kim et al., 2011; Kordyaka & Hribersek, 2019; Mantymaki, 2011; Mantymaki & Salo, 2011; Mantymaki & Salo, 2013; Mantymaki et al., 2014). Network externalities or the perceived size of a user's network has been found to influence purchase intention of virtual goods in virtual worlds (Mantymaki & Salo, 2011; Mantymaki & Salo, 2013; Mantymaki et al., 2014). Concepts such as social relationship support, or how in-game items help with social bonds and social self-image expression, which refers to how people express themselves in online social environments, have shown mixed results for their influence on purchase intention (Ho & Wu, 2012; Kim et al., 2011). Ho and Wu (2012) demonstrated social relationship support influences purchase intention with role-playing games but not war-strategy games. Social self-image expression showed no influence on purchase intention in either type of game. Kim and colleagues (2011) found social self-image expression influenced intention to purchase digital items in virtual worlds but did not find support for social relationship support to have an influence. The different findings from the two studies might be due to the type of game each one examined. Socializing was found to influence both in-app purchase intention and intention to reuse in Pokémon Go (Hamari, Malik, et al., 2019). Hamari and colleagues (2019) found that social value influenced both continued use intention and purchase intention in F2P games. Kordyaka and Hribersek (2019) found that identification with a virtual group and online self-presentation influenced purchasing behavior of skins in the game League of Legends. There have been mixed findings with social presence influencing purchase intention

(Mantymaki & Salo, 2013; Mantymaki et al., 2014). Both studies examined purchase intention with Habbo Hotel, a social virtual world, and included social factors as a predictor of purchase intention in the game with one studying finding it influencing purchase intention and the other not. Trust in other users was also found to influence purchase intention in Habbo Hotel (Mantymaki et al., 2014).

Perceived and Monetary Value

Hsiao and Chen (2016) defined perceived value as "the consumer's overall assessment of the utility of a product or service, determined by a consumer's perception of what is received and given" (p. 19). Sweeney and Soutar (2001) developed PERVAL, a scale used to measure perceived value that include dimensions such as: social, price, emotional, and performance/quality. Past research has shown emotional and social value influence intention to pay on social networking sites and mobile internet services (Lu & Hsiao, 2010; Hsiao, 2013). Concepts like price utility or price perception also fall under the concept of perceived value (Mertens, 2017). Price utility, monetary value, or price perception refer to how reasonable consumers view the price of goods (Ho & Wu, 2012). In gaming literature, researchers have found that perceived value positively affects player purchase intention in virtual worlds (Guo & Barnes, 2011; Guo & Barnes, 2012; Kim, 2012). Park and Lee (2011) investigated in-game purchase intention with an integrated perceived value composed of monetary, enjoyment, character competency, and visual authority. Results indicated that the integrated value positively influenced purchase intention of in-game items. Ho and Wu (2012) found that price utility was positively associated with purchase intention of role-playing game users and Warouw (2014) found similar findings with online games. Price

perception may have an impact on purchase intention of Facebook game players as well (Liu & Shiue, 2014).

Continuance Intention

Continuance intention refers to the intention to continue the use of a product or service (Bhattacherjee, 2001a; Liao et al., 2016). Continuance intention has been researched in e-commerce services (Bhattacherjee, 2001a; 2001b), consumer products (Zeithamal et al., 1996), and video games (Ghazali et al., 2019; Hsiao & Chiou, 2012; Nguyen, 2015). In gaming literature, other terms like intention of continuous use (Lu & Hsiao, 2007) or continued usage intention (Liao et al., 2015), loyalty (Choi & Kim, 2004), sustained use (Wohn, 2013), and continued intention to use (Lee & Tasi, 2010) were used to describe continuance intention. Video game players tend to switch to different games (Li et al., 2015; Nguyen, 2015) and since there are so many games available, keeping players invested to continue playing can be difficult. Understanding what contributes to continuance intention may provide insight to video game developers about what they can do to keep players playing their games. Attempts to model factors that influence of continuance intention have been conducted (Li, et al., 2015; Nguyen, 2015; Patzer, 2018). Li and colleagues (2015) used a U&G approach to investigate continuance intention of social network games with their findings indicating that three types of gratifications, hedonic, utilitarian, and social may influence continuance intention to use a social networking game.

In gaming literature, several studies have used continuance intention as a predictor of purchase intention (de Souza & de Freitas, 2017; Ghazali et al., 2019; Hamari, 2015; Hamari, Hanner, et al., 2019; Hsaio & Chen, 2016; Mantymaki, 2011, Mantymaki & Salo, 2011; Mertens, 2017). Ghazali et al., (2019) studied the motivations and player intentions

behavior of Pokémon Go video game players. The model included factors like enjoyment, flow, social influences, which were gaming motivations used to predict continuance intention. The factor continuance intention was then examined to see its impact on in-app purchases in Pokémon Go. Results showed that continuance intention explained about 10% of the variance of purchase intention. Hamari (2015) examined purchasing intentions of three different types of F2P games (social virtual worlds, first-person shooters, and social networking games). Overall, continuance intention was shown to be positively related to purchase intention but when breaking this relationship down by game type, only social virtual worlds and first-person shooters showed a significant relationship. Mobile game user loyalty was found to positivity affect in-app purchases of both paying and non-paying players (Hsiao & Chen, 2016).

Attitudes

Attitude can be defined as the beliefs and perceptions about a particular behavior (Ajzen & Fishbein, 1980) and can be formed based on concepts such as past experiences and cognitive information (Zanna & Rempel, 1988). The F2P or freemium business model and the sales of virtual goods have negative attitudes related to them for a few reasons (Hamari, 2015). For example, creating a need for players to buy virtual goods because of obstacles in the game such as increasingly challenging content, inconvenient gameplay elements, or artificial scarcity (Hamari & Lehdonvirta, 2010). Hamari (2015) included attitudes towards purchasable virtual goods in a research model of purchase intentions of virtual goods in three different types of F2P games (social virtual worlds, first-person shooters, and social networking games). Overall, attitude was positively associated with purchase intentions and even when broken down by game type. Kaburuan and colleagues

(2009) also found attitudes being positively related to intentions to purchase with virtual world games.

Addiction

In 2019, the World Health Organization (WHO) added gaming disorder as an official condition in the International Classification of Diseases (ICD) (Park, 2019). According to the new definition, gaming behavior turns into a disorder when there is: impaired control over gaming, gaming takes priority over other activities, and gaming continues despite negative consequences (World Health Organization, 2019). Kuss (2012) conducted a review of internet gaming addiction research and found gaming addiction seems to resemble substance-related addictions but a behavioral one. Griffiths (2005) suggests that behavioral addiction consists of six components: salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse. The six components suggested by Griffiths (2005) has been applied to online gaming (Griffiths, 2010; Balakrishnan & Griffiths, 2018). Chen and Leung (2016) investigated psychological factors such as loneliness, self-control, perceived gratifications, and boredom to mobile game use and addiction. Factors like loneliness and self-control were significantly related to mobile game addiction. Players that had more self-control were less likely to become addicted to mobile gaming. Mobile game addiction was a predictor of mobile game use. Researchers have examined online mobile game addiction's relationship to game loyalty and intention to purchase mobile in-app features. Results indicated addiction being positively related to both purchase intention and game loyalty (Balakrishnan & Griffiths, 2018). Males were also more likely to indicate an intention to purchase than females. Mobile game players addicted to a game may be more likely to spend money in that game.

Game Player Characteristics

Previous research with purchase intention in mobile games have shown the impact of gender and age on purchase intention for paying players but not for non-paying players (Hsiao & Chen, 2016). One research study found that age, gender, and education impact purchase intention of Pokémon Go players (Hamari, Malik et al., 2019). More research is needed on the impact of demographic factors in the modeling of in-game purchase intention as it has not been a focus in previous literature (Hamari & Keronen, 2017).

Purpose

This research seeks to gain a greater understanding of purchase intention of in-game content or virtual goods in mobile games. Two studies were conducted. The first study modeled purchase intention with factors including addiction, attitudes of virtual goods, social motivations, continuance intention, and attitudes while the second study examined actual purchase behavior of mobile video game players using a longitudinal diary study.

CHAPTER 2 STUDY 1: SURVEY OF MOBILE GAME PLAYERS

Study 1 sought to understand why gamers purchase virtual goods in mobile games by modeling purchase intention using the following factors: satisfaction, social motivations, monetary value, continuance intention, attitudes towards virtual goods, addiction, and demographic factors. Each of the above factors have been used in some capacity to examine purchase intention in mobile games but not all in the same model (Table 3). These factors were chosen based on previous findings indicating a direct relationship with purchase

intention. This research will specifically examine mobile games due to their immense popularity and tendency to be F2P while selling in-game content.

Table 3

Constructs in the Proposed Model

Construct	Description	Source(s)
Purchase Intention	A user's willingness to buy virtual goods or in-game content in a mobile video game	Adapted from Huang, 2012
Satisfaction	"the degree to which the player feels gratified with his or her experience while playing a video game"	Phan et al., 2016, p. 1220
Usability/ Playability	"ease in which the game can be played with clear goals/objectives in mind and with minimal cognitive interferences or obstructions from the user interfaces and controls"	Phan et al., 2016, p. 1238
Narratives	"The story aspects of the game (e.g., events and characters) and their abilities to capture the player's interest and shape the player's emotions"	Phan et al., 2016, p. 1238
Play Engrossment	"The degree to which the game can hold the player's attention and interest"	Phan et al., 2016, p. 1238
Enjoyment	"The amount of pleasure and delight that was perceived by the player as a result of playing the game"	Phan et al., 2016, p. 1238
Creative Freedom	"The extent to which the game is able to foster the player's creativity and curiosity and allows the player to freely express his or her individuality while playing the game"	Phan et al., 2016, p. 1238
Audio Aesthetics	"The different auditory aspects of the game (e.g., sound effects) and how much they enrich the gaming experience"	Phan et al., 2016, p. 1238
Personal Gratification	"The motivational aspects of the game (e.g., challenge) that promote the player's sense of accomplishment and the desire to succeed and continue playing the game"	Phan et al., 2016, p. 1238
Social Connectivity	"The degree to which the game facilitates social connection between players through its tools and features"	Phan et al., 2016, p. 1238
Visual Aesthetics	"The graphics of the game and how attractive they appeared to the player"	Phan et al., 2016, p. 1238

Continuance Intention	"an individual's intention to continuously engage in a particular task"	Liao et al., 2016, p. 66; Bhattacherjee, 2011a
Community Involvement	"activities in which players engage in the online environment, for example, by sharing information and providing suggestions or opinions"	Ghazali et al., 2019, p. 653
Network Externality	"utility that a user derives from consumption of a good, and it increases as the number of product users increase"	Ghazali et al., 2019, p. 653; Katz and Shapiro, 1985
Attitude towards Virtual Goods	"individual's positive or negative feelings about performing specific behavior" (e.g., purchasing virtual goods)	Kaburuan et al., 2009, p. 4
Monetary Value	"game users purchase game items because they are cost effective and reasonably priced"	Park & Lee, 2010, p. 2179
Addiction	"excessive and compulsive use of computer or videogames that results in social and/or emotional problems; despite these problems, the gamer is unable to control this excessive use"	Lemmens et al., 2009, p. 78

Relational Hypotheses

Structural equation modeling (SEM) was used to test the model. Multiple models were evaluated but the following model depicts the hypothesized relationships between satisfaction, social motivations, monetary value, continuance intention, attitudes towards virtual goods, addiction, demographic factors and purchase intention (Figure 9).

The following hypotheses were examined:

H1. GUESS subscales scores will be positively related to purchase intention

H1a. Usability/Playability scores will be positively related to purchase intention

H1b. Narrative scores will be positively related to purchase intention

H1c. Play Engrossment scores will be positively related to purchase intention

H1d. Enjoyment scores will be positively related to purchase intention

H1e. Creative Freedom scores will be positively related to purchase intention

H1f. Audio Aesthetics scores will be positively related to purchase intention

H1g. Personal Gratification scores will be positively related to purchase intention

H1h Social Connectivity scores will be positively related to purchase intention

H1i. Visual Aesthetics scores will be positively related to purchase intention

H2. Network Externality will be positively related to purchase intention

H3. Community involvement will be positively related to purchase intention

H4. Attitude towards Virtual Goods will be positively related to purchase intention

H5. Monetary Value will be positively related to purchase intention

H6. Continuance Intention will be positively related to purchase intention

H7. Addiction will be positively related to purchase intention

H8. Age will be positively related to purchase intention

H9. Gender will be related to purchase intention

H10. Education will be positively related to purchase intention

H11. Income will be positively related to purchase intention

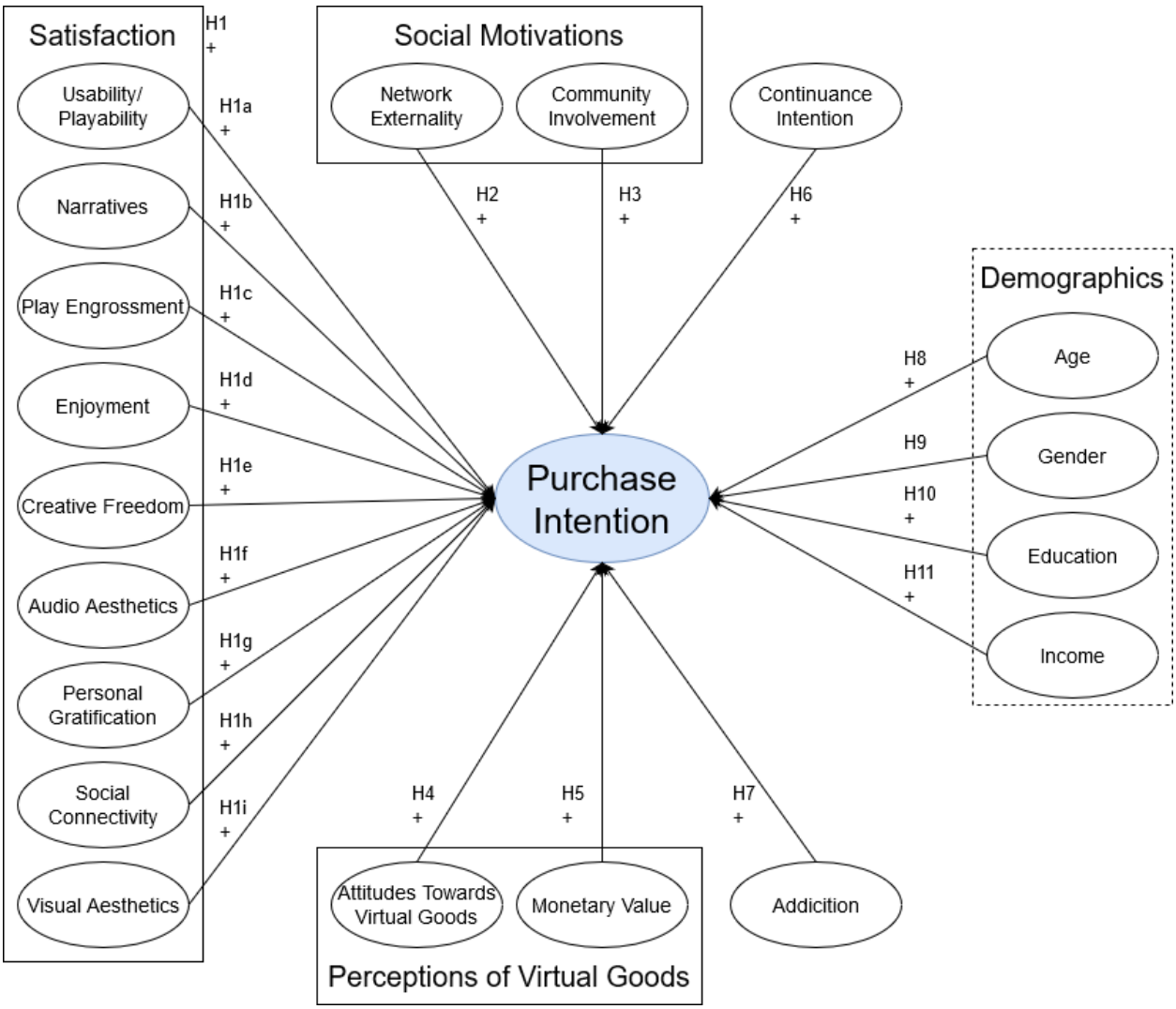
Exploratory Hypothesis

To add to the validity and use of the GUESS as a metric in gaming research additional exploratory analyses were conducted. In particular, the relationship between the

GUESS subscale scores, purchase intention, and continuance intention were examined (Patzer, 2018).

Figure 9

Proposed Model for Mobile In-Game Purchase Intention



Study 1: Methods

Sample Size Estimation

One rule of thumb for estimating the minimum sample size for SEM is 10 cases per variable, which with 20 variables would require at least 200 participants (Wolf et al., 2013). Barrett (2007) suggests a sample of less than 200 should not be published unless the population being sampled is small or restricted. Marsh et al., (1996) suggested using the following ratio to calculate the minimum sample size of an SEM,

$$n > 50r^2 - 450r + 1100$$

This formula takes into account the ratio of indicators to latent variables in the model, represented by *r*. The proposed research model has 92 indications, and 20 latent variables, which makes *r* equal 4.6. Based on equation above, the suggested minimum sample size would be 88.

Procedure

Recruitment of participants was conducted through Amazon Mechanical Turk (MTurk), Embry Riddle Aeronautical University's (ERAU) online research pool, social media websites (e.g., LinkedIn, Facebook), and gaming forums (e.g., Reddit, Discord). Participants recruited from ERAU were compensated with research credits for their participation. Participants recruited through MTurk will need to meet the following qualifications: Human Intelligence Task (HIT) approval rate > 97%, 1000 HITs completed, and be located in United States or Canada. Participants recruited from MTurk will complete a screener survey to verify they play mobile games and receive 1 cent for their participation (Appendix B). Those who qualify from MTurk will receive $1 for their participation in the actual survey (Appendix C). Once participants agree to participate in

the study, they will take an online survey that will take approximately five to ten minutes to complete.

Participants

Participants were eligible to participate if they have played mobile games, played a mobile game for at least 10 hours in the past three months, and rated that they play mobile games for at least 5 hours a week. A total of 345 responses were gathered for this study. After cleaning and screening the data, 283 responses remained which was enough to continue with analysis based on the sample size estimation conducted (Barrett, 2007; Wolf et al., 2013). Participants ages ranged from 18 to 69 (M = 34.26, SD = 9.94).

Table 4

Participant Demographics

Variable		
Age		M = 34.26, SD = 9.94, Range (18 - 69)
Gender		
	Male	121
	Female	158
	Non-binary	3
	Prefer not to say	1
Ethnicity		
	White	211
	Asian	32
	African America/Black	16

	Hispanic/Latino	14
	Multiracial/Mixed Race	6
	American Indian/Alaska Native	3
	Prefer not to say	1
Education		
	Some high school	3
	High school graduate or GED	22
	Some college	74
	College graduate (2- or 4-year degree)	137
	Post-graduate degree (MA, MS, PhD, Law, Medical, or Professional school)	47
Income (USD)		
	Less than $19,999	35
	$20,000 - $39,999	50
	$40,000 - $59,999	67
	$60,000 - $79,999	44
	$80,000 - $99,999	36
	$100,000 - $119,999	35
	Greater than $120,000	16
Purchased Something in Game		
	Never	120
	At Least Once	163
Overall Average GUESS Score		M = 46.38, SD = 6.07

Measures

The survey collected data on the following: demographics, video game experience, video game satisfaction, purchase intention, continuance intention, community involvement, network externality, attitudes towards virtual goods, monetary value, and addiction (Appendix C). The survey was created in Qualtrics and had 104 questions. Participants completed demographics questions then picked a mobile game that they have played for at least 10 hours in the past three months to be evaluated. The rest of the questions/statements in the survey were related to, or about the game they picked to evaluate. Table 5 lists the various measures and sources that were in the survey.

Table 5

Survey Measures for Study 1

Measure (No. of items)	Scale Name	Source(s)
Demographics (7)	N/A	N/A
Game Experience (9)	N/A	N/A
Video Game Satisfaction (55)	GUESS	Phan et al., 2016
Usability/Playability (11)	GUESS	Phan et al., 2016
Narratives (7)	GUESS	Phan et al., 2016
Play Engrossment (8)	GUESS	Phan et al., 2016
Enjoyment (5)	GUESS	Phan et al., 2016
Creative Freedom (7)	GUESS	Phan et al., 2016
Audio Aesthetics (4)	GUESS	Phan et al., 2016
Personal Gratification (6)	GUESS	Phan et al., 2016
Social Connectivity (4)	GUESS	Phan et al., 2016
Visual Aesthetics (3)	GUESS	Phan et al., 2016
Purchase Intention (5)	N/A	Ghazali et al., 2019
Continuance Intention (4)	N/A	Hsiao & Chiou, 2017
Community Involvement (3)	N/A	Ghazali et al., 2019
Network Externality (6)	N/A	Ghazali et al., 2019; Wei & Lu, 2014
Attitudes toward Virtual Good Purchases (4)	N/A	Shin, 2008; Self-created
Monetary Value (4)	N/A	Park & Lee, 2010; Mertens, 2017
Addiction (7)	Short Video Game Addiction Scale	Lemmens et al., 2009; Balakrishnan & Griffiths, 2018

Study 1: Results

Confirmatory factors analysis (CFA) was conducted to evaluate how well the hypothesized model fits the collected data and compare model fit across multiple models to

find the one with the best fit before conducting structural equation modeling (SEM). IBM SPSS Statistics 22, IBM AMOS 23, and Microsoft Excel were used to analyze data.

Normality, Skewness, and Kurtosis

Normality of the data was assessed with Histograms and Shapiro-Wilk tests. The skewness of each item was assessed with acceptable skewness values being < |2| (Finney & DiStefano, 2013). The kurtosis of each item was also examined with kurtosis values less than 7 considered acceptable for SEM (Finney & DiStefano, 2013). Data gathered from the GUESS were expected to be negatively skewed due to the criteria for participant recruitment (played the game 10 hours in the last 3 months) and participants may be more satisfied with a game they choose to evaluate (Patzer, 2018). After reviewing the items, none demonstrated problems with skewness and kurtosis (Appendix D).

Model Fit Assessment

Overall fit of the model was assessed with $\chi 2$ Test, RMSEA, NFI, CFI, TLI, SRMR, and Hoelter's Critical N (Table 6 provides a review of these fit indices with descriptions and acceptable threshold levels). In SEM, fit indices allow for the evaluation of model fit of the data, which helps determine which proposed model(s) best fits the data. There are several fit indices that researchers can use and some disagreement on which to report as well as the cut-offs and acceptable threshold levels (Hooper et al., 2008).

Table 6

Fit Indices Descriptions and Acceptable Threshold Levels

Name of Fit Index	Description	Acceptable Threshold Levels
χ2 Test (CMIN)	"assess the magnitude of discrepancy between the sample and fitted covariance matrices" (Hu & Bentler, 1999, p. 2)	$p > .05$
Root Mean Square Error of Approximation (RMSEA)	"estimates the lack of fit in a model compared to a perfect or saturated model" (Ullman & Bentler, 2003, p. 619)	Values below .08
Normed fit index (NFI)	"assess the model by comparing the χ2 value of the model to the χ2 of the null model" (Hooper, 2008, p. 55)	Values greater than .95
Comparative Fit Index (CFI)	"revised form of the NFI that takes account sample size" (Hooper, 2008, p. 55)	Values greater than .95
Tucker Lewis Index (TLI)	"developed against the disadvantage of the NFI regarding being affect by sample size" (Cangur & Ercan, 2015, p. 158)	Values greater than .95
Standardized Root Mean Square Residual Index (SRMR)	"the average of standardized residuals between the observed and the hypothesized covariance matrices" (Cangur & Ercan, 2015, p. 156)	Values less than .08
Hoelter's Critical N (Hoelter's)	"its purpose is to estimate a sample size that would be sufficient to yield an adequate model fit for a χ2 test" (Byrne, 2010, p. 83)	75 ≤ value ≤ 200
Akaike Information Criterion (AIC)	"used when comparing non-nested or non-hierarchical models estimated with the same data and indicates to the researcher which of the models is the most parsimonious" (Hooper, 2008, p. 56)	Lower value suggest a better fit

Confirmatory Factor Analysis

Confirmatory factor analysis was conducted on the hypothesized model with all unobserved latent factors (16) being covaried with each other. Continuance intention included four items. Purchase intention included five items. Community involvement included three items. Network externality included six items. Attitudes towards virtual

good purchases included four items. Addiction included seven items. Monetary value included four items. The GUESS included constructs for usability/playability (11 items), narratives (7 items), play engrossment (8 items), enjoyment (5 items), creative freedom (7 items), audio aesthetics (4 items), personal gratification (6 items), social connectivity (4 items), and visual aesthetics (3 items). Table 7 displays the CFA process with modification indices.

Initial Model. The first model contained the 16 constructs with their representation questions and error terms. The model showed poor fit: (χ2 (*df*) 7065.593 (3622), $p < .01$, NFI = .658, TLI = .784, CFI = .796, RMSEA = .058, SRMR = .086, Hoelter's = 153). There were several high modification indices between error terms and a second model was analyzed with the error terms between (e67) and (e69) correlated in the network externality construct as it contained the highest modification index (166.093).

2nd Model. After correlating the error terms between (e67) and (e69), the model has the following fit indices: (χ2 (*df*) 6822.635 (3621), $p < .01$, NFI = .67, TLI = .799, CFI = .81, RMSEA = .056, SRMR = .0846, Hoelter's = 158). There were still several high modification indices with the current model. A high modification index (69.037) was observed between error terms (e76) and (e74) in the addiction construct; these terms were correlated, and a third model was run.

3rd Model. After correlating the error terms between (e76) and (e74), the model has the following fit indices: (χ2 (*df*) 6745.721 (3620), $p < .01$, NFI = .674, TLI = .804, CFI = .814, RMSEA = .055, SRMR = .0858, Hoelter's = 160). Modification indices were examined again, and a high modification index (59.21) was observed between error terms (e81) and

(e80) in the continuance intention construct; these terms were correlated, and a fourth model was run.

4th Model. After correlating the error terms between (e81) and (e80), the model has the following fit indices: (χ2 (*df*) 6671.809 (3619), $p < .01$, NFI = .677, TLI = .808, CFI = .819, RMSEA = .055, SRMR = 0.0873, Hoelter's = 162). Modification indices were examined again, and a high modification index (58.443) was observed between error terms (e90) and (e91) in the purchase intention construct; these terms were correlated, and a fifth model was run.

5th Model. After correlating the error terms between (e80) and (e91), the model has the following fit indices: (χ2 (*df*) 6608.240 (3618), $p < .01$, NFI = .68, TLI = .812, CFI = .823, RMSEA = .054, SRMR = .0873, Hoelter's = 163). Modification indices were examined again, and a high modification index (52.573) was observed between error terms (e58) and (e59) in the attitudes towards virtual goods purchase construct; these terms were correlated, and a sixth model was run.

6th Model. After correlating the error terms between (e58) and (e59), the model has the following fit indices: (χ2 (*df*) 6547.234 (3617), $p < .01$, NFI = .683, TLI = .816, CFI = .826, RMSEA = .054, SRMR = .0872, Hoelter's = 165). Again, modification indices were examined, and a high modification index (35.775) was observed between error terms (e33) and (e32) in the creative freedom construct; these terms were correlated, and a seventh model was run.

7th Model. After correlating the error terms between (e33) and (e32), the model has the following fit indices: (χ2 (*df*) 6503.632 (3616), $p < .01$, NFI = .685, TLI = .819, CFI =

.829, RMSEA = .053, SRMR = .0868, Hoelter's = 166). All error terms that are correlated in the model are between items within the same dimensions.

Table 7

CFA Process with Model Fit and Modification Indices

Iteration	χ2 Test	NFI	TLI	CFI	RMSEA	SRMR	Hoelter's .01	Modification Index
Initial Model								
	7065.593, *df* = 3622	.658	.784	.796	.058	.086	153	e67 & e69: 166.093
2nd Model								
	6822.635, *df* = 3621	.67	.799	.81	.056	.086	158	e76 & e74: 69.037
3rd Model								
	6745.721, *df* = 3620	.674	.804	.814	.055	.0858	160	e81 & e80: 59.21
4th Model								
	6671.809, *df* = 3619	.677	.808	.819	.055	.0873	162	e90 & e92: 58.443
5th Model								
	6608.240, *df* = 3618	.68	.812	.823	.054	.0873	163	e58 & e59: 52.573
6th Model								
	6547.234, *df* = 3617	.683	.816	.826	.054	.0872	165	e58 & e59: 35.775
7th Model								
	6503.632, *df* = 3616	.685	.819	.829	.053	.0868	166	-

Validity Assessment

The convergent and discriminant validity was assessed for each construct in the model. Average variance extracted (AVE) and maximum shared variance (MSV) was examined to determine construct validity. AVE will help determine how well constructs that should be conceptually related actually are (convergent validity) and MSV will help determine how well constructs that are not related are unrelated (discriminant validity).

Convergent validity would be considered acceptable if AVE values are higher than .50 (Fornell & Larcker, 1981; Hair et al., 2014). Out of the 16 latent variables, 8 had AVE values higher than .50 indicating acceptable convergent validity. Constructs that did not have convergent validity included: usability, narrative, play engrossment, enjoyment, creative freedom, personal gratification, addiction, and continuance intention. Low standardized item loadings in latent variables may cause low AVE. Loadings that are greater than .70 are considered strong and loadings less than .40 are considered weak (Hair et al., 2006). Constructs that had at least one item loading less than .40 included personal gratification and network externality (Table 8).

Discriminant validity was assessed by examining the square root of the AVE values of the latent variables. Discriminant validity would be considered acceptable if the square root of the AVE is greater than the correlation with another factor. A construct's AVE should also be greater than its MSV. Out of the 16 latent variables, 7 indicated problems with discriminant validity. Constructs that did not meet the criteria for discriminant validity included: usability, narrative, enjoyment, creative freedom, personal gratification, monetary value, and continuance intention.

Construct reliability was assessed with composite reliability (CR) with values greater than .70 considered acceptable (Hair et al., 2014). All 16 latent variables had CR values greater than .70 and were considered acceptable (Table 9).

Overall, there were some constructs in this research that indicated issues with both convergent and discriminant validity. Items that have high cross loadings on other constructs could lead to issues with discriminant validity. Constructs that had items that loaded poorly on them could lead to issues with convergent validity. Even with the issues with validity, the hypothesized model was still assessed to show how the relationships between constructs would fit. The interpretations from this model will be considered not acceptable given the validity issues.

Table 8

Convergent and Discriminant Validity of the 7th CFA Model

	CR	AVE	MSV	MaxR(H)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Monetary (1)	0.813	0.530	0.536	0.863	**0.728**															
Usability (2)	0.871	0.383	0.575	0.878	0.122	**0.619**														
Narrative (3)	0.849	0.451	0.694	0.870	0.353	0.299	**0.672**													
PlayEngros (4)	0.854	0.424	0.361	0.858	0.140	0.146	0.324	**0.651**												
Enjoy (5)	0.823	0.488	0.776	0.850	0.108	0.758	0.448	0.304	**0.699**											
Creative (6)	0.851	0.452	0.694	0.857	0.372	0.316	0.833	0.370	0.527	**0.672**										
Personal (7)	0.767	0.361	0.663	0.786	0.125	0.586	0.484	0.498	0.814	0.584	**0.601**									
Attitudes (8)	0.908	0.713	0.674	0.920	0.732	0.094	0.488	0.259	0.211	0.463	0.200	**0.844**								
Social (9)	0.856	0.598	0.533	0.863	0.288	-0.047	0.472	0.108	0.161	0.489	0.202	0.406	**0.773**							
Visual (10)	0.830	0.620	0.452	0.835	0.106	0.648	0.393	0.084	0.672	0.369	0.542	0.193	-0.037	**0.788**						
Audio (11)	0.896	0.685	0.315	0.917	0.250	0.223	0.561	0.074	0.279	0.499	0.332	0.317	0.273	0.417	**0.828**					
Community (12)	0.925	0.804	0.533	0.945	0.302	-0.053	0.462	0.165	0.129	0.441	0.159	0.474	0.730	0.069	0.302	**0.897**				

Network (13)	0.844	0.501	0.183	0.931	0.364	0.100	0.428	0.216	0.175	0.426	0.212	0.427	0.328	0.095	0.255	0.329	**0.708**			
Addiction (14)	0.867	0.485	0.361	0.878	0.183	-0.260	0.232	0.601	-0.177	0.157	0.096	0.249	0.164	-0.124	0.090	0.263	0.248	**0.696**		
Continue (15)	0.755	0.443	0.776	0.790	0.148	0.737	0.432	0.367	0.881	0.506	0.722	0.252	0.162	0.487	0.245	0.208	0.366	-0.079	**0.666**	
Purchase (16)	0.977	0.896	0.674	0.982	0.622	0.094	0.356	0.227	0.240	0.315	0.201	0.821	0.352	0.127	0.219	0.396	0.313	0.245	0.278	**0.946**

Note: Numbers on the diagonal represent the squared correlation of that factor with its manifest variables.

Table 9

Reliability and Factor Loadings of Items on Constructs in the 7th CFA Model

Construct		Cronbach's Alpha	CR	Item Number	Statement	Factor Loading
Satisfaction	Usability/ Playability	.863	.871	U1	I think it is easy to learn how to play the game.	.682
				U2	I find the controls of the game to be straightforward.	.669
				U3	I always know how to achieve my goals/objectives in the game.	.582
				U4	I find the game's interface to be easy to navigate.	.676
				U5	I do not need to go through a lengthy tutorial or read a manual to play the game.	.460
				U6	I find the game's menus to be user friendly.	.706
				U7	I feel the game trains me well in all of the controls.	.569
				U8	I always know my next goal when I finish an event in the game.	.553
				U9	I feel the game provides me the necessary information to accomplish a goal within the game.	.646
				U10	I feel very confident while playing the game.	.552
				U11	I think the information provided in the game (e.g., onscreen messages, help) is clear.	.666
	Narratives	.843	.849	N1	I am captivated by the game's story from the beginning.	.836
				N2	I think the characters in the game are well developed.	.703
				N3	I enjoy the fantasy or story provided by the game.	.700
				N4	I can identify with the characters in the game.	.656
				N5	I am emotionally moved by the events in the game.	.624
				N6	I can clearly understand the game's story.	.476
				N7	I am very interested in seeing how the events in the game will progress.	.656
	Play Engrossment	.850	.854	PE1	I cannot tell that I am getting tired while playing the game.	.630
				PE2	I tend to spend more time playing the game than I have planned.	.635
				PE3	Whenever I stopped playing the game, I cannot wait to start playing it again.	.632
				PE4	I feel detached from the outside world while playing the game.	.689
				PE5	I can block out most other distractions when playing the game.	.605

				PE6	I do not care to check events that are happening in the real world during the game.	.593
				PE7	Sometimes I lose track of time while playing the game.	.684
				PE8	I temporarily forget about my everyday worries while playing the game.	.731
	Enjoyment	.782	.823	EN1	I think the game is fun.	.820
				EN2	I feel bored while playing the game.	.524
				EN3	If given the chance, I want to play this game again.	.681
				EN4	I am likely to recommend this game to others.	.633
				EN5	I enjoy playing the game.	.794
	Creative Freedom	.857	.851	CF1	I feel the game allows me to be imaginative.	.707
				CF2	I feel creative while playing the game.	.720
				CF3	I feel I can explore things in the game.	.696
				CF4	I feel the game allows me to express myself.	.712
				CF5	I feel my curiosity is stimulated as the result of playing the game.	.699
				CF6	I think the game is unique or original.	.576
				CF7	I feel the game gives me enough freedom to act how I want.	.579
	Audio Aesthetics	.893	.896	AA1	I enjoy the sound effects in the game.	.904
				AA2	I think the game's audio fits the mood or style of the game.	.673
				AA3	I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.	.878
				AA4	I enjoy the music in the game.	.837
	Personal Gratification	.732	.767	PG1	I am in suspense about whether I will succeed in the game.	.373
				PG2	I feel successful when I overcome the obstacles in the game.	.635
				PG3	I feel the game constantly motivates me to proceed further to the next stage or level.	.629
				PG4	I find my skills gradually improve through the course of overcoming the challenges in the game.	.538
				PG5	I am very focused on my own performance while playing the game.	.683
				PG6	I want to do as well as possible during the game.	.689
	Social Connectivity	.855	.856	SC1	I find the game supports social interaction (e.g., chat) between players.	.754
				SC2	I am able to play the game with other players if I choose.	.703

				SC3	I like to play this game with other players.	.807
				SC4	I enjoy the social interaction within the game.	.824
	Visual Aesthetics	.829	.830	V1	I enjoy the game's graphics.	.809
				V2	I think the game is visually appealing.	.817
				V3	I think the graphics of the game fit the mood or style of the game.	.734
Purchase Intention		.978	.977	PI1	I intend to buy microtransactions in the future.	.958
				PI2	I predict that I will buy microtransactions in the future.	.977
				PI3	I would consider buying microtransactions in the future.	.919
				PI4	The likelihood that I will buy microtransactions is high.	.961
				PI5	I would consider spending real money to purchase items in the game store.	.915
Continuance Intention		.766	.755	CI1	In the future, I will continue to play XYZ.	.798
				CI2	In the future, I will play XYZ often.	.710
				CI3	I will say advantages of XYZ to other people.	.461
				CI4	I will recommend XYZ to other people.	.648
Community Involvement		.922	.925	CE1	I am interested in participating in the online community of XYZ.	.958
				CE2	It is pleasurable and enjoyable for me to participate in the online community of XYZ.	.880
				CE3	It is important for me to participate in the online community of XYZ.	.849
Network Externality		.862	.844	NE1	There are a good number of people playing XYZ.	.369
				NE2	There will be many more people playing XYZ in the future.	.595
				NE3	Many people are playing XYZ.	.403
				NE4	Many friends around me play XYZ.	.882
				NE5	Most of my friends play XYZ.	.932
				NE6	Many of my friends will play XYZ in the future.	.841
Attitudes Towards Virtual Goods Purchase		.918	.908	AVG1	I have positive feelings towards buying in-game content from XYZ.	.911
				AVG2	The thought of buying a virtual good from this game is appealing to me.	.872
				AVG3	I approve of the sale of in-game content in XYZ.	.778
				AVG4	I think the sale of virtual goods in XYZ is a good thing.	.810

Monetary Value		.801	.813	MV1	Game items are worth more than what they cost.	.548
				MV2	A game item is a good product given the price.	.874
				MV3	The prices of game items are reasonable.	.816
				MV4	I have enough money to spend regularly, and enjoy investing in online items.	.624
Addiction	Salience	.869	.867	AD1	Do you think about playing online mobile games all day long?	.819
	Tolerance			AD2	Do you spend increasing amounts of time playing online mobile games?	.667
	Mood Modification			AD3	Do you play online mobile games to forget about real life?	.619
	Relapse			AD4	Do others unsuccessfully try to reduce the time you spend playing online mobile games?	.656
	Withdrawal			AD5	Do you feel bad when you are unable to play online mobile games?	.759
	Conflict			AD6	Do you have fights with others (e.g., family, friends) over the time you spend playing online mobile games?	.638
	Problems			AD7	Do you neglect other important activities (e.g., school, work, sports) to play online mobile games?	.695

Structural Model Evaluation and Hypothesis Testing

An SEM was conducted to test the hypothesized model. Table 10 shows the results of the hypotheses based on the hypothesized model. Multicollinearity was assessed with variance inflation factor (VIF) with values greater than 5 indicating an issue (Craney & Surles, 2002). There were no issues of multicollinearity in the hypotheses tested.

Table 10

Findings Based on the Hypothesized Model

Hypothesis #	**Hypothesis**	**Std β**	**S.E.**	**C.R.**	**p-value**	**Supported or Not**	***VIF***
1	GUESS subscales scores will be	-	-	-	-	-	

	positively related to purchase intention						
1a	Usability/Playability scores will be positively related to purchase intention	-.047	.103	-1.161	.246	Not Supported	2.17
1b	Narrative scores will be positively related to purchase intention	.001	.054	.031	.975	Not Supported	2.48
1c	Play Engrossment scores will be positively related to purchase intention	-.038	.067	-.933	.351	Not Supported	1.87
1d	Enjoyment scores will be positively related to purchase intention	.162	.105	3.893	.001	Supported	3.06
1e	Creative Freedom scores will be positively related to purchase intention	-.158	.067	-3.720	.001	Supported	2.46
1f	Audio Aesthetics scores will be positively related to purchase intention	-.017	.048	-.416	.677	Not Supported	1.48
1g	Personal Gratification scores will be positively related to purchase intention	.019	.131	.453	.650	Not Supported	2.20
1h	Social Connectivity scores will be positively related to purchase intention	.058	.049	1.397	.162	Not Supported	1.92
1i	Visual Aesthetics scores will be positively related to purchase intention	-.055	.093	-1.308	.191	Not Supported	1.82
2	Network Externality will be positively related to purchase intention	-.042	.180	-1.056	.291	Not Supported	1.54
3	Community involvement will be positively related to purchase intention	.039	.038	1.014	.311	Not Supported	2.10
4	Attitude towards Virtual Goods will be positively related to purchase intention	.735	.050	16.308	.001	Supported	2.12

5	Monetary Value will be positively related to purchase intention	.176	.092	3.987	.001	Supported	1.85
6	Continuance Intention will be positively related to purchase intention	.136	.109	3.053	.002	Supported	2.54
7	Addiction will be positively related to purchase intention	.106	.114	2.554	.011	Supported	1.74
8	Age will be positively related to purchase intention	-.055	.007	-1.442	.149	Not Supported	-
9	Gender will be related to purchase intention	.023	.128	.611	.541	Not Supported	-
10	Education will be positively related to purchase intention	-.004	.081	-.099	.921	Not Supported	-
11	Income will be positively related to purchase intention	.053	.041	1.401	.161	Not Supported	-

The hypothesized model explained 67.3% of the variance in purchase intention (R^2) with attitudes towards virtual goods purchases, continuance intention, addiction, monetary value, enjoyment, and creative freedom making significant, unique contributions to the model. The results from the hypothesized model showed that most of the constructs that were significantly related to purchase intention were positively related except for creative freedom. Out of the GUESS constructs only two had a significant contribution to the model, enjoyment (β = .162) and creative freedom (β = -.158). Attitudes towards virtual goods (β = .735) was the most closely related construct to purchase intention while others tended to be much lower such as addiction (β = .106), monetary value (β = .176), and continuance intention (β = .136). The fit indices of the hypothesized model demonstrated poor fit with a low NFI (.574), a low TLI (.700), a low CFI (.708), a low RMSEA (.066), and a high SRMR

(.1968). Figure 10 shows the standardized β's of the constructs in the hypothesized model. The hypothesized model displayed several issues such as problems with discriminant and convergent validity, and poor model fit (Table 11). Additional, exploratory analyses were conducted to find a more acceptable model.

Table 11

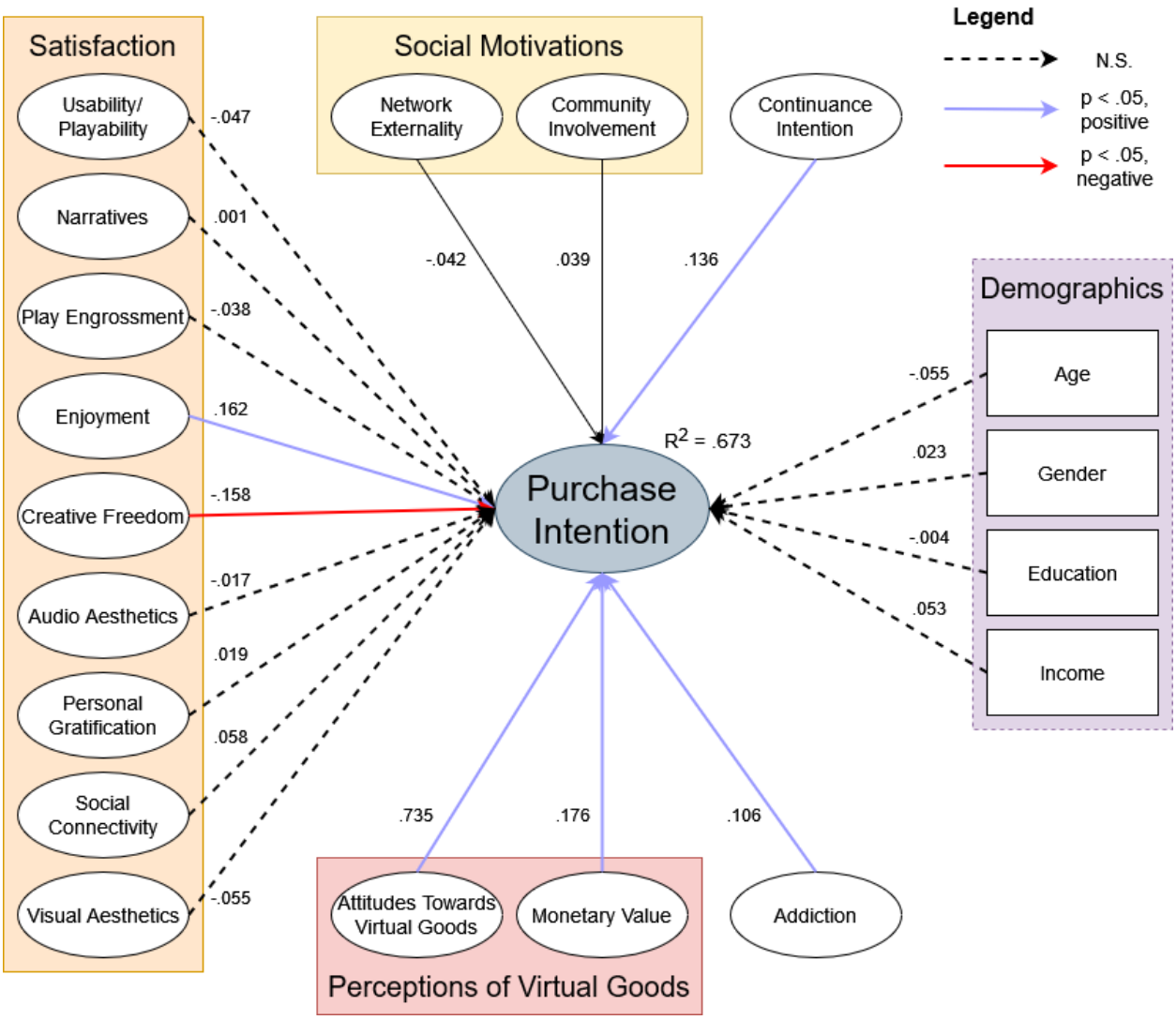
Fit Indices of Hypothesized Model

χ2 Test	**NFI**	**TLI**	**CFI**	**RMSEA**	**SRMR**	**Hoelter's .01**	**AIC**
9074.263, *df* = 4075	.574	.700	.708	.066*	.1968	134*	9664.263

* Indicates the value of the model is in the acceptable range of fit indices

Figure 10

Results of the Hypothesized Model



Exploratory Analyses

Alternative Models. Issues with the hypothesized model such as constructs with poor discriminant validity or convergent validity, as well as poor model fit led to conducting alternative analyses to identify a more acceptable model. Table 12 shows a summary of the different models created in this study.

Table 12

Summary of Models

Model	χ2 Test	NFI	TLI	CFI	RMSEA	SRMR	Hoelter's .01	AIC
Hypothesized Model								
	9074.263, *df* = 4075	.574	.700	.708	.066	.1968	134	9664.263
Validity Adjusted Model								
	2321.133, *df* = 807	.764	.820	.831	.082	.2024	110	2513.133
Parsimonious Adjusted Model								
	990.056, *df* = 397	.852	.896	.905	.073	.1769	133	1186.056

Alternative Model 1: Validity Adjusted Model. There were several issues with the Hypothesized Model such as discriminant validity, convergent validity, and poor model fit. To improve the discriminant validity of the constructs, several factor analyses were conducted to check the pattern and correlation matrix of each construct; these factor analyses were constrained to only two factors to examine cross loadings (Byrne, 2010). Items that had the highest cross loadings were removed one at a time while conducting a CFA to retest for validity. The highest cross loadings items had to have a moderate size loading (.35 for a sample size of 250) on another factor or factors (Hair et al., 2006). Removing high cross loading items was able to improve the discriminant validity of the following constructs: continuance intention, enjoyment, and monetary value. Several constructs still had issues with discriminant or convergent validity after removing cross loading items such as: usability, narrative, play engrossment, creative freedom, personal gratification, and addiction. Refer to Appendix F for the validity of the Validity Adjusted

Model constructs. Any constructs with issues related to discriminant or convergent validity were removed from the model. An SEM was conducted with the remaining constructs with demographic factors included. The fit indices of the Validity Adjusted Model demonstrated poor fit with a low NFI (.764), a low TLI (.820), a low CFI (.831), a slightly high RMSEA (.082), and a high SRMR (.2024). Appendix F shows a summary of the fit indices of the Validity Adjusted Model. The Validity Adjusted Model demonstrated better fit than the hypothesized model, but overall, still poor. One limitation of the Validity Adjusted Model is that many of the hypothesized relationships (e.g., H1a – 1c, H1e, H1g, H7) can no longer to be assessed. Another limitation of this model is the removal of items alters how the constructs were originally measured.

Alternative Model 2: Parsimonious Adjusted Model. There were several issues with the Hypothesized Model such as discriminant validity, convergent validity, and poor model fit. The Validity Adjusted Model also demonstrated poor model fit so a different approach to creating a more parsimonious model was conducted. Starting at the hypothesized model, constructs that did not have a significant influence on the model were removed such as: usability, narrative, play engrossment, audio aesthetics, personal gratification, social connectivity, visual aesthetics, community involvement, network externality, age, gender, education, and income. Following the removal of non-significant constructs, a CFA was conducted with the remaining constructs and the validity was assessed with this new model. A series of factor analysis with pairs of constructs restrained to two-factor models were conducted to identify high cross loading items. The highest cross loadings items had to have a moderate size loading (.35 for a sample size of 250) on another factor or factors (Hair et al., 2006). Items with the highest cross loadings were then

removed one at a time to improve the discriminant validity (Square root of AVE > Cross-factor correlations) of constructs. The discriminant and convergent validity of enjoyment and continuance intention were improved from this process. Only creative freedom and addiction indicated an issue with convergent validity (AVE > .5; Table 13). Several SEMs were conducted with the remaining constructs and with models that had removed one construct at a time (Table 14) to evaluate how parsimonious the models were using fit indices (NFI, TLI, CFI, RMSEA, Hoelter's, SRMR, AIC).

Table 13

Validity of the Parsimonious Model

	CR	AVE	MSV	MaxR(H)	Purchase	Enjoyment	Creative	Attitudes	Monetary	Addiction
Purchase	0.977	0.895	0.671	0.982	**0.946**					
Enjoyment	0.804	0.518	0.188	0.858	0.216	**0.719**				
Creative	0.858	0.468	0.194	0.877	0.286	0.434	**0.684**			
Attitudes	0.909	0.714	0.671	0.922	0.819	0.184	0.440	**0.845**		
Monetary	0.806	0.591	0.483	0.875	0.586	0.061	0.349	0.695	**0.769**	
Addiction	0.868	0.486	0.062	0.879	0.246	-0.189	0.168	0.248	0.182	**0.697**

Note: Numbers on the diagonal represent the squared correlation of that factor with its manifest variables.

Table 14

Summary of Parsimonious Models Generated

Model	χ2 Test	NFI	TLI	CFI	RMSEA	SRMR	Hoelter's .01	AIC
Initial Significant Model								
	1672.681, *df* = 583	.791	.840	.852	.081	.1999	133	1946.803
Significant Validity Adjusted Model								
	1279.737, *df* = 486	.823	.871	.881	.076	.1903	124	1495.737
Removed Continuance Intention Model (Parsimonious Model)								
	990.056, *df* = 397	**.852**	**.896**	**.905**	**.073**	**.1769**	**133**	**1186.056**
Removed Creative Freedom Model								
	851.848, *df* = 291	.859	.891	.902	.083	.1707	116	1023.848
Removed Monetary Value Model								
	987.279, *df* = 397	.851	.895	.905	.073	.1766	133	1183.279
Removed Addiction Model								
	948.573, *df* = 292	.842	.872	.885	.089	.2228	105	1118.573
Removed Attitudes Model								
	946.382, *df* = 270	.839	.884	.894	.074	.1575	130	1134.382

The Parsimonious Adjusted Model explained 66.1% of the variance in purchase intention (R^2). Attitudes towards virtual goods purchases (β = .767), monetary value (β = .148), enjoyment (β = .153), creative freedom (β = -.127), and addiction (β = .106) made significant unique contributions to the model. Figure 11 shows the standardized β's of the constructs in the Parsimonious Model. The fit indices of the Parsimonious Adjusted Model demonstrated excellent fit with a low NFI (.852), a low TLI (.896), a low CFI (.905), a low

RMSEA (.073), and a high SRMR (.1769). Table 15 shows a summary of the fit indices of the parsimonious adjusted model. Multicollinearity was assessed using VIF, with a VIF of greater than 5 indicating a problem with multicollinearity (Craney & Surles, 2002). The VIFs of the constructs in the Parsimonious Adjusted Model were all less than 5, indicating no issues with multicollinearity (Table 16).

Figure 11

Results of the Parsimonious Model

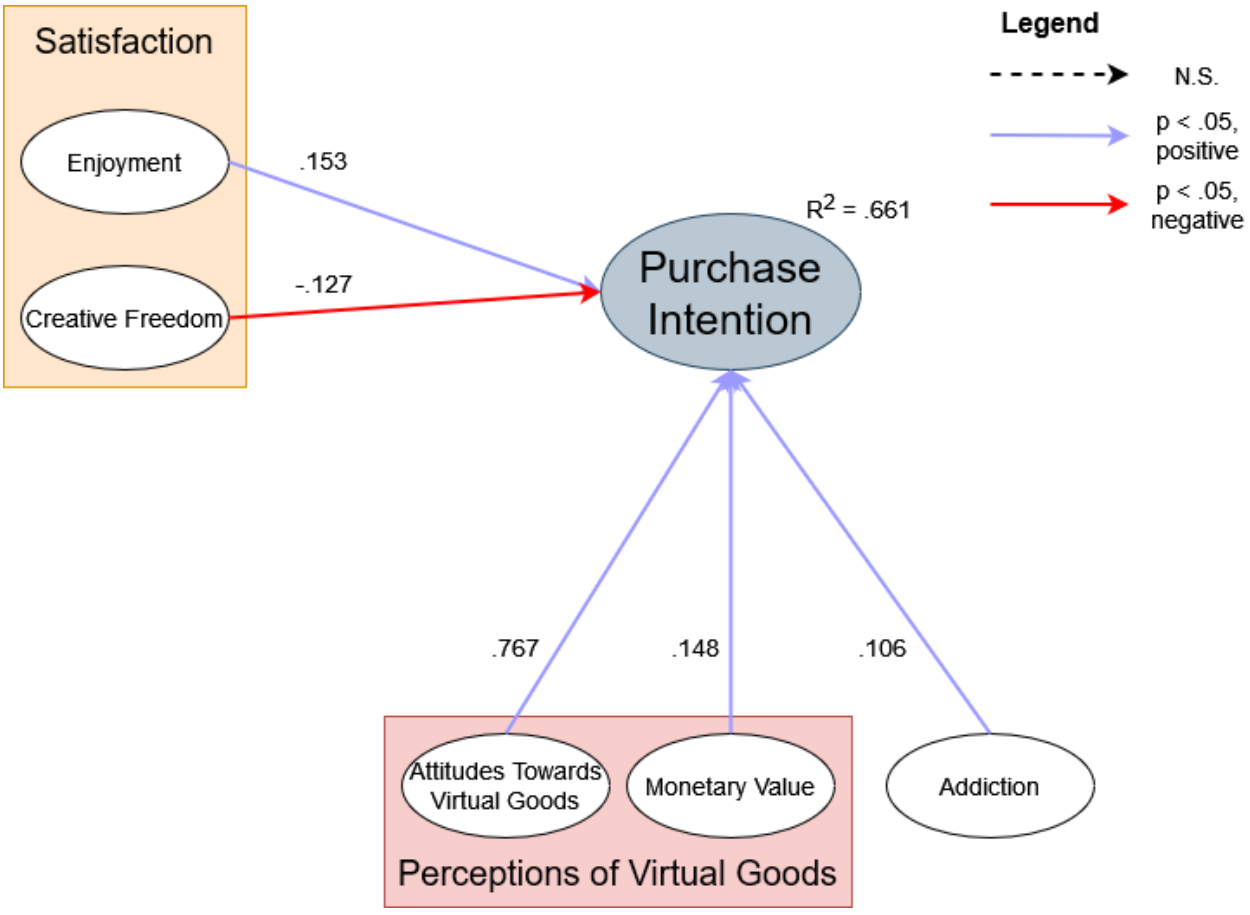


Table 15

Fit Indices of Parsimonious Model

χ2 Test	**NFI**	**TLI**	**CFI**	**RMSEA**	**SRMR**	**Hoelter's .01**	**AIC**
990.056, *df* = 397	.852	.896	.905	.073*	.1769	133*	1186.056

* Indicates the value of the model is in the acceptable range of fit indices

The Parsimonious Adjusted Model demonstrated better fit than the Hypothesized Model and the Validity Adjusted Model. One limitation with the Parsimonious Adjusted Model is that one item was removed from enjoyment and monetary value which could alter how the constructs were originally measured. Another limitation of the Parsimonious Adjusted Model is that many of the hypothesized relationship can no longer to be assessed. A third limitation of the Parsimonious Adjusted Model is the inclusion of two constructs that demonstrate issues with convergent validity but given the CR value of those constructs were above .70 we were willing to accept that limitation.

Table 16

Findings Based on the Parsimonious Model

Hypothesis #	Hypothesis	Std β	S.E.	C.R.	p-value	Supported or Not	VIF
1	GUESS subscales scores will be positively related to purchase intention	-	-	-	-	-	
1a	Usability/Playability scores will be positively related to purchase intention	-	-	-	-	-	
1b	Narrative scores will be positively related to purchase intention	-	-	-	-	-	

1c	Play Engrossment scores will be positively related to purchase intention	-	-	-	-	-	
1d	Enjoyment scores will be positively related to purchase intention	.153	.109	3.629	.001	Supported	1.35
1e	Creative Freedom scores will be positively related to purchase intention	-.127	.06	-3.065	.002	Not Supported	1.50
1f	Audio Aesthetics scores will be positively related to purchase intention	-	-	-	-	-	
1g	Personal Gratification scores will be positively related to purchase intention	-	-	-	-	-	
1h	Social Connectivity scores will be positively related to purchase intention	-	-	-	-	-	
1i	Visual Aesthetics scores will be positively related to purchase intention	-	-	-	-	-	
2	Network Externality will be positively related to purchase intention	-	-	-	-	-	
3	Community involvement will be positively related to purchase intention	-	-	-	-	-	
4	Attitude towards Virtual Goods will be positively related to purchase intention	.767	.052	16.733	.001	Supported	1.86
5	Monetary Value will be positively related to purchase intention	.148	.094	3.422	.001	Supported	1.74
6	Continuance Intention will be positively related to purchase intention	-	-	-	-	-	
7	Addiction will be positively related to purchase intention	.106	.117	2.537	.011	Supported	1.10

8	Age will be positively related to purchase intention	-	-	-	-	-	
9	Gender will be related to purchase intention	-	-	-	-	-	
10	Education will be positively related to purchase intention	-	-	-	-	-	
11	Income will be positively related to purchase intention	-	-	-	-	-	

Regressions with the GUESS. To explore the relationship between the GUESS subscales and constructs such as, continuance intention and purchase intention several standard multiple regressions were conducted. Preliminary analyses indicated no violations of normality, outliers, multicollinearity, and homoscedasticity. Results of purchase intention being regressed onto the GUESS subscales showed that model explained 15.4% (Adjusted R^2) of the variance and indicated the model was a significant predictor of purchase intention (F (9, 273) = 6.698, $p < .001$). The play engrossment ($\beta = .142$, $p < .05$) and social connectivity ($\beta = .230$, $p < .01$) subscales showed a significant unique contribution to the model as well.

Table 17

Results of Purchase Intention Regressed onto GUESS Subscales

GUESS Subscales	**Beta (β) Weight**
Usability	β = -.057, t (283) = -.773
Narratives	β = .150, t (283) = 1.795
Play Engrossment	***β* = .142, *t* (283) = 2.229***
Enjoyment	β = .140, t (283) = 1.661
Creative Freedom	β = .009, t (283) = .108
Audio Aesthetics	β = .045, t (283) = .672
Personal Gratification	β = -.067, t (283) = -.845
Social Connectivity	***β* = .230, *t* (283) = .3.640****
Visual Aesthetics	β = .031, t (283) = .667

* $p < .05$, ** $p < .001$; **Significant contribution to the model**

Results of continuance intention being regressed on to the GUESS subscales indicated that the model explained 54.5% (Adjusted R^2) of the variance and showed the model was a significant predictor of continuance intention (F (9, 273) = 38.540, $p < .001$). Several GUESS subscales provided a unique contribution to the model such as: usability (β = .128, $p < .05$), play engrossment (β = .100, $p < .05$), enjoyment (β = .451, $p < .001$), and personal gratification (β = .117, $p < .05$).

Table 18

Results of Continuance Intention Regressed onto GUESS Subscales

GUESS Subscales	Beta (β) Weight
Usability	***β* = .128, *t* (283) = 2.261***
Narratives	*β* = .092, *t* (283) = 1.506
Play Engrossment	***β* = .100, *t* (283) = 2.155***
Enjoyment	***β* = .451, *t* (283) = 7.277****
Creative Freedom	*β* = .111, *t* (283) = 1.781
Audio Aesthetics	*β* = .033, *t* (283) = .683
Personal Gratification	***β* = .117, *t* (283) = 2.004***
Social Connectivity	*β* = .040, *t* (283) = .867
Visual Aesthetics	*β* = -.089, *t* (283) = -1.676

* $p < .05$, ** $p < .001$, **Significant contribution to the model**

Study 1: Discussion

This study explored the relationships between purchase intention and several factors found in the literature that could play an influencing role. A CFA was conducted with the hypothesized model before moving forward with SEM. The hypothesized model demonstrated issues with convergent and discriminant validity in several constructs. Measures such as usability, narrative, play engrossment, enjoyment, creative freedom, personal gratification, addiction, and continuance intention demonstrated problems with convergent validity. Discriminant validity issues also were found with constructs such as usability, narrative, enjoyment, creative freedom, personal gratification, monetary value, and continuance intention. Even with the hypothesized model demonstrating problems

with discriminant and convergent validity, SEM was conducted to examine the hypothesized relationships. The SEM of the Hypothesized Model demonstrated poor fit in several fit indices and displayed issues with convergent and discriminant validity. The hypothesized model explained 67.3% of the variance in purchase intention (R^2) with factors such as attitudes towards virtual goods purchases, monetary value, enjoyment, continuance intention, addiction, and creative freedom making significant unique contributions to the model. Given the problems with discriminant and convergent validity of several factors in the hypothesized model, interpretations of this model were not accepted.

Validity Adjusted Model

Exploratory analyses were conducted to deal with the validity issues of the hypothesized model by removing high cross loading items in the constructs. After going through the process of moving high cross loading items, some constructs saw improvements in their validity but the ones that showed no improvements were removed from the model. The Validity Adjusted Model demonstrated better fit than the hypothesized model, but still was quite poor. The Validity Adjusted model has the limitation of the removal of items which may alter how a construct was originally measured. Another limitation of the Validity Adjusted Model is that with the removal of several constructs, many of the hypothesized relationship could no longer be assessed (e.g., H1a, H1b, H1c, H1e, H1g, H7).

Parsimonious Adjusted Model

The Hypothesized Model had several issues with it such as discriminant validity, convergent validity, and poor model fit. The Validity Adjusted Model demonstrated poor

model fit so a different approach to creating a more parsimonious model was conducted. The second exploratory model was focused on the constructs that were significant in the hypothesized model and has fewer latent variables which may help improve model fit. Several constructs that did not have a significant influence on the model were removed such as: usability/playability, narrative, play engrossment, audio aesthetics, personal gratification, social connectivity, visual aesthetics, community involvement, network externality, age, gender, education, and income. A CFA was conducted with the remaining constructs and the validity was assessed with this new model. A series of factor analyses with pairs of constructs restrained to two-factor models were conducted to identify high cross loading items. The items were removed one at a time to improve the discriminant validity of constructs with enjoyment and continuance intention constructs being improved. One limitation of this model is that creative freedom and addiction indicated an issue with convergent validity though AVE scores were near the acceptable level (AVE > .5) and the CR was above .70 which is considered acceptable (Hair et al., 2014). SEMs were conducted with the remaining constructs with removing one construct at a time to evaluate how parsimonious the models were using fit indices. The Parsimonious Adjusted Model demonstrated good fit that was better than the Hypothesized Model and the Validity Adjusted Model.

Final Interpretations

This research was an effort to gain a greater understanding of what influences purchase intention in mobile gaming. Due to the removal of the several factors in creating the Parsimonious Adjusted model, many of the original hypotheses could not be tested (e.g., H1a, H1b, H1c, H1f, H1g, H1h, H1i, H2, H3, H6, H8, H9, H10, H11). The final model

demonstrated better fit and better validity then the Hypothesized Model. The final model provided some insight into the different influences of purchase intention in mobile games. The final model suggested factors such as attitudes towards virtual goods, monetary value, addiction, enjoyment, and creative freedom may influence purchase intention in mobile games. The final model explained 66.1% of the variance in purchase intention with attitudes virtual goods purchases being most closely associated with purchase intention (β = .767). Players that have a positive view of the sales of in-game content may be more willing to consider purchasing in-game content. Hamari & Keronen (2017) conducted a meta-analysis of research that examined models of purchase intention in gaming and found that attitudes towards virtual goods had the closest association to purchase intention out of the research variables. Addiction (β = .106) was a significant factor included in the final model suggesting that those who may have addictive tendencies may be more likely to purchase in-game content. Enjoyment (β = .153) and monetary value (β = .148) were also significant constructs included in the final model Players that enjoy a mobile game may be more likely to consider purchasing in-game content and those that view the in-game content as having good monetary value may consider purchasing as well. Surprisingly, creative freedom ($\beta = -.127$) indicated a negative relationship with purchase intention. Players that find consider a game restrictive in creative freedom, may be more likely to consider purchasing. Games that are more restrictive in how a player can customize or play a game with designs such as a stamina system where the player has a limited amount of play that may recharge over time or where players can purchase to continue playing may encourage players to consider purchasing in-game content. Overall, these findings provide a unique model of purchase intention in mobile games and its different influences.

The additional GUESS regression analyses provided some insight into its relationship with continuance intention and purchase intention. The GUESS was able to explain 54.4% of the variance in continuance intention (Adjusted R^2 = .544) but only 15.4% (Adjusted R^2 = .154) for purchase intention. Previous research has shown a relationship with the GUESS and continuance intention (Patzer, 2020) with higher scores being related to higher continuance intention.

Implications

This research effort created a unique model of purchase intention in mobile gaming including factors such as enjoyment, creative freedom, attitudes towards virtual goods, monetary value, and addiction. This research used the GUESS as a measure of satisfaction in the Hypothesized Model while other previous research used different measures of satisfaction with scales that may not have been validated. While several factors of the GUESS were removed in the final model, subscales such as enjoyment and creative freedom remained and were found to have a significant influence on purchase intention.

Previous research had indicated attitudes towards virtual goods playing a role in purchase intention (Hamari, 2015; Rathee & Rajain, 2019). The other factors such as enjoyment (Guo & Barnes, 2012; Hamari, Hanner, 2019), monetary value (Chou & Kimsuwan, 2013; Liu & Shiue, 2014), and addiction (Balakrishnan & Griffiths, 2018) had previous research to support these findings as well. Creative freedom was a unique construct used in this research that was found to have an influence on purchase intention. An outcome of this research is a theoretical model that can be built upon for future research related to purchasing intention in games.

Outcomes from this research may be useful for game companies to help in their approach to selling in-game content to players. Game companies could be more informed about the relationship between purchase intention and the factors in the final model. Based on this research, creating an enjoyable game that sells in-game content that players view as monetarily valuable, or perceived to be fairly priced may help with purchase intention. Games that may be limited in creative freedom for players in customization or even have systems in place that restrict how much players can play may impact purchase intention of players.

Limitations

This research has several limitations that must be mentioned. First, a convenience sample of data was collected from Embry Riddle Aeronautical University's SONA, MTurk, and social media gaming forms (e.g., Reddit, Discord). Pre-screening questions were used to ensure participants were mobile video gamers and to screen out non-mobile video game players. The final model created had several limitations. Due to the removal of constructs from the hypothetical model, a simpler model was created but limited the ability to examine constructs and their relationships (e.g., H1a, H1b, H1c, H1f, H1g, H1h, H1i, H2, H3, H6, H8, H9, H10, H11). The removal of these constructs was needed to improve the validity of the model. The GUESS was a validated scale to measure game user satisfaction, but other constructs were measured with scales that have not gone through standard scale validation process or best practices.

Future Research & Next Steps

This research focused on the different factors that may influence purchase intention in mobile games. Additional factors or different factor relationships could be examined

around purchase intention. There may be additional relationships that were not explored in this research that could provide insight into purchase intention. The theoretical model from this research could be applied in different contexts such as different types of games to see how well the model holds or how it may differ if used in different applications. Future research may want to target specific genres of games (e.g., puzzle, strategy, card games) or other devices (e.g., consoles or PCs) in the modeling of purchase intention. Purchase intention of in-game content and its influences may vary with games that have a different business model such as pay to play, where players need to purchase the game before being able to play.

While this research examined several influences of purchase intention, there are other factors that may play a role that were not considered. Game design aspects and purchase practices may play a role in how players view purchasing in-game content. This research was a snapshot of factors that could play a role in in-game purchase intention. Purchase intention was the primary focus of this research but not actual purchasing behavior. A second study was conducted to dig deeper into the user experience of mobile game players and examine actual purchasing behavior of in-game content.

CHAPTER 3 STUDY 2: DIARY STUDY OF MOBILE GAME PLAYERS

Purchase Intention to Purchase Behavior

Research on measuring in-game purchase behavior of virtual goods has used different variables to describe it such as purchase intention, actual purchase behavior, willingness to purchase, or loyalty (Hamari & Keronen, 2017). A meta-analysis of in-game purchase literature by Hamari and Keronen (2017) found that most of the research

modeling in-game purchasing rarely used actual purchase behavior as a variable and they could not use it in their meta-analysis. Researchers defined purchase intention differently which can cause inconsistencies in findings; for example, some defined purchase intention as a player's intention to purchase something which is different than the player actually making that purchase (Ghazali, 2021; Hamari & Keronen, 2017). Another reason may be due to most modeling in-game purchase literature using single survey sampling and cannot follow-up with participants to determine actual purchase (Ghazali, 2021). In-game purchase intention research has tended to make use of theories that suggest intention leads to actual behaviors; in addition, the research that examined both purchase intention and actual purchase behavior showed support that they are positively related (Guo & Barnes, 2011; Guo & Barnes, 2012; Han & Windsor, 2013; Kordyaka & Hribersek, 2019).

Quantitative literature on in-game purchases has tended to focus on psychological constructs and their relationships with purchase intention (Chou & Kimsuwan, 2013; Ghazali et al. 2019; Kim et al., 2011) while more qualitative studies have investigated the relationship between how the game is designed and how the game sells to players (Hamari & Lehdonvirta, 2010; Hamari, 2011; Lehdonvirta, 2009). Video games can use design mechanics to market to users, encourage them to spend their time playing a game, or even push them to purchase content (Hamari & Lehdonvirta, 2010; Lewis et al., 2012; Zagal et al., 2013). These mechanisms that lead to a negative or deceptive design practices are considered dark patterns.

Dark Game Design Patterns

Harry Brignull coined the term "dark pattern" in 2010, in reference to misleading or deceptive practices that websites or apps used to make users do things they did not want to

do (Brignull, 2010). Brignull created a website dedicated to dark patterns, which provides a definition of dark patterns as well as list of different dark patterns that websites implement (Brignull, 2019). Gray and colleagues (2018) recently developed five categories of dark patterns using the original ones suggested by Brignull and from their literature review. The five main categories are: nagging, obstruction, sneaking, interface interference, and forced action. Game design mechanics that can cause a negative experience for the player are referred to as dark patterns. Zagal and colleagues (2013) defined dark game design patterns:

"Dark game design pattern is a pattern used intentionally by a game creator to cause negative experiences for players which are against their best interests and likely to happen without their consent."

Zagal et al., (2013) categorized the dark patterns into three categories: temporal, monetary, and social capital-based. Temporal dark patterns are related to the player's time with the game and their expectations. For example, grinding or the act of completing repetitive tasks can be considered a dark pattern as it can be used to spend player time for the purpose of extending a game's duration. Monetary dark patterns involve the deception of players to spend more money than expected. Pay to skip has players pay money to continue playing a game or skip a wait time. Social capital-based dark patterns involve a player's social standing and status at risk from a game. Social pyramid schemes as a dark pattern involves a game requiring players to use their social network to make progress in a game. Classifying a game design pattern as dark is not always clear since the context of how

they are used can vary and there is not an all or none rule or test for can be considered dark (Zagal et al., 2013). People may be more acceptable to certain game design patterns than others; for example, in Borderlands 2 certain enemies have a chance to drop specific items and players may need to grind these enemies to have that item drop but players do not need these items to make progress in the game. Zagal et al., (2013) did not consider things that players are complicit in their interactions with the game as dark patterns such as gambling. Mobile games tend to sell loot boxes and arguments have been made about whether they are a form or gambling, or defined as a dark pattern (Goodstein, 2021). An argument has been made that loot boxes could be defined as monetized rivalries or a dark pattern that encourages players to spend money to achieve in-game status using Zagel et al., (2013) classifications of dark patterns; for example, players may buy lootboxes with the hope to acquire items, power-ups, or cosmetics to compete with peers in the game or even in cosmetic expression (Cara, 2019; Goodstein, 2021).

Table 19

Descriptions of Dark Patterns from Zagal et al., (2013)

Category	Dark Patterns	Description
Temporal	Grinding	Players need to perform repetitive tasks to progress
	Playing by Appointment	The game requires players to play at specific times/dates that the game determines
Monetary	Pay-to-Skip	Player can pay to bypass content or wait time
	Pre-Delivered Content	Game content that is provided with a game is inaccessible unless a player pays for it
	Monetized Rivalries	The game encourages players to spend money to achieve in-game status usually versus other players. (e.g., leaderboards)
Social Capital-Based	Social Pyramid Schemes	The game encourages players to recruit others and entrap them to play through social obligation
	Impersonation	The game pretends to be another player in messages or notifications

Fitton and Read (2019) expanded on the dark patterns by Zagal et al., (2013) by developing the App Dark Design (ADD) framework in the context of free-to-play apps. These categories and dark patterns were developed from existing literature then followed up with a qualitative study. The study involved a sample of young students (12-13 years) from a high school divided into groups that worked together to answer questions related to F2P apps and provide insight into their experience with F2P apps. The literature review and results from the study helped develop and finalize the ADD framework (Table 20).

Table 20

Descriptions of Dark Patterns from the ADD Framework by Fitton & Read (2019)

Category	Types
Temporal	Grinding, Play by Appointment, Interstitial Non-app Content
Monetary	Pay for Permanent Enhancements, Pay for Expendable Updates, Pay to Skip/Progress, Pay to Win, Subscriptions, Intermediate Currencies
Social	Impersonation/Friend Spam, Prompts to Share/Review, Social Pyramid Schemes
Disguised Ads	Advergames, Character Placement
Sneaky Ads	Difficult/Deceptive to Dismiss, Camouflaged Game Items, Notification-based Ads
Inappropriate	Unsuitable Adverts, Encouraging Anti-Social Behavior, Psychological Manipulation, Persuasive Design, Developmentally Insensitive

Dark patterns may be used by businesses for commercial purposes such as increasing sales or transactions (Goethe, 2019). Mathur et al., (2019) used a web crawler to examine dark patterns of 11,000 shopping websites and found around 1,800 instances of dark patterns. At least one dark pattern was on about 11% of the websites. These dark patterns tended to be enabled by third-party entities. Di Geronimo et al., (2020) studied dark patterns in popular apps on the Google Play Store then followed up with an online survey to see how dark patterns affect user experience. Of the 240 apps examined, 95% had at least dark pattern or more. In the online study, participants reviewed apps with some containing malicious designs and asked if they noticed any malicious designs. Over half of users (55%) did not spot malicious designs in the apps show, 20% were unsure, and 25% noticed a malicious design. Luguri and Strahilevitz (2021) investigated the effectiveness of dark patterns by exposing participants to mild and aggressive dark

patterns. Participants were assigned to either a control, mild, or aggressive dark pattern group and instructed to decline an identity theft protection plan they were automatically enrolled to. Results indicated that dark patterns swayed users and those who were exposed to aggressive dark patterns reported more negative affect.

More research on evaluating the effects of dark patterns is needed, especially in how they affect user behavior and in creating techniques against them (Mathur et al., 2019). For example, understanding game design patterns and how it many encourage or decrease purchase intention (Hamari et al., 2017).

Diary Studies as a Method to Understand Player Experiences

Researchers use diary studies to obtain a more naturalistic and longitudinal look at a user's experience over time. Diary studies are a method of collecting data by having participants log their experience over time. Participant data could be collected by self-reported survey questions, time-logs, audio recordings, videos, or even physiological data (Bolger et al., 2003). Diary studies may vary in how often participants log their experience; for example, participants may complete a diary based on time (e.g., hourly, daily, weekly) or an event-based procedure where participants log when they complete an assigned task (Bolger et al., 2003). Diary studies have the advantage of collecting detailed naturalistic data over time for participants while a single survey or lab study may only have a snapshot of data from a single point. There are some limitations with the diary study method such as condensed data collection (e.g., smaller surveys), requiring participants to be diligent in completing them, participant attrition, and subjective responses.

In gaming research, diary studies provide insight into the first-time experience of a game, usability of a game, player habits, retention, and other factors (McAllister & Long,

2018). For example, they can provide insight into where and when users are playing games. Mobile games can be played in more places than traditional consoles or PCs, such as waiting on a bus, or at a dentist office. In gaming research, diary studies have been used to investigate player performance, social interactions, game completion, and motivations (Fox et al., 2018; Mekler et al., 2014). Fox and colleagues (2018) wanted to investigate communication in gaming but wanted to look at more than just a single point in time retrospectively and diary studies allowed for an investigation of natural gaming contexts over a period of time. Mekler et al., (2014) used diary studies to examine player experience and intrinsic motivations of video game players of the game FEZ. Preliminary analysis showed that participants who completed FEZ would be more likely to recommend it and rate it better.

Purpose

Study 2 sought to gain an understanding of purchasing behavior of mobile gamers through the use of the diary study method. This study examined mobile games in a more naturistic way over time to understand player experience with mobile games and buying in-game content. While Study 1 examined purchase intention as defined as a user's intention to buy virtual goods or in-game content in a mobile game, Study 2 investigated purchasing behavior as actual purchasing of in-game content. Study 2 complements the results the of Study 1 which provided only a snapshot of various constructs to model purchase intention.

Study 2: Methods

Procedure

Participants were recruited through Embry Riddle Aeronautical University's SONA online research pool and gaming social media websites/platforms (e.g., Reddit, Discord). Potential participants received an online screener survey and eligible ones continued on to participate in the diary study portion of the research. The screener survey included questions around what mobile games the participants were familiar with to ensure the game they would choose to play was not one they were already familiar with. Eligible participants were contacted by a researcher and given instructions about the research. Over 14 days, participants were asked to complete daily diary logs with an interview at the midpoint and at the end of the study. An event-based diary method or logging every time participants complete relevant tasks like buying something or playing the game was considered but may not work for mobile gaming as users may play in short bursts instead of long sessions (Bolger et al., 2003). The diaries were Google Forms surveys that included open-end responses and rating questions that were sent with text messages. Diaries included questions around how long participants played the game that day, a screenshot of their playtime, what they did in the game that day, and their experience. Participants gave daily satisfaction ratings and if they purchased something that day, would give details about what they purchased, why they purchased, and their experience with the in-game content they purchased (Appendices G, H, & I). The initial and final diary contained similar questions to the daily one but included the GUESS-18 as a measure of satisfaction as well (Appendix G and Appendix I). The interviews at the midpoint and last day of the study consisted of questions around the participants' overall experience with the game and their

experience with anything they purchased. Participants were paid with a $15 Amazon gift card at the midpoint and endpoint of the study for completing the logs and participating in the interviews. Participants were also given a $20 Apple or Google Play Store gift card on the third day of the study for purchasing in-game content; this was to help ensure that we would see some type of purchasing behavior from participants.

Participants

Eight participants were recruited for this study (Table 21). Participants were considered eligible to participate if they have a mobile phone that can play games, played video games for at least 10 hours in the past three months, rated that they play mobile games for at least 3 hours a week, have purchased in-game content before, rated that they have neutral to positive attitudes towards in-game purchases, and rated that they are not familiar with the games of interest. These qualifications were to ensure the participants were mobile video game players and would be willing to consider purchasing from the games they play during the study period.

Table 21

Summary of Participant Demographics and Games

Participant #	Gender	Age	Game	Phone
1	M	24	Raid Shadow Legends	Google Pixel 3
2	M	18	Marvel Contest of Champions	iPhone XR
3	F	22	Mobile Legends Adventure	iPhone 8
4	M	18	Marvel Future Fight	Samsung A10e
5	F	22	Marvel Contest of Champions	iPhone XS
6	F	23	Marvel Future Fight	iPhone 11
7	F	22	Mobile Legends Adventure	iPhone 11
8	M	21	Marvel Strike Force	iPhone 11

Games

The games analyzed from Study 1 and several other popular mobile F2P games were considered for evaluation for their unique player experience and business model. Games selected were F2P so participants would not have to initially purchase them and games that have a purchase upfront to play tend to differ in business models than F2P games (Nguyen, 2015). The games varied in genre and gameplay as to give participants options that they would find interesting to play. Games that had a strong focus on player vs. player gameplay were avoided so that other players would not heavily influence the participants experience when playing the game. Most mobile F2P games include monetization and in-app purchases which are related to dark patterns and the games chosen for this research fell

under this as well. The games selected for this research were examined and the author confirmed if elements of dark patterns were present (Table 22).

Table 22

Mobile Games that Participants Played and Some of the Dark Patterns in Them Based on the ADD Framework by Fitton & Read (2019)

Game	**Dark Patterns in Game**
Marvel Contest of Champions	Grinding, Pay for Permanent Enhancements, Notification-based Ads, Pseudo Currency/Intermediate Currencies, Subscriptions
Marvel Future Fight	Grinding, Pay for Permanent Enhancements, Notification-based Ads, Pseudo Currency/Intermediate Currencies, Subscriptions
Marvel Strike Force	Grinding, Pay for Permanent Enhancements, Notification-based Ads, Pseudo Currency/Intermediate Currencies, Subscriptions
Mobile Legends Adventure	Grinding, Pay for Permanent Enhancements, Notification-based Ads, Pseudo Currency/Intermediate Currencies, Subscriptions
Raid Shadow Legends	Grinding, Pay for Permanent Enhancements, Notification-based Ads, Pseudo Currency/Intermediate Currencies, Subscriptions

Study 2: Results

Analysis

Given the small sample size of this diary study, the analysis was primarily qualitative in nature. While some quantitative data was collected, it was used to help interpret qualitative responses.

Purchasing Behavior

Seven of the eight participants made a purchase during their time logging over the two-week period. Of those seven that made a purchase, four of them made a second purchase. Participants tended to purchase in-game items that would be considered functional, which add in-game benefits such as characters with specific abilities or resources to upgrade and improve characters (Lin & Sun, 2011). Several participants purchased in-game content that included in-game currencies that would be used to make characters stronger or in-game currencies that allowed participants to play the game more. The other primary purchases were for in-game characters, but these typically were items that only give a chance to receive a character (e.g., loot box) from a set that have different rarities with stronger characters typically being rarer to receive. Two participants regretted making their purchases with one participant regretting both of theirs and the other only regretting one of the two. One important thing to note about all the purchases made in this research, participants have to turn money into a different currency to make purchases in the game. For example, in Marvel Strike Force, players can purchase a premium currency know as Power Cores with actual money, but the conversion is not 1:1 so spending $20 dollars gets a player 1,580 power cores. This is known as intermediate currencies or pseudo currencies as users may not be aware how much they spend in the game since it's in a different currency and amount then what they originally used and spent (Cara, 2019; Fitton & Read, 2019)

In-game Currencies. A common purchase from participants were in-game currencies that provided in-game benefits such as leveling characters or equipment to make them stronger. As participants progressed through their respective games, they

would complete levels that would get progressively harder. Participants brought up in their logs the concept of grinding or completing repetitive tasks in a video game. In mobile games, examples of grinding could include completing levels that the player has already completed to get rewards or materials that have a use in the game. Several participants mentioned that they needed to grind in the game to get their characters stronger so they could continue in the game. Participant four (P4) mentioned grinding several times in their logs, "It was difficult, and I was grinding." and "Just another day grinding materials." Participants mentioned in logs that grinding was done to level up characters or get materials that would level up characters to make them stronger so they could progress further in the game. One participant (P1) made a purchase of a pack that gave in-game currencies which would be used to level up their characters. P1 stated that he was running low on the currency to level up characters and thought the missions in the game did not give him enough; instead of grinding missions he made the purchase so he could level up the characters and continue playing new missions instead. Another participant (P8) stated in one log they purchased in-game items to make their characters stronger, but it seemed like it wasn't as effective as they hoped, "I keep upgrading and spending money however the battles are not getting easier and I'm still losing." P8 mentioned that the purchase of a character and extra upgrades was to help them win battles, but they felt that it didn't do much to help them progress.

Loot boxes. Another purchase type seen in this study was loot boxes to get in-game characters. Mobile games have various monetization strategies they can use to generate revenue; one such option is loot boxes which give players a chance to get items or rewards from a set of items with different chances to receive them based on rarity. For example, one

participant (P5) wanted a specific character, but they could only buy a pack that could give them chance to receive this character; the participant made this purchase twice trying to get a specific character but were not successful. While P5 did not receive the character they wanted, the pack did give them what they believed were stronger characters, so they had mixed feelings about their purchase decision. The game P5 played (Marvel Contest of Champions) had other methods to get characters and they were able to receive the character they were interested in using those other methods that did not require a payment.

Table 23

Summary of Purchases for Each Participant

P#	Game	# Purchases	Purchase Day	Content Purchased	Associated Dark Patterns
1	Raid Shadow Legend	2	3	Starter pack with shards to unlock characters, coins, and gems	Pay for Permanent Enhancements
			10	Pack with in-game currency to upgrade characters	Grinding, Pay for Permanent Enhancements
2	Marvel Content of Champions	1	6	Daily deal with in-game currency, energy, and crystals to get more characters (loot box) or energy (stamina)	Pay for Permanent Enhancements, Pay to Skip/Progress
3	Mobile Legends: Adventure	0	N/A	N/A	N/A
4	Marvel Future Fight	2	8	Starter pack with characters and in-game currency	Grinding, Pay for Permanent Enhancements
			9	6-star character pack	Loot boxes
5	Marvel Content of Champions	2	8	Guardians of the Galaxy pack with characters	Loot boxes
			11	Guardians of the Galaxy pack with characters	Loot boxes
6	Marvel Future Fight	1	5	In-game currency to upgrade characters	Pay for Permanent Enhancements
7	Mobile Legends: Adventure	1	7	50 five start hero pieces and 70 vip points.	N/A
8	Marvel Strike Force	2	10	Pack with in-game currency and characters	Grinding, Pay for Permanent Enhancements
			11	Characters and extra upgrades	Grinding, Pay for Permanent Enhancements

Journey Maps

Journey maps were created to display a participant's experience over the course of the study. The journey maps were created based on a participant's daily logs using satisfaction ratings and qualitative feedback as well as feedback from the two interviews during the midpoint and endpoint of the logging. The journey maps contain a participant's quotes from their daily logs and indicated the points where they made a purchase (Appendices J-Q). Combined journey maps were created for participants that played the same game to compare their experiences and purchases points (Figure 12, Figure 13, & Figure 14).

Figure 12

Combined Participant 2 & 5 Journey Maps

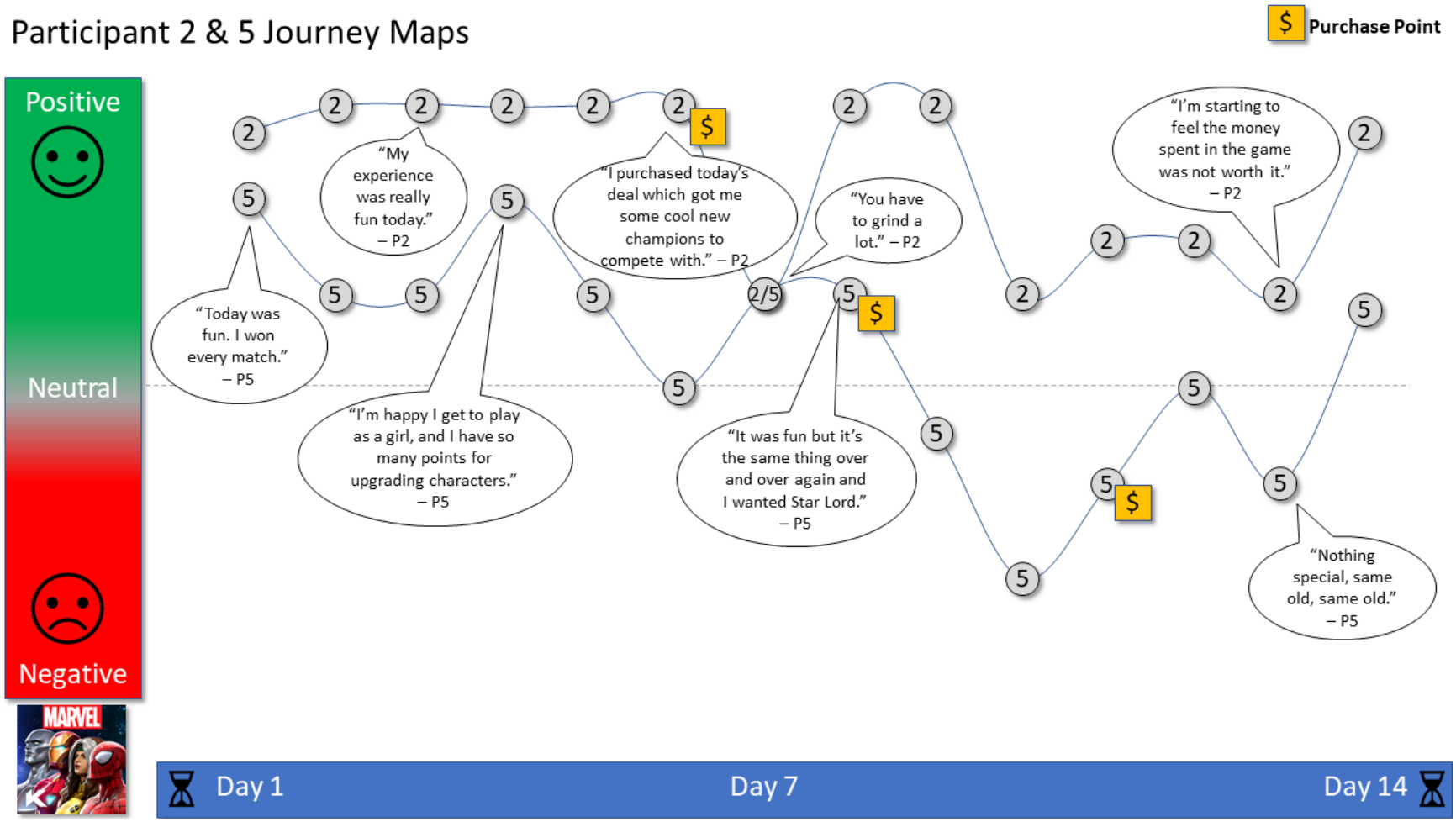


Figure 13

Combined Participant 3 & 7 Journey Maps

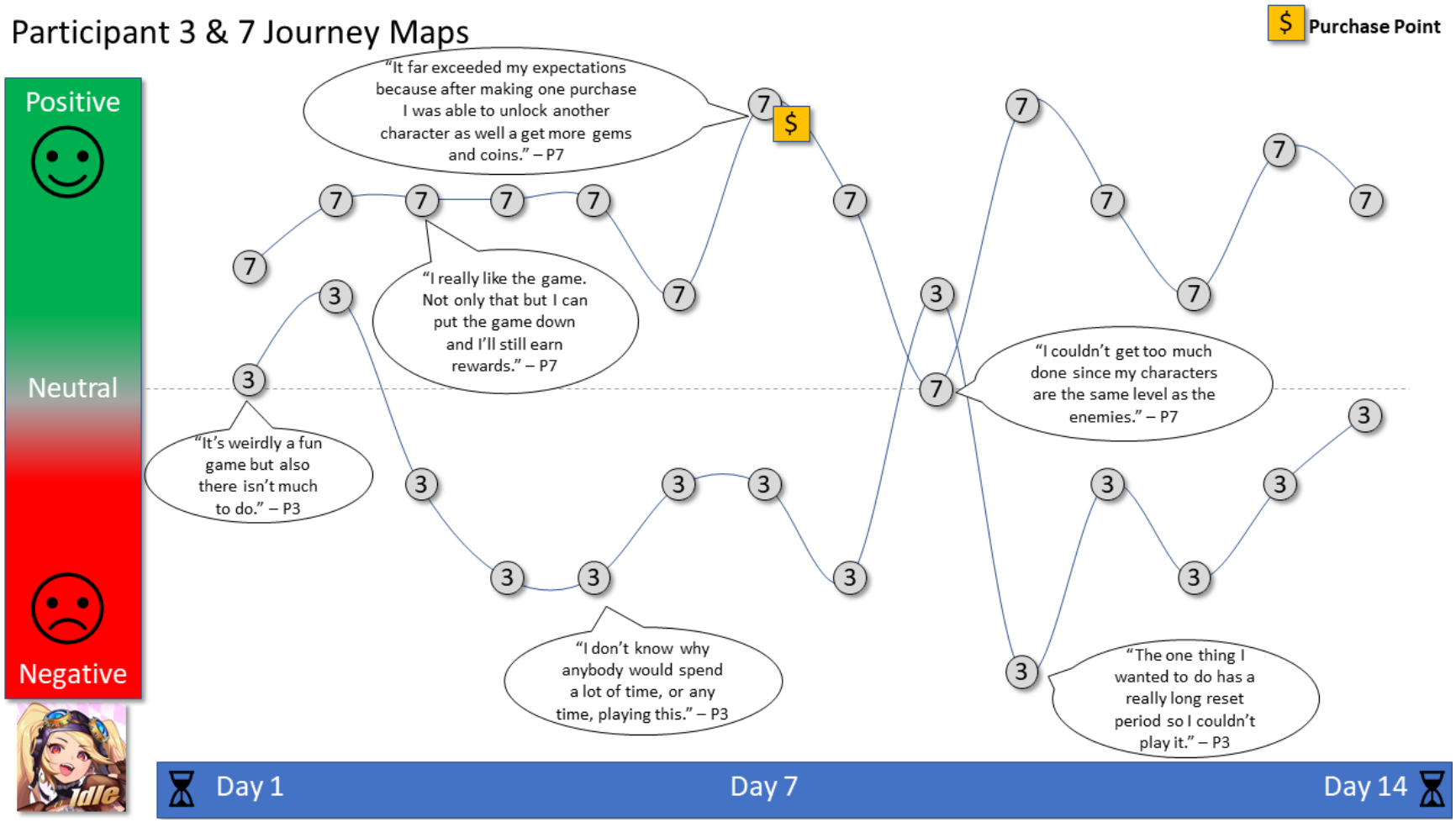
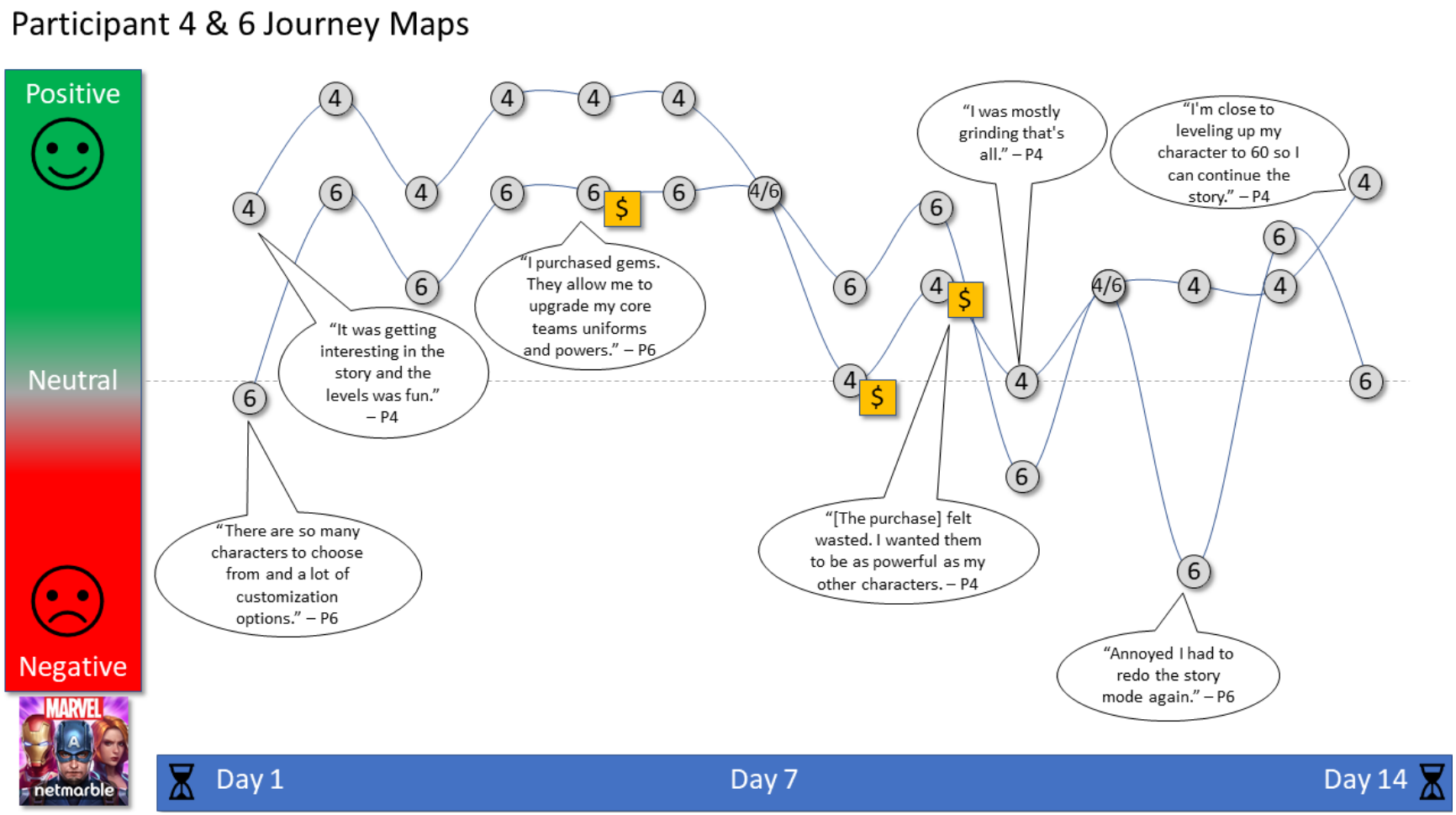


Figure 14

Combined Participant 4 & 6 Journey Maps



Satisfaction Scores (GUESS-18)

The GUESS-18 (Keebler et al., 2020) was used as measure of satisfaction in the first diary entry participants completed and the last diary at the end of the study. Five of the eight participants reported an increase in their GUESS-18 scores but due to the small sample size, statistical analysis was not conducted (Table 24).

Table 24

GUESS-18 Scores for Day 1 and Day 14

Participant #	Game	Day 1 GUESS-18 Score	Day 14 GUESS-18 Score
1	Raid Shadow Legends	48.5	50.5
2	Marvel Contest of Champions	52.5	52
3	Mobile Legends: Adventure	37	31
4	Marvel Future Fight	52.5	54.5
5	Marvel Contest of Champions	45.5	40.5
6	Marvel Future Fight	32.5	42
7	Mobile Legends: Adventure	49	53
8	Marvel Strike Force	49	47.5

Overall GUESS-18 scores range from 9-63

Study 2: Discussion

As mobile gaming continues to become more popular and use monetization strategies such as microtransactions to generate revenue, understanding why and what mobile game players purchase is important. Mobile games typically are F2P and use

different monetization mechanisms that are often considered deceptive or similar to dark patterns (Fitton & Read, 2019). Findings from this study provide some insight into the user experience of mobile video game players and purchase behavior. One strength of this study was the naturalistic view of mobile game players and their purchasing behavior. Participants were able to pick a game that interested them from a list of potential games to play over the study's timeframe. This was done to ensure participants would find a game that was enjoyable to them, would want to play it for the duration of the study, and at least consider purchasing something in the game. Seven of the eight participant made some type of purchase during the timeframe of the study and some of those even purchased a second time. Looking at the participants' purchases, most were functional in-game items that were for making characters stronger or for progressing in the game. Participants mentioned dark patterns around reasons for purchasing such as to avoid grinding or paying to make their characters stronger to advance in the game. Another type of purchase seen in this study was loot boxes which provided a chance to receive certain rewards based on rarity set by the game. For this study, participants tended to buy loot boxes to unlock specific characters which could be for both a functional and cosmetic use because characters have different abilities, stats, and appearances. Two participants even reported that they regretted their purchases with one participant feeling that way for both of theirs and the other participant only regretting one of the two.

Implications

These findings provide a better understanding mobile gaming purchasing behavior. For this research, participants purchased both functional and cosmetics items and even mentioned associated dark patterns with most purchases. This research makes no

judgements about the intention of game designers, but this research may help in understanding how players feel about the game they play and their purchasing considerations. Understanding how players respond to game design patterns and their relationship to purchasing behavior is helpful to game developers to make their games more satisfying and more profitable.

Future Research

There is research on the impact of web dark patterns on user experience, but more research is needed on the measurable impact of dark patterns in mobile games on user experience (Di Geronimo et al., 2020; Mathur et al., 2019). There are several studies specifically on loot boxes in video games, but other game design elements should be further examined (Adam, et al., 2021; Goodstein, 2021; Macey & Hamari, 2019). Future research could study other types of game design patterns (e.g., grinding, pay to win, play by appointment) and their contribution to user experience and purchase behavior. In-game purchasing has been examined with adults, but more research is needed on younger users such as children and teenagers as certain game design elements may be more effective on different audiences (Fitton & Read, 2019).

Limitations

This study used the diary study technique to collect data which has several limitations such as potential bias from participants. Participants picked a game to play over a two-week period, but they may have come to dislike the game over the study's duration which could impact their experience and purchase behavior. Participants were given money to purchase in-game content which may have encouraged them to purchase but this was done to at least see some type of purchasing and the reasoning behind it. A small

number of mobile games were examined in this research so results may not generalize to all mobile games or genres. Like Study 1, this study used a convenience sample of participants recruited from Embry Riddle Aeronautical University and social media gaming forms (e.g., Reddit, Discord) and may not completely generalize to the general population.

CHAPTER 4 DISCUSSION

Overall Implications

Results from both Study 1 and Study 2 contribute to the gaming literature by providing a model of purchase intention using constructs such as attitudes towards virtual goods, monetary value, addiction, enjoyment, and creative freedom. This research provides a theoretical model that could be used in future studies, such as replications in other types of games, targeting specific genres, or with different populations. The final model explained 66.1 % of the variance of purchase intention and attitudes towards virtual goods (β = .767) was the strongly associated with purchase intention out of the constructs which is in line with modeling gaming purchase intention literature (Hamari & Keronen, 2017). This research affirms the value of the GUESS and the GUESS-18 as tools to measure game user satisfaction. Most modeling purchase intention literature has not used a validated scale like the GUESS to measure satisfaction and while not all factors of the GUESS appeared in the final model, this research does add to its usefulness and the predictive ability of some of its subscales for understanding purchase intention. The GUESS-18 is a validated shorter version of the GUESS, and this research adds to its use of examining satisfaction over time (Keebler et al., 2020) in Study 2. Findings from this research also provide a naturalistic look at mobile video game players and purchase behavior. While Study 1 focused on

psychological concepts that may influence purchase intention, Study 2 examined purchasing behavior from participants and their experience with a game's design around that purchase. The addition of the diary study research with Study 2 adds a more naturalistic look at the mobile video game player experience and purchasing behavior. Participants' purchases were mainly functional in-game items that helped further progress in the game and participants tended to report aspects of game design around these purchases such as grinding, pay for permanent enhancements, or loot boxes.

The game industry could use the results from this research to be informed on the relationship between purchase intention and several different factors (satisfaction, addiction, social motivations, monetary value). Furthermore, game companies can be more informed on how player's attitudes on the selling of in-game content could affect purchasing and take those considerations into account when designing what content to sell players and how they sell them. Game designers could use this research to help inform and present to players why they are selling in-game content the way they are and develop a dialog with players in how they can match their expectations as well as the game company.

Future Research

This research focused on purchase intention of in-game content in mobile games, future research could expand the proposed model to other types of games or genres. Specific game types such as virtual world, mobile, F2P, Pay to Play, console could vary in what factors are most related to purchase intention (Hamari & Keronen, 2017). While attitudes towards the sales of in-game content was related to purchase intention, more research is needed on the impact of game design elements on purchase intention and purchasing behavior. There is research on the impact of web dark patterns on user

experience, but more research is needed on the impact of dark patterns in mobile games on user experience. Future research could study other types of game design patterns and their contribution to user experience as well as player attitudes towards certain game design elements or even a game's marketing tactics. More research is needed on specific player attitudes towards the sales of in-game content with factors such as manipulativeness, addictiveness, intrusiveness, overpricing, and riskiness for consideration (Salehudin & Alpert, 2021). While the GUESS measures a player's satisfaction with a game, there may need to be more research on additional constructs about player attitudes towards a game design including monetization, fairness, difficulty, or accessibility for a more complete view of user experience.

Conclusion

This research used two studies to investigate purchase intention in mobile games: the first used SEM to examine purchase intention with several factors such as satisfaction, social motivations, monetary value, continuance intention, attitudes towards virtual goods, addiction, and demographic factors; the second used diary studies to examine purchase behavior in mobile video game players. Findings from Study 1 suggested that attitudes towards virtual goods explained the most variance in mobile game purchase intention out of the constructs in the final model. Other factors such as enjoyment, monetary value, and addiction were positively related to purchase intention while creative freedom was negatively associated. Results from Study 2 had players report purchasing of functional in-game content to continue progression within the game and loot boxes to acquire more content. In the logs, participants tended to report associated dark patterns with their purchase such as grinding, pay for permanent enhancement, and loot boxes. The

combination of Study 1 and 2 show that both psychological constructs and aspects of game design may influence players in-game purchase intention. Results from both these studies indicate future research should measure or define metrics of the impact of game design on player experience or attitudes.

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Appendices

Appendix A Review of Gaming Purchase Intention Modeling Literature

Authors	Year	Games/Genres Examined	Theoretical Foundations & Constructs Studied	Influences on Purchase Intention
Animesh et al.,	2011	Second Life	Stimulus-Organism-Response Model Interactivity, Sociability, Telepresence, Flow, Density, Stability, Flow, Social Presence	Flow
Balakrishnan & Griffiths	2018	Mobile Video Games	Salience, Tolerance, Mood Modification, Relapse, Withdrawal, Conflict, Problems, Online Mobile Game Addiction, Loyalty Towards Online Mobile Games	Mobile Game Addiction, Game Loyalty
Cheon	2013	Second Life	Interactivity, Vividness, Involvement, Flow, Product Value, Satisfaction	Product Value, Flow
Chou & Kimsuwan	2013	Online Prepayment Cards	Enjoyment Value, Character Competency Value, Visual Authority Value, Monetary Value, Price, Promotion	Enjoyment Value, Monetary Value, Promotion
De Souza & de Freitas	2017	Electronic Games	Arousal, Time Flexibility, Challenge, Competition, Diversion, Fun, Fantasy, Social Interaction, Intention to Play	Intention to Play
Ernst	2018	Clash of Clans	Patience, Enjoyment of Routine Tasks	Patience (-)
Fan	2019	MOBA Games	Self-Determination Theory Competence, Autonomy, Relatedness, Rewards, Reputation, Money, Praise, Intention to Buy In-game Hero Skins	Competence, Praise
Ghazali et al.	2019	Pokémon Go!	Uses and Gratifications Theory, Flow Theory	Continuance Intention

			Achievement, Challenge, Escapism, Social Interaction, Enjoyment, Flow, Nostalgia, Need-to-Collect, Network Externalities, Community Involvement, Continuance Intention	
Ghazali et al.,	2022	DOTA 2	Goal-Setting Theory, Flow Theory, Enjoyment, Skill, Challenge, Telepresence, Flow, Continuance Intention, Enjoyment of Buying	Flow, Continuance Intention
Grønstad	2021	Pokémon Go	Maslow's Hierarchy of Needs Unlocking Content, Evolving or Powering Up, Leveling Up, Achievement, Competition, Leaderboard, Best Character, Esteem, Number of Friends, Cooperative Play, Interactivity, Social, Gender, Age, OS, Income, Fiends, Level	Competition, Unlocking Content, Leveling Up, Cooperative Play,
Guo & Barnes	2011	Second Life	Transaction Cost Theory, Unified Theory of Acceptance and Use of Technology Effort Expectancy, Performance Expectancy, Perceived Value, Perceived Enjoyment, Advancement, Customization; Social Influence	Perceived Enjoyment, Customization, Advancement, Perceived Value, Performance Expectancy, Effort Expectancy
Guo & Barnes	2012	World of Warcraft	Transaction Cost Theory, Unified Theory of Acceptance and Use of Technology Perceived Enjoyment, Social Influence, Status, Habit	Perceived Enjoyment, Perceived Value, Effort Expectancy, Advancement, Customization

Hamari	2015	Social Virtual Worlds, First-Person Shooters, Social Networking	Attitude Towards Purchasable Virtual Goods, Continuous Use Intentions for the Core Service, Perceived Enjoyment of the Core Service, Subjective Norms Towards Purchasing Virtual Goods	Attitude towards Purchasable Virtual Goods, Subjective Norms Towards Purchasing Virtual Goods Continuous Use Intentions for the Core Service for Social Virtual World Games
Hamari et al.,	2017	Free-to-Play Games	Assurance, Empathy, Reliability, Responsiveness, Play Intention	Reliability, Play Intention
Hamari, Malik, et al.,	2019	Pokémon Go	Uses and Gratifications Enjoyment, Challenge, Competition, Socializing, Outdoor Activity, Trendiness, Nostalgia, Ease of Use, Privacy Concerns, Intention to Reuse	Gender, Age, Education, Challenge, Competition, Socializing, Outdoor Activity, Nostalgia
Hamari, Hanner, et al.,	2019	Free-to-Play Games	Perceived Value Framework Enjoyment, Social Value, Quality, Economic Value, Continued Use Intentions	Continued Use Intentions, Enjoyment, Social Value, Economic Value
Han & Windsor	2013	The Mystery of the Crystal Portal	Perceived Attractiveness, Social Influence, Perceived Playfulness, Added Value, Service Orientation: Mobility, UI Limitations, Cohesive Support	Perceived Playfulness, Added Value of Gaming App on Smartphone
Haziri et al.,	2019	Gamified Purchasing Setting	Game Mechanics, Game Dynamics, Aesthetics, Game Experience	Game Experience (-)
Ho & Wu	2012	Role-Playing and War-Strategy Games	Theory of Consumption Values Character Competency, Price Utility, Social Value: Social Self-Image Expression, Social	Price Utility, Aesthetics, Social Relationship Support for Role-Playing Games

			Relationship Support, Playfulness, Satisfaction with the Game, Identification with the Character	Satisfaction, Identification with Character, Character Competency for War-Strategy
Hsiao & Chen	2016	Mobile Games	Playfulness, Access Flexibility, Connectedness, Good Price, Reward, Mobile Game Loyalty, Habit, Platform, Age, Gender, Income	Mobile Game Loyalty, Playfulness, Good Price, Reward, Gender, Income, for Paying Players Mobile Game Loyalty, Good Price, for Non-Paying Players
Huang	2012	Social Network Game	Stimulus-Organism-Response Model Active Control, Reciprocal Communication, Social Identity, Affective Involvement, Flow, Cognitive Involvement	Affective Involvement, Flow, Cognitive Involvement (-)
Jimenez	2019	Game-Related Products	Uses and Gratifications Theory, Social Comparison Theory, Trait Theory Hedonic Motivation, Social Motivation	Hedonic Motivation, Social Motivation
Kaburuan et al.,	2009	Virtual Worlds	Extended Theory of Planned Behavior Perceived Consequence, Attitudes, Personal Innovativeness, Subjective Norms, Subjective Norms, Behavioral Control	Perceived Consequence, Attitudes, Personal Innovativeness, Subjective Norms, Subjective Norms, Behavioral Control
Kim	2012	Social Virtual Worlds	Perceived Usefulness, Perceived Enjoyment, Perceived Fee, User Satisfaction, Perceived Value	User Satisfaction, Perceived Value
Kim et al.,	2011	Cyworld	Customer Value Theory	Aesthetics, Playfulness, Social Self-Image Expression

			Price Utility, Functional Quality, Aesthetics, Playfulness, Social Self-Image Expression, Social Relationship Support	
Kim et al.,	2012	Cyworld, Habbo	Self-Presentation Theory Online Presentation Self-Efficacy, VC Involvement, Online Self-Presentation Norms	Desire for Online Self-Presentation
Kordyaka & Hribersek	2019	League of Legends	Social Identity Approach, Self-Presentation Theory Personality Traits, Online Presentation Self-Efficacy, Online Presentation Social Norms, Amount of Friends, Identification with the Virtual Groups; Online Self-Presentation, Purchase Goal	Online Self-Presentation, Identification with the Virtual Group
Liu & Shiue	2014	Facebook Games	Flow Theory Sociality, Interactivity, Challenge, Novelty, Flow, Price Perception	Flow, Price Perception
Luo et al.,	2011	World of Warcraft & Maple Story	Theory of Reasoned Action Sense, Interaction, Pleasure, Flow, Community Relationship	Pleasure, Flow, Community Relationship for World of Warcraft Pleasure, Community Relationship for Maple Story
Mantymaki	2011	Habbo Hotel	Theory of Network Externalities, Technology Acceptance Model, Social Presence Theory, Social Cognitive Theory,	Continuance Use Intention, Perceived Network Size, Social Presence

			Theory of Planned Behavior, Innovation Diffusion Theory Perceived Enjoyment, Perceived Usefulness, Perceived Network Size, Subjective norm, Perceived Ease of Use, Social Presence, Self-Efficacy, Availability, Continuous Use Intention	
Mantymaki & Salo	2011	Habbo Hotel	Technology Acceptance Model Attitude, Continuous Use Intention, Perceived Usefulness, Perceived Enjoyment, Perceived Aggregate Network Exposure, Perceived Ease of Use	Perceived Aggregate Network Exposure, Continuous Use Intention,
Mantymaki & Salo	2013	Habbo Hotel	Unified Theory of Acceptance and Use of Technology Perceived Usefulness, Perceived Enjoyment, Perceived Network Size, Social Presence, Perceived Ease of Use, Self-efficacy, Availability	Perceived Usefulness, Perceived Enjoyment, Perceived Network Size, Perceived Ease of Use, Availability
Mantymaki et al.,	2014	Habbo Hotel	Perceived Enjoyment, Perception of Control, Curiosity, Focused Immersion, Temporal Dissociation, Cognitive Absorption, Perceived Network Size, Social Presence, Trust in Other Users	Perceived Enjoyment, Perceived Network Size, Social Presence, Trust in Other Users
Mertens	2017	League of Legends	Achievement Value, Social Value, Immersive Value, Customer Satisfaction with the Game, Perceived Value,	Price Ranges, Intention to Continue Playing, Promotions, Perceived Value

			Promotions, Intention to Continue Playing, Prince Ranges	
Park & Lee	2011	Online Games	Theory of Consumption Values Enjoyment Value, Character Competency Value, Visual Authority Value, Monetary Value, Character Identification, Satisfaction About the Game	Character Identification, Integrated Value of Purchasing Game Item
Rathee & Rajain	2019	Advertgames	Persuasion Knowledge, Entertainment, Attitude, Purchase Intention	Attitude
Shin	2008	Virtual Worlds	Technology Acceptance Model Trust, Perceived Usefulness, Perceived Ease of Use, Attitude, Perceived Risk, Subjective Norm	Perceived Usefulness, Perceived Ease of Use, Social Norm, Perceived Risk (-)
Wang & Chang	2014	Online Games	Expectancy Disconfirmation Model Perceived Customization, Perceived Sociability, Outcome Expectations, Perceived Quality, Customer Satisfaction	Customer Satisfaction
Warouw	2014	Online Games	Price Utility, Quality, Aesthetics, Playfulness, Social Self-Image, Social Relationship	Price Utility, Aesthetics, Playfulness
Wuryandari et al.,	2021	PUBG Mobile	Uses and Gratification Hedonic Gratification, Perceived Value, Utilitarian Gratification, Social Gratification	Utilitarian Gratification

Appendix B Screener Survey for Study 1

Demographics

- Age
  - Write in
- Gender
  - Male, Female, Non-binary, Prefer to self-identify, Prefer not to say
- Ethnicity
  - American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Middle Eastern or North African, Native Hawaiian/Pacific Islander, White, Prefer to self-identify, Prefer not to say
- Native Language
  - English, German, Chinese, Spanish, French, Japanese, Korean, Other (Write in)
- Income
  - Less than 19,999, 20,000-39,999, 40,000-59,000, 60,000-79,999, 80,000-119,999, 120,000-139,999, 140,000 and up
- Occupation
  - Write in

Screener Questions

- Do you use streaming services (e.g., Netflix, Hulu, Amazon Prime Video) on at least one of the following devices: cellphone/smartphone, tablet, console, desktop, laptop, or smart TV?
  - On average, how many hours do you spend watching movies or TV shows on streaming services (e.g., Netflix, Hulu, Amazon Prime Video) per week?
    - Less than 1 hour, 1 – 4 hours, 5 - 9 hours, 10 – 19 hours, 20 – 29 hours, 20 – 39 hours, More than 40 hours
  - Which of the following tv show genres do you FREQUENTLY play? Check all that apply.
    - Action/Adventure, Animation, Comedy, Documentary, Drama, Family, Fantasy, History, Mystery, News, Reality, Romance, Sci-Fi, Sports, Talk Shows, I don't watch TV shows
- Do you play video games on at least one of the following devices: cellphone/smartphone, tablet, console, desktop, laptop, or handheld device?
  - On average, how often do you play games on the following devices?
    - Mobile device, computer device, console device, handheld device
    - Never, rarely, occasionally, somewhat often, extremely often
  - On average, how many hours do you spend playing video game per week?
    - Less than 1 hour, 1 – 4 hours, 5 - 9 hours, 10 – 19 hours, 20 – 29 hours, 20 – 39 hours, More than 40 hours
  - Which of the following video game genres do you FREQUENTLY play? Check all that apply.

        - Action, Adventure, Driving, Educational/Edutainment, Fighting, Fitness, Music/Dance, Puzzle/Card, Retro/Classic, Role Playing, Simulation, Social/Social Network, Sports, Strategy
- Please think of a MOBILE GAME that you currently play or recently played in the last 30 days. The mobile game you choose can either be a mobile game that you LIKE or DISLIKE. However, avoid choosing any mobile games that you have little experience playing (e.g., a mobile game you just started to play) OR that you have stopped playing more than 3 months ago.
- Choose a mobile game that you have played for at least 10 hours in the last 3 months. Please type the entire name of the mobile game (e.g., Gargoyles and Gravel 5) and do not abbreviate the official title.
- Type the name of the MOBILE GAME below:
    - When was the last time you played XYZ?
        - Today, yesterday, last week, last month, about 2 – 3 months, about 4 – 6 months ago, about 7 – 12 months ago, more than a year ago
    - On average, how many hours do you spend playing XYZ per week?
    - Have you every purchased something in XYZ?

Appendix C Survey for Study 1

Demographics

- Age
  - Write in
- Gender
  - Male, Female, Non-binary, Prefer to self-identify, Prefer not to say
- Ethnicity
  - American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Middle Eastern or North African, Native Hawaiian/Pacific Islander, White, Prefer to self-identify, Prefer not to say
- Education
  - High school, Vocational degree, College degree, University degree
- Occupation
  - Write in
- Please indicate your current annual income (USD):
  - Less than 19,999, 20,000-39,999, 40,000-59,000, 60,000-79,999, 80,000-119,999, 120,000-139,999, 140,000 and up
- Native Language
  - English, Hindi, Chinese, Arabic, French, Spanish, Italian, German, Other

Game Experience Questions

- Do you play video games on at least one of the following devices: cellphone/smartphone, tablet, console, desktop, laptop, or handheld device?
  - On average, how many hours do you spend playing video games per week?
    - Less than 1 hour, 1 – 4 hours, 5 - 9 hours, 10 – 19 hours, 20 – 29 hours, 20 – 39 hours, More than 40 hours
  - On average, how often do you play games on the following devices?
    - Mobile device, computer device, console device, handheld device
    - Never, rarely, occasionally, somewhat often, extremely often
- Please think of a MOBILE GAME that you currently play or recently played in the last 30 days. The mobile game you choose can either be a mobile game that you LIKE or DISLIKE. However, avoid choosing any mobile games that you have little experience playing (e.g., a mobile game you just started to play) OR that you have stopped playing more than 3 months ago.
- Choose a mobile game that you have played for at least 10 hours in the last 3 months. Please type the entire name of the mobile game (e.g., Gargoyles and Gravel 5) and do not abbreviate the official title.
  - When was the last time you played XYZ?
    - Today, yesterday, last week, last month, about 2 – 3 months, about 4 – 6 months ago, about 7 – 12 months ago, more than a year ago
  - On average, how many hours do you spend playing XYZ per week?
  - Have you every purchased something in XYZ?

        - Never, at least once
    - Typically, what kind of in-game content do you purchase from XYZ?
        - Functional Items (e.g., Characters, Weapons, Energy, Extra lives, Game/Time skips, Resource Boosts), Cosmetic Items (e.g., Character skins, Weapon skins, Emotes, Appearance Items), Both Functional Items and Cosmetic Items, None of the above, Other
    - How many purchases of in-game content have you made in the past month in XYZ?
    - In TOTAL, approximately how many hours have you spent playing XYZ

Purchase Intention, Adapted from Ghazali et al., 2019, (1 = Strongly Disagree; 7 = Strongly Agree)

- I intend to buy microtransactions in the future
- I predict that I will buy microtransactions in the future
- I would consider buying microtransactions in the future
- The likelihood that I will buy microtransactions is high
- I would consider spending real money to purchase items in the game store

Satisfaction, Adapted from Phan et al., 2016, (1 = Strongly Disagree; 7 = Strongly Agree)

- Game User Experience Satisfaction Scale (GUESS) (Appendix C)
- **Usability/Playability (11 items)**
    - I think it is easy to learn how to play the game.
    - I find the controls of the game to be straightforward.
    - I always know how to achieve my goals/objectives in the game.
    - I find the game's interface to be easy to navigate.
    - I do not need to go through a lengthy tutorial or read a manual to play the game.
    - I find the game's menus to be user friendly.
    - I feel the game trains me well in all of the controls.
    - I always know my next goal when I finish an event in the game.
    - I feel the game provides me the necessary information to accomplish a goal within the game.
    - I feel very confident while playing the game.
    - I think the information provided in the game (e.g., onscreen messages, help) is clear.
- **Narratives (7 items)**
    - I am captivated by the game's story from the beginning.
    - I think the characters in the game are well developed.
    - I enjoy the fantasy or story provided by the game.
    - I can identify with the characters in the game.
    - I am emotionally moved by the events in the game.
    - I can clearly understand the game's story.
    - I am very interested in seeing how the events in the game will progress.

- **Play Engrossment (8 items)**
  - I cannot tell that I am getting tired while playing the game.
  - I tend to spend more time playing the game than I have planned.
  - Whenever I stopped playing the game I cannot wait to start playing it again.
  - I feel detached from the outside world while playing the game.
  - I can block out most other distractions when playing the game.
  - I do not care to check events that are happening in the real world during the game.
  - Sometimes I lose track of time while playing the game.
  - I temporarily forget about my everyday worries while playing the game.
- **Enjoyment (5 items)**
  - I think the game is fun.
  - I feel bored while playing the game. (REVERSE CODE)
  - If given the chance, I want to play this game again.
  - I am likely to recommend this game to others.
  - I enjoy playing the game.
- **Creative Freedom (7 items)**
  - I feel the game allows me to be imaginative.
  - I feel creative while playing the game.
  - I feel I can explore things in the game.
  - I feel the game allows me to express myself.
  - I feel my curiosity is stimulated as the result of playing the game.
  - I think the game is unique or original.
  - I feel the game gives me enough freedom to act how I want.
- **Audio Aesthetics (4 items)**
  - I enjoy the sound effects in the game.
  - I think the game's audio fits the mood or style of the game.
  - I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.
  - I enjoy the music in the game.
- **Personal Gratification (6 items)**
  - I am in suspense about whether I will succeed in the game.
  - I feel successful when I overcome the obstacles in the game.
  - I feel the game constantly motivates me to proceed further to the next stage or level.
  - I find my skills gradually improve through the course of overcoming the challenges in the game.
  - I am very focused on my own performance while playing the game.
  - I want to do as well as possible during the game.
- **Social Connectivity (4 items)**
  - I find the game supports social interaction (e.g., chat) between players.
  - I am able to play the game with other players if I choose.
  - I like to play this game with other players.
  - I enjoy the social interaction within the game.

- **Visual Aesthetics (3 items)**
    - I enjoy the game's graphics.
    - I think the game is visually appealing.
    - I think the graphics of the game fit the mood or style of the game.

Continuance Intention, Adapted from Patzer, 2018, who adapted from Hsiao & Chiou, 2017, (1 = Strongly Disagree; 7 = Strongly Agree)

- In the future, I will continue to play XYZ
- In the future, I will play XYZ often
- I will say advantages of XYZ to other people
- I will recommend XYZ to other people

Attitude towards Virtual Goods, Adapted from Shin, 2008 and self-created, (1 = Strongly Disagree; 7 = Strongly Agree)

- Shin, 2008
    - I have positive feelings towards buying in-game content from XYZ
    - The thought of buying a virtual good from this game is appealing to me
- Self-created
    - I approve of the sale of in-game content in XYZ
    - I think the sale of virtual goods in XYZ is a good thing

Monetary Value, Adapted from Park & Lee, 2010 and Mertens, 2017, (1 = Strongly Disagree; 7 = Strongly Agree)

- Game items are worth more than what they cost
- A game item is a good product given the price
- The prices of game items are reasonable
- I have enough money to spend regularly, and enjoy investing in online items

Community Involvement, Adapted from Ghazali et al., 2019, (1 = Strongly Disagree; 7 = Strongly Agree)

- I am interested in participating in the online community of XYZ
- It is pleasurable and enjoyable for me to participate in the online community of XYZ
- It is important for me to participate in the online community of XYZ

Network Externality, Adapted from Ghazali et al., 2019; Wei & Lu, 2014 (1 = Strongly Disagree; 7 = Strongly Agree)

- There are a good number of people playing XYZ. (1)
- There will be many more people playing XYZ in the future. (1)
- Many people are playing XYZ. (1)
- Many friends around me play XYZ. (2)
- Most of my friends play XYZ. (2)
- Many of my friends will play XYZ in the future. (2)

Addiction, Short Video Game Addiction Scale from Lemmens, Valkenburg, & Peter, 2009 and adapted from Balakrishnan & Griffiths, 2018 for online mobile video games, (1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very Often)

- **Salience**
  - Do you think about playing online mobile games all day long?
- **Tolerance**
  - Do you spend increasing amounts of time playing online mobile games?
- **Mood Modification**
  - Do you play online mobile games to forget about real life?
- **Relapse**
  - Do others unsuccessfully try to reduce the time you spend playing online mobile games?
- **Withdrawal**
  - Do you feel bad when you are unable to play online mobile games?
- **Conflict**
  - Do you have fights with others (e.g., family, friends) over the time you spend playing online mobile games?
- **Problems**
  - Do you neglect other important activities (e.g., school, work, sports) to play online mobile games?

Appendix D Skewness and Kurtosis of Each Item

Construct		Items			Skewness		Kurtosis	
			Mean	SD	Value	Std. Error of Skewness	Value	Std. Error of Kurtosis
GUESS	Usability	U1	6.16	1.022	-1.435	.145	2.049	.289
		U2	6.15	1.022	-1.835	.145	4.919	.289
		U3	5.69	1.189	-1.304	.145	2.219	.289
		U4	6.11	0.998	-1.487	.145	2.916	.289
		U5	5.86	1.46	-1.626	.145	2.353	.289
		U6	5.94	1.104	-1.535	.145	2.943	.289
		U7	5.44	1.271	-.930	.145	.863	.289
		U8	5.62	1.298	-1.283	.145	1.846	.289
		U9	5.72	1.245	-1.290	.145	1.951	.289
		U10	5.48	1.198	-1.078	.145	1.744	.289
		U11	5.86	1.147	-1.374	.145	2.151	.289
	Narratives	N1	4.41	1.636	-.327	.145	-.495	.289
		N2	4.78	1.543	-.615	.145	-.118	.289
		N3	4.97	1.454	-.690	.145	.258	.289
		N4	4.01	1.619	-.164	.145	-.581	.289
		N5	3.26	1.808	.371	.145	-.980	.289
		N6	5.55	1.361	-1.028	.145	.881	.289
		N7	5.35	1.369	-1.136	.145	1.516	.289
	Play Engrossment	PE1	3.82	1.763	-.027	.145	-1.171	.289
		PE2	4.73	1.663	-.628	.145	-.422	.289
		PE3	4.11	1.612	-.143	.145	-.746	.289
		PE4	4.09	1.759	-.151	.145	-1.007	.289
		PE5	5.11	1.289	-.979	.145	1.017	.289
		PE6	3.75	1.835	.149	.145	-1.148	.289
		PE7	4.98	1.66	-.902	.145	-.031	.289
		PE8	4.88	1.556	-.873	.145	.277	.289
	Enjoyment	EN1	6.3	0.85	-1.707	.145	4.479	.289
		EN2	5.62	1.405	-1.221	.145	.950	.289
		EN3	6.22	0.912	-1.324	.145	1.781	.289
		EN4	5.69	1.239	-1.096	.145	1.237	.289
		EN5	6.27	0.858	-2.074	.145	7.815	.289
	Creative Freedom	CF1	4.76	1.606	-.642	.145	-.224	.289
		CF2	4.61	1.751	-.498	.145	-.774	.289
		CF3	4.9	1.653	-.706	.145	-.333	.289
		CF4	4.37	1.609	-.448	.145	-.512	.289
		CF5	5.01	1.405	-.791	.145	.406	.289
		CF6	5.23	1.527	-.940	.145	.404	.289
		CF7	5.29	1.38	-1.004	.145	.937	.289
	Audio Aesthetics	AA1	4.88	1.706	-.734	.145	-.305	.289
		AA2	5.44	1.339	-1.079	.145	1.499	.289
		AA3	4.67	1.791	-.534	.145	-.697	.289
		AA4	4.64	1.737	-.543	.145	-.509	.289
	Personal Gratification	PG1	4.05	1.746	-.068	.145	-.999	.289

		PG2	5.86	1.037	-1.187	.145	2.225	.289
		PG3	5.54	1.332	-1.162	.145	1.375	.289
		PG4	5.51	1.364	-1.188	.145	1.444	.289
		PG5	5.69	1.124	-.926	.145	1.057	.289
		PG6	5.88	1.156	-1.405	.145	2.691	.289
	Social Connectivity	SC1	4.04	2.035	-.114	.145	-1.288	.289
		SC2	4.44	2.135	-.387	.145	-1.270	.289
		SC3	4.4	1.953	-.360	.145	-1.080	.289
		SC4	4.34	1.744	-.385	.145	-.760	.289
	Visual Aesthetics	V1	5.89	1.038	-.892	.145	.927	.289
		V2	5.98	0.991	-1.132	.145	1.666	.289
		V3	6.06	0.938	-1.523	.145	4.351	.289
Attitudes		AVG1	4	1.776	-.247	.145	-1.013	.289
		AVG2	3.79	1.823	-.121	.145	-1.106	.289
		AVG3	4.59	1.749	-.600	.145	-.637	.289
		AVG4	4.22	1.632	-.368	.145	-.609	.289
Monetary Value		MV1	3.23	1.603	.400	.145	-.576	.289
		MV2	4.13	1.682	-.342	.145	-.789	.289
		MV3	4.2	1.687	-.408	.145	-.763	.289
		MV4	3.88	1.738	-.149	.145	-1.049	.289
Community Involvement		CE1	4.12	1.947	-.257	.145	-1.219	.289
		CE2	4.34	1.823	-.473	.145	-.851	.289
		CE3	3.51	1.861	.174	.145	-1.245	.289
Network Externality		NE1	5.77	1.142	-1.250	.145	1.999	.289
		NE2	4.85	1.391	-.401	.145	-.397	.289
		NE3	5.64	1.211	-1.178	.145	1.753	.289
		NE4	3.95	1.824	-.030	.145	-1.159	.289
		NE5	3.44	1.827	.377	.145	-.979	.289
		NE6	4.04	1.782	-.098	.145	-1.053	.289
Addiction	Salience	AD1	1.83	0.973	.919	.145	.036	.289
	Tolerance	AD2	2.43	1.068	.224	.145	-.660	.289
	Mood Modification	AD3	2.64	1.213	.192	.145	-.830	.289
	Relapse	AD4	1.65	0.95	1.376	.145	1.117	.289
	Withdrawal	AD5	2.01	1.05	.719	.145	-.277	.289
	Conflict	AD6	1.42	0.844	2.153	.145	4.024	.289
	Problems	AD7	1.88	0.96	.824	.145	.053	.289
Continuance Intention		CI1	6.03	0.98	-1.727	.145	4.810	.289
		CI2	5.69	1.112	-1.061	.145	1.488	.289
		CI3	4.57	1.591	-.413	.145	-.532	.289
		CI4	5.34	1.4	-1.067	.145	1.026	.289
Purchase Intention		PI1	3.73	2.057	-.041	.145	-1.417	.289
		PI2	3.87	2.095	-.142	.145	-1.438	.289
		PI3	4.14	2.026	-.326	.145	-1.253	.289
		PI4	3.73	2.093	-.028	.145	-1.431	.289
		PI5	4	2.061	-.257	.145	-1.373	.289

Appendix E Diary Study Screener

Screener Questions

- Age
  - Write in
- Gender
  - Male, Female, Non-binary, Prefer to self-identify, Prefer not to say
- Ethnicity
  - American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Middle Eastern or North African, Native Hawaiian/Pacific Islander, White, Prefer to self-identify, Prefer not to say
- Are you currently an Embry-Riddle Aeronautical University student?
  - Yes, No
- Please indicate your current annual income (USD):
  - Less than 19,999, 20,000-39,999, 40,000-59,000, 60,000-79,999, 80,000-119,999, 120,000 and up
- What is your smartphone operating system (OS)?
  - iOS (Apple)
  - Android
  - Other
  - I don't know
- What is your current smartphone?
  - Write in
- Do you play video games on at least one of the following devices: cellphone/smartphone, tablet, console, desktop, laptop, or handheld device?
  - Yes, No
- On average, how many hours do you spend playing video games on the following devices?
  - Rating scale from Never to Extremely Often
  - Mobile device, Computer device, Console device, Handheld device, Other
- On average, how many hours do you spend playing XYZ per week?
- How familiar are you with the following mobile games?
  - Rating scale from Not at all familiar to Extremely familiar
  - Candy Crush Saga, Toy Blast, Marvel Future Fight, Marvel Strike Force, Marvel Contest of Champions, Mario Kart Tour, Clash Royale, Raid Shadow Legends, AFK Arena, Mobile Legends: Adventure, Brawl Stars
- Have you every made an in-game purchase before?
  - Yes, No, Not sure
- I have positive feelings towards buying in-game content.
  - Rating scale from Strongly disagree to Strongly Agree
- The thought of buying virtual goods is appealing to me.
  - Rating scale from Strongly disagree to Strongly Agree

- If you qualify for this study, you will be contacted by a researcher. Please provide some contact info below for them to reach out to you.
- Preferred method of contact
    - Email, Phone Call, Text Message
- Email address
- Phone number

Appendix F Results of the Validity Adjusted Model

Figure 15

Results of the Validity Adjusted Model

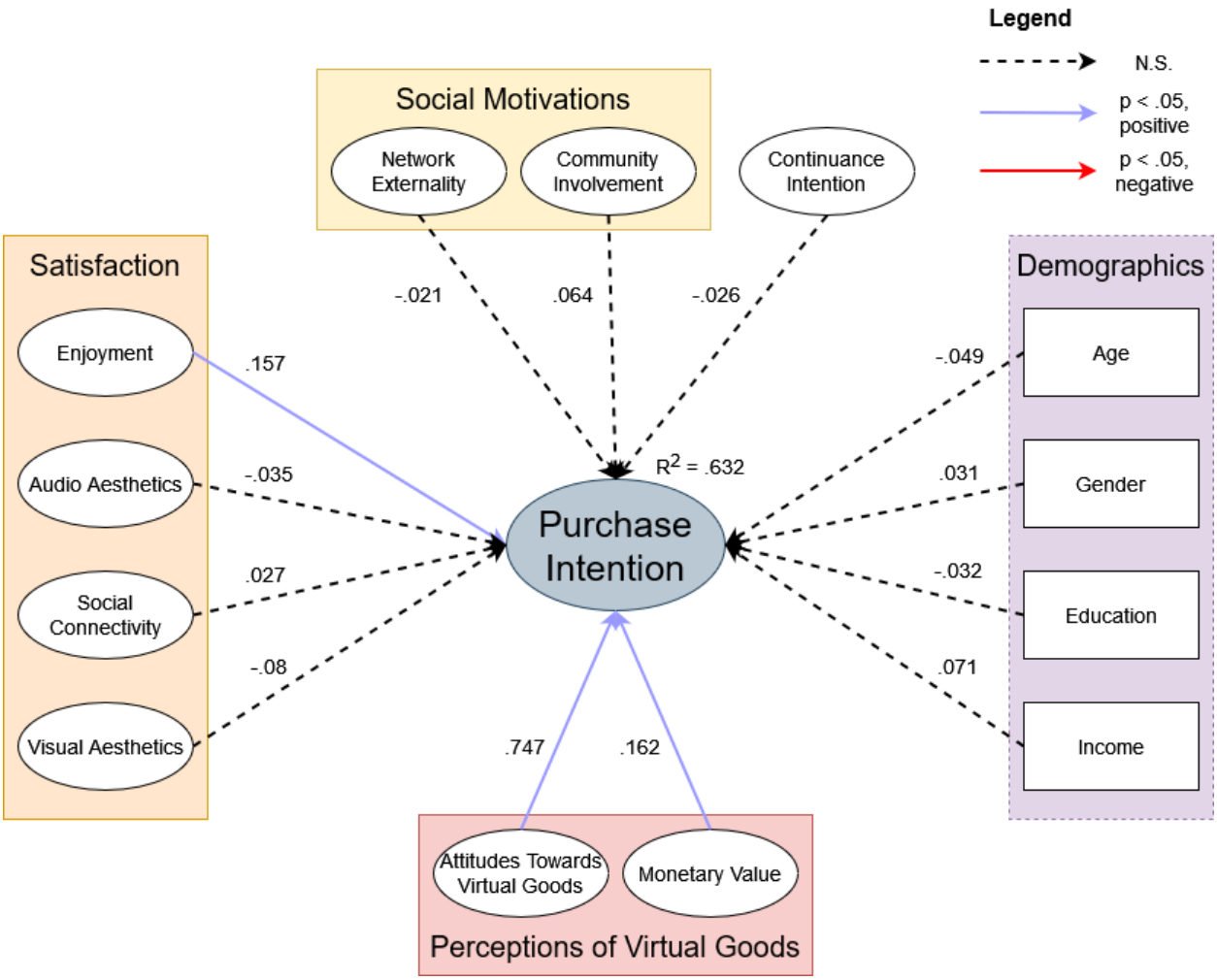


Table 25

Fit Indices of Validity Adjusted Model

χ2 Test	NFI	TLI	CFI	RMSEA	SRMR	Hoelter's .01	AIC
2321.133, *df* = 807	.764	.820	.831	.082	.2024	110*	2513.133

* Indicates the value of the model is in the acceptable range of fit indices

Table 26

Validity of the Validity Adjusted Model

	CR	AVE	MSV	MaxR(H)	1	2	3	4	5	6	7	8	9	10
Continuance (1)	0.799	0.667	0.339	0.828	**0.817**									
Enjoyment (2)	0.805	0.519	0.446	0.856	0.582	**0.720**								
Attitudes (3)	0.909	0.714	0.674	0.920	0.358	0.180	**0.845**							
Social Connect (4)	0.856	0.599	0.533	0.862	0.323	0.116	0.406	**0.774**						
Visual Aesthetics (5)	0.830	0.621	0.446	0.835	0.357	0.668	0.192	-0.039	**0.788**					
Audio Aesthetics (6)	0.896	0.686	0.173	0.917	0.362	0.243	0.317	0.270	0.416	**0.829**				
Monetary Value (7)	0.807	0.591	0.487	0.871	0.318	0.061	0.698	0.259	0.112	0.250	**0.769**			
Community (8)	0.925	0.804	0.533	0.944	0.324	0.094	0.474	0.730	0.069	0.302	0.286	**0.897**		
Network (9)	0.844	0.501	0.234	0.929	0.484	0.131	0.427	0.328	0.094	0.255	0.351	0.331	**0.708**	
Purchase Intent (10)	0.977	0.895	0.674	0.982	0.296	0.211	0.821	0.352	0.125	0.218	0.586	0.396	0.315	**0.946**

Note: Numbers on the diagonal represent the squared correlation of that factor with its manifest variables

Appendix G Diary Study Starting (Day 1) Log

- Please input your initials followed by your age. For example, if your name is John Smith and you are 23 years old, then you would put: JS23.
    - Write in
- Please provide the name of the game below that you choose to play:
    - Write in
- What day of the week is it?
    - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- The next question is about your playtime with the game you are playing. To check how much you played, refer to Screen Time on Apple devices (https://support.apple.com/en-us/HT208982) or Android Digital Wellbeing on Android devices (https://support.google.com/android/answer/9346420?hl=en).
- How much time did you play the game today?
    - Write in
- Please attach a screenshot that shows your playtime of the game with Screen Time on Apple devices or Android Digital Wellbeing on Android devices:
- Based on your experience with the game, please rate the following statements on a scale from "Strongly Disagree" to "Strongly Agree". Select "N/A" if a statement does not apply to the game that you are rating.
- Short GUESS Questions (Keebler et al., 2020) (Day 1, Day 14)
    - I find the controls of the game to be straightforward.
    - I find the game's interface to be easy to navigate.
    - I am captivated by the game's story from the beginning.
    - I enjoy the fantasy or story provided by the game.
    - I feel detached from the outside world while playing the game.
    - I do not care to check events that are happening in the real world during the game.
    - I think the game is fun.
    - I feel bored while playing the game.
    - I feel the game allows me to be imaginative.
    - I feel creative while playing the game.
    - I enjoy the sound effects in the game.
    - I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.
    - I am very focused on my own performance while playing the game.
    - I want to do as well as possible during the game.
    - I find the game supports social interaction (e.g., chat) between players.
    - I like to play this game with other players.
    - I enjoy the game's graphics.
    - I think the game is visually appealing.
- Describe your experience with the game today. What levels/activities did you do? What did you complete? (Please be as specific as possible)

    - Write in
- How many times did you encounter purchasing propositions (the game asking you to purchase something) while playing today, if any?
    - Write in
- Did you purchase anything in the game today? (This includes using a premium currency to buy something in-game)
    - Yes, No
- What exactly did you purchase? If you purchased in-game currency, what did you buy with it?
    - Write in
- Why did you make the purchase?
    - Write in
- How did you feel after the purchase? Did it meet your expectations?
    - Write in
- Would you make the purchase again if you could?
    - Yes, No
- How likely are you to purchase in the game in the future?
    - Rating scale from Not at all likely to Extremely likely
- I intend to buy in-game content in the future.
    - Rating scale from Strongly Disagree to Strongly Agree

Appendix H Diary Study Logs

- Please input your initials followed by your age. For example, if your name is John Smith and you are 23 years old, then you would put: JS23.
    - Write in
- Please provide the name of the game below that you choose to play:
    - Write in
- What day of the week is it?
    - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- The next question is about your playtime with the game you are playing. To check how much you played, refer to Screen Time on Apple devices (https://support.apple.com/en-us/HT208982) or Android Digital Wellbeing on Android devices (https://support.google.com/android/answer/9346420?hl=en).
- How much time did you play the game today?
    - Write in
- Please attach a screenshot that shows your playtime of the game with Screen Time on Apple devices or Android Digital Wellbeing on Android devices:
- Describe your experience with the game today. What levels/activities did you do? What did you complete? (Please be as specific as possible)
    - Write in
- How satisfied are you with the game today?
    - Rating scale from Extremely dissatisfied to Extremely satisfied
- Why did you give the game that rating today?
    - Write in
- How many times did you encounter purchasing propositions (the game asking you to purchase something) while playing today, if any?
    - Write in
- The number of purchasing propositions during my play time was:
    - Rating scale from Too little to Too many
- Did you purchase anything in the game today? (This includes using a premium currency to buy something in-game)
    - Yes, No
- What exactly did you purchase? If you purchased in-game currency, what did you buy with it?
    - Write in
- Why did you make the purchase?
    - Write in
- How did you feel after the purchase? Did it meet your expectations?
    - Write in

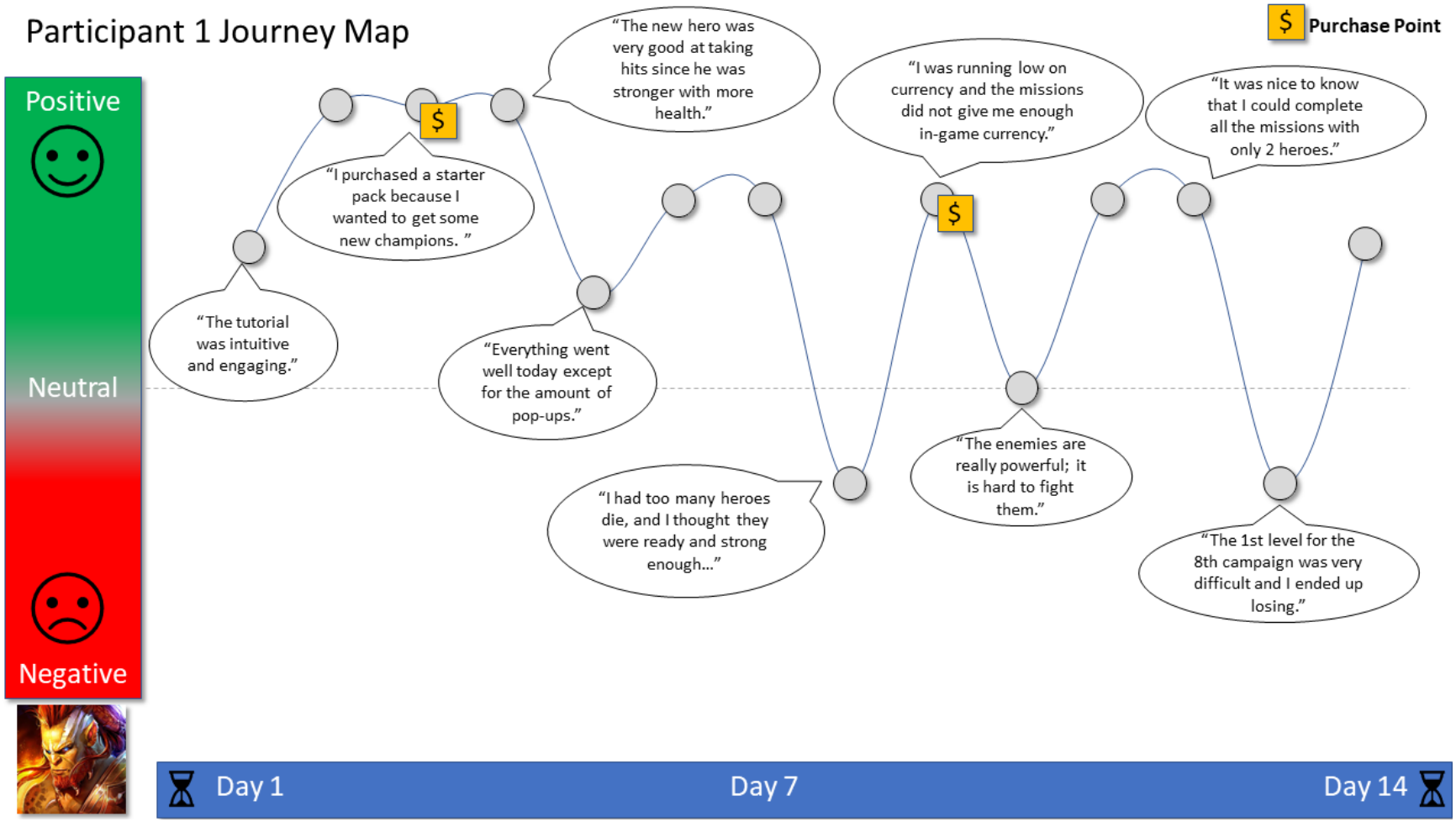
- Would you make the purchase again if you could?
    - Yes, No
- How likely are you to purchase in the game in the future?
    - Rating scale from Not at all likely to Extremely likely
- I intend to buy in-game content in the future.
    - Rating scale from Strongly Disagree to Strongly Agree

Appendix I Diary Study Ending (Day 14) Log

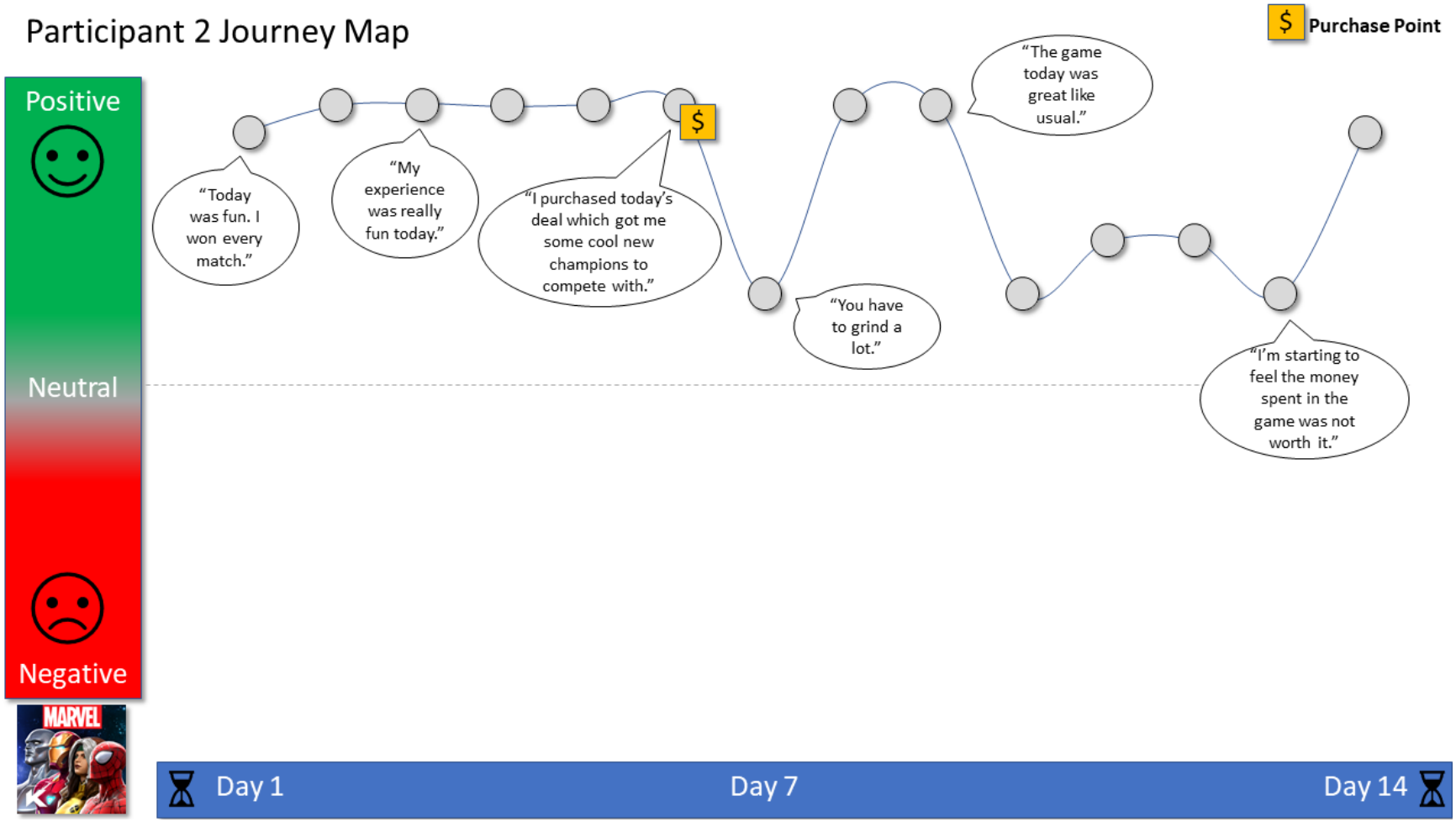
- Please input your initials followed by your age. For example, if your name is John Smith and you are 23 years old, then you would put: JS23.
    - Write in
- Please provide the name of the game below that you choose to play:
    - Write in
- What day of the week is it?
    - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- The next question is about your playtime with the game you are playing. To check how much you played, refer to Screen Time on Apple devices (https://support.apple.com/en-us/HT208982) or Android Digital Wellbeing on Android devices (https://support.google.com/android/answer/9346420?hl=en).
- How much time did you play the game today?
    - Write in
- Please attach a screenshot that shows your playtime of the game with Screen Time on Apple devices or Android Digital Wellbeing on Android devices:
- Based on your experience with the game, please rate the following statements on a scale from "Strongly Disagree" to "Strongly Agree". Select "N/A" if a statement does not apply to the game that you are rating.
- Short GUESS Questions (Keebler et al., 2020) (Day 1, Day 14)
    - I find the controls of the game to be straightforward.
    - I find the game's interface to be easy to navigate.
    - I am captivated by the game's story from the beginning.
    - I enjoy the fantasy or story provided by the game.
    - I feel detached from the outside world while playing the game.
    - I do not care to check events that are happening in the real world during the game.
    - I think the game is fun.
    - I feel bored while playing the game.
    - I feel the game allows me to be imaginative.
    - I feel creative while playing the game.
    - I enjoy the sound effects in the game.
    - I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.
    - I am very focused on my own performance while playing the game.
    - I want to do as well as possible during the game.
    - I find the game supports social interaction (e.g., chat) between players.
    - I like to play this game with other players.
    - I enjoy the game's graphics.
    - I think the game is visually appealing.
- Describe your experience with the game today. What levels/activities did you do? What did you complete? (Please be as specific as possible)

    - Write in
- Overall, how was your experience with the game over the past 14 days? Walk through your experience from the beginning of the study to the end.
    - Write in
- Did you purchase anything in the game today? (This includes using a premium currency to buy something in-game)
    - Yes, No
- What exactly did you purchase? If you purchased in-game currency, what did you buy with it?
    - Write in
- Why did you make the purchase?
    - Write in
- How did you feel after the purchase? Did it meet your expectations?
    - Write in
- Would you make the purchase again if you could?
    - Yes, No
- How likely are you to purchase in the game in the future?
    - Rating scale from Not at all likely to Extremely likely
- I intend to buy in-game content in the future.
    - Rating scale from Strongly Disagree to Strongly Agree
- Overall, how much did you spend towards purchasing while playing the game?
    - Write in
- If you were not given money to spend in game, how likely would you have made a purchase?
    - Rating scale from Not at all likely to Extremely likely
- How likely is it that you would recommend the game to a friend or colleague?
    - Rating scale from Not at all likely to Extremely likely

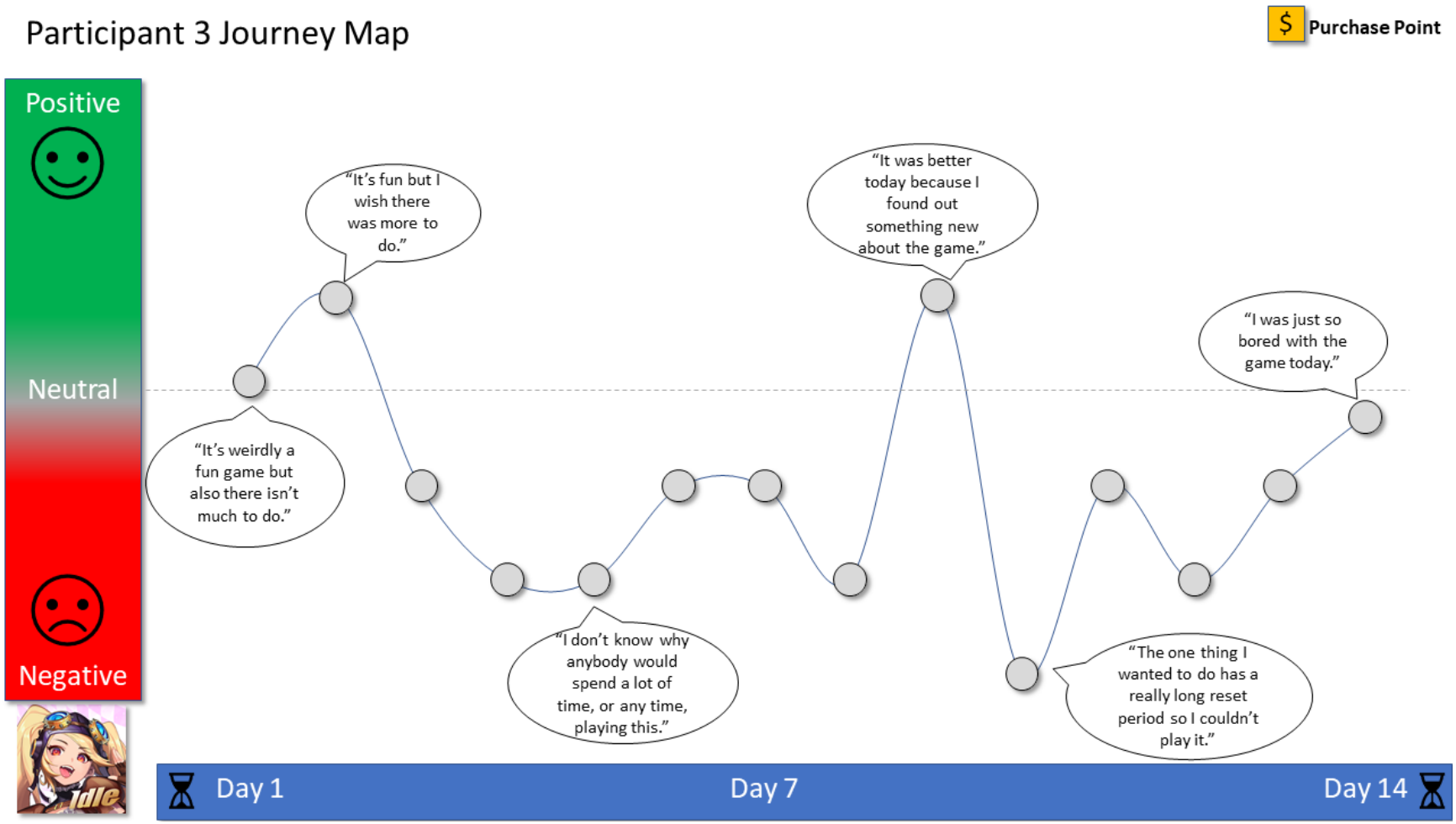
Appendix J P1 Journey Map



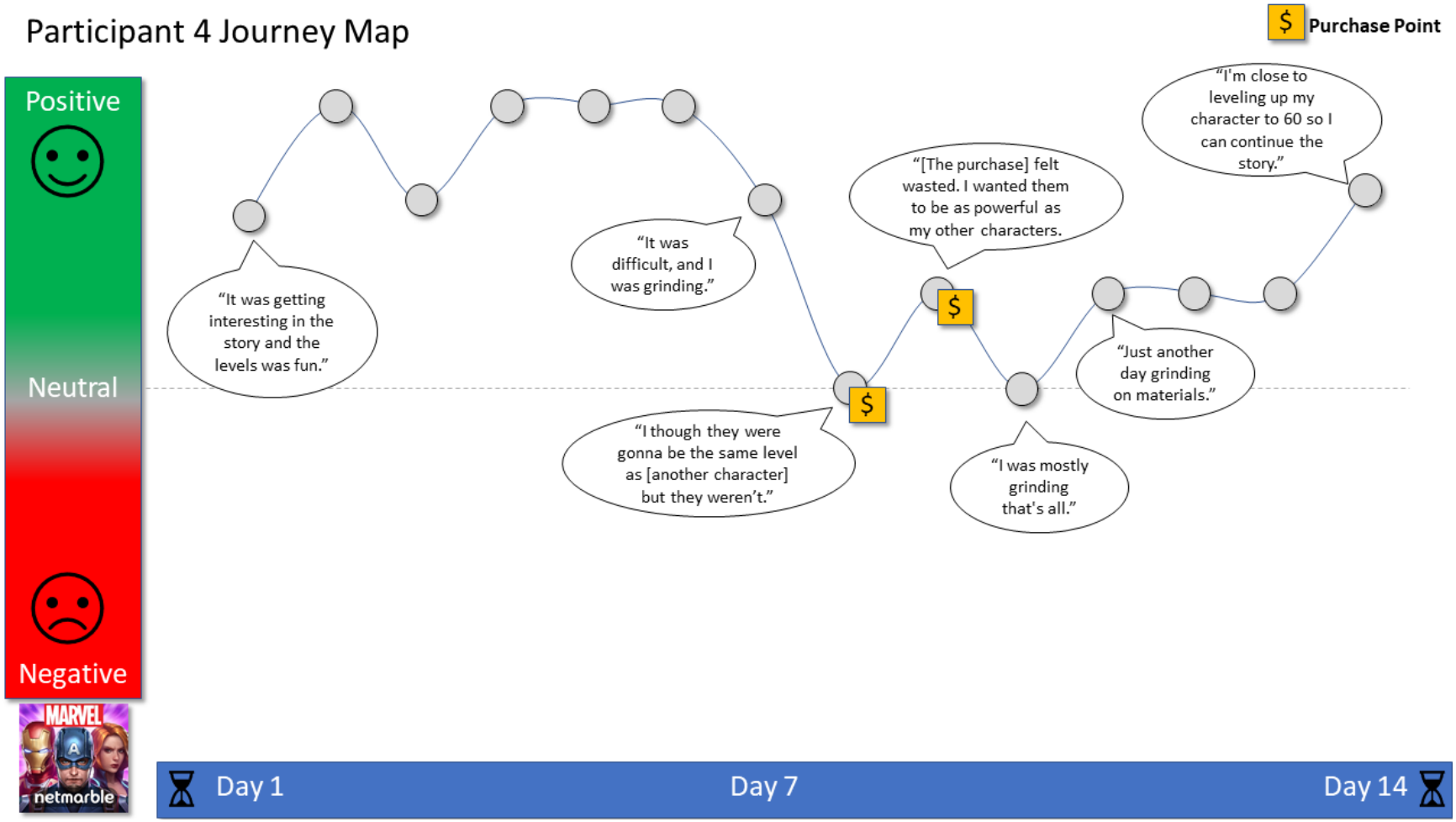
Appendix K P2 Journey Map



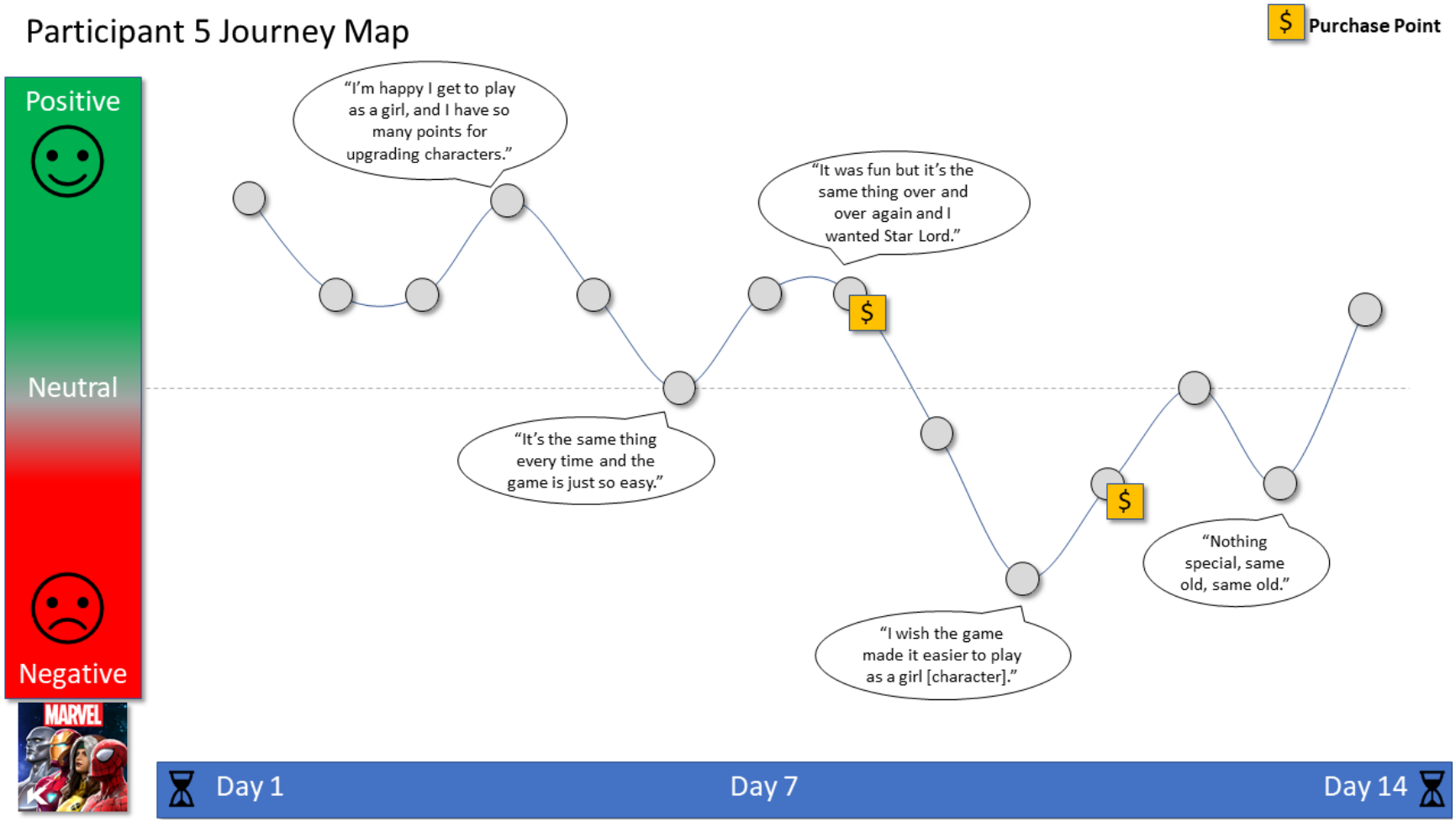
Appendix L P3 Journey Map



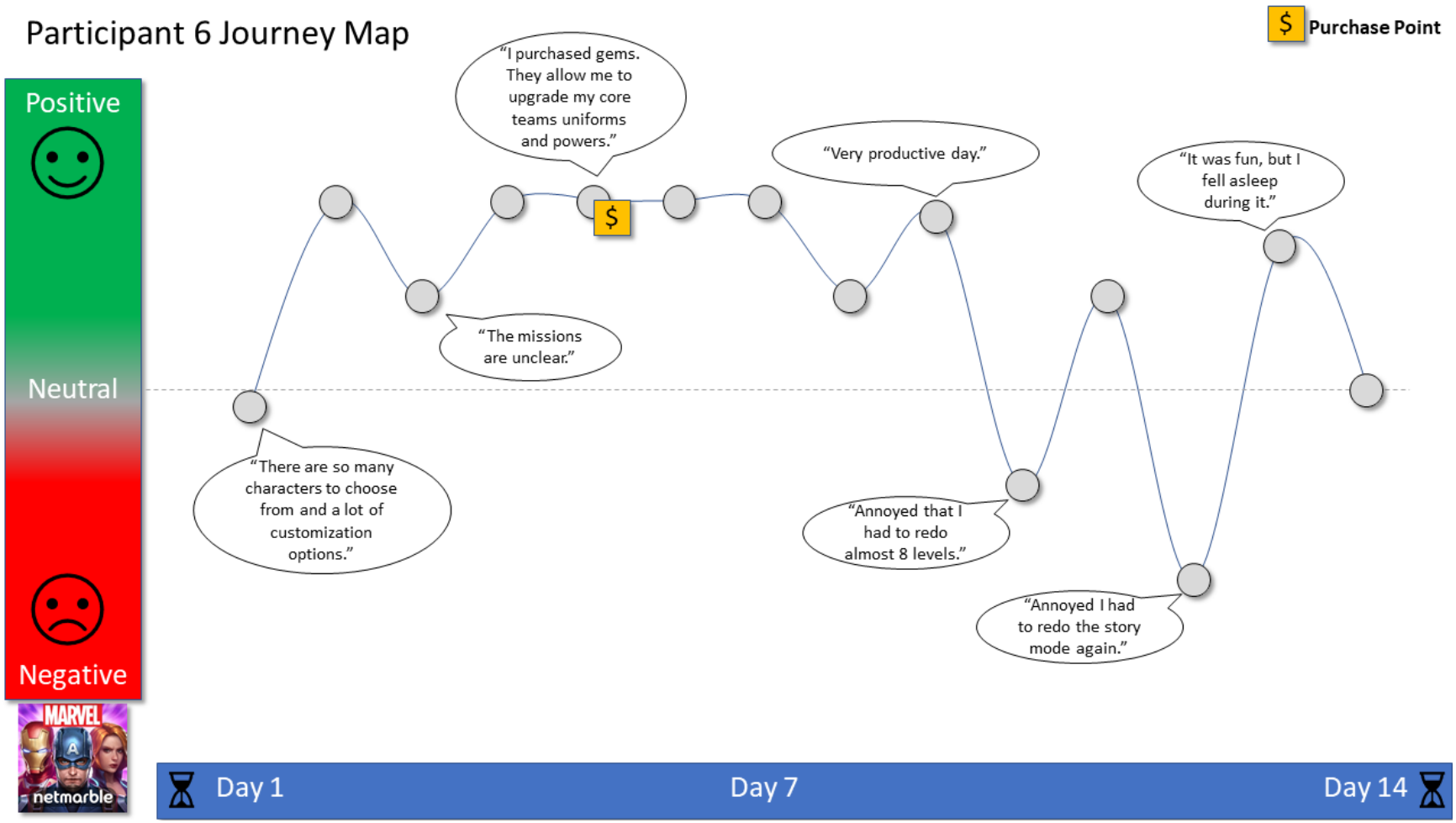
Appendix M P4 Journey Map



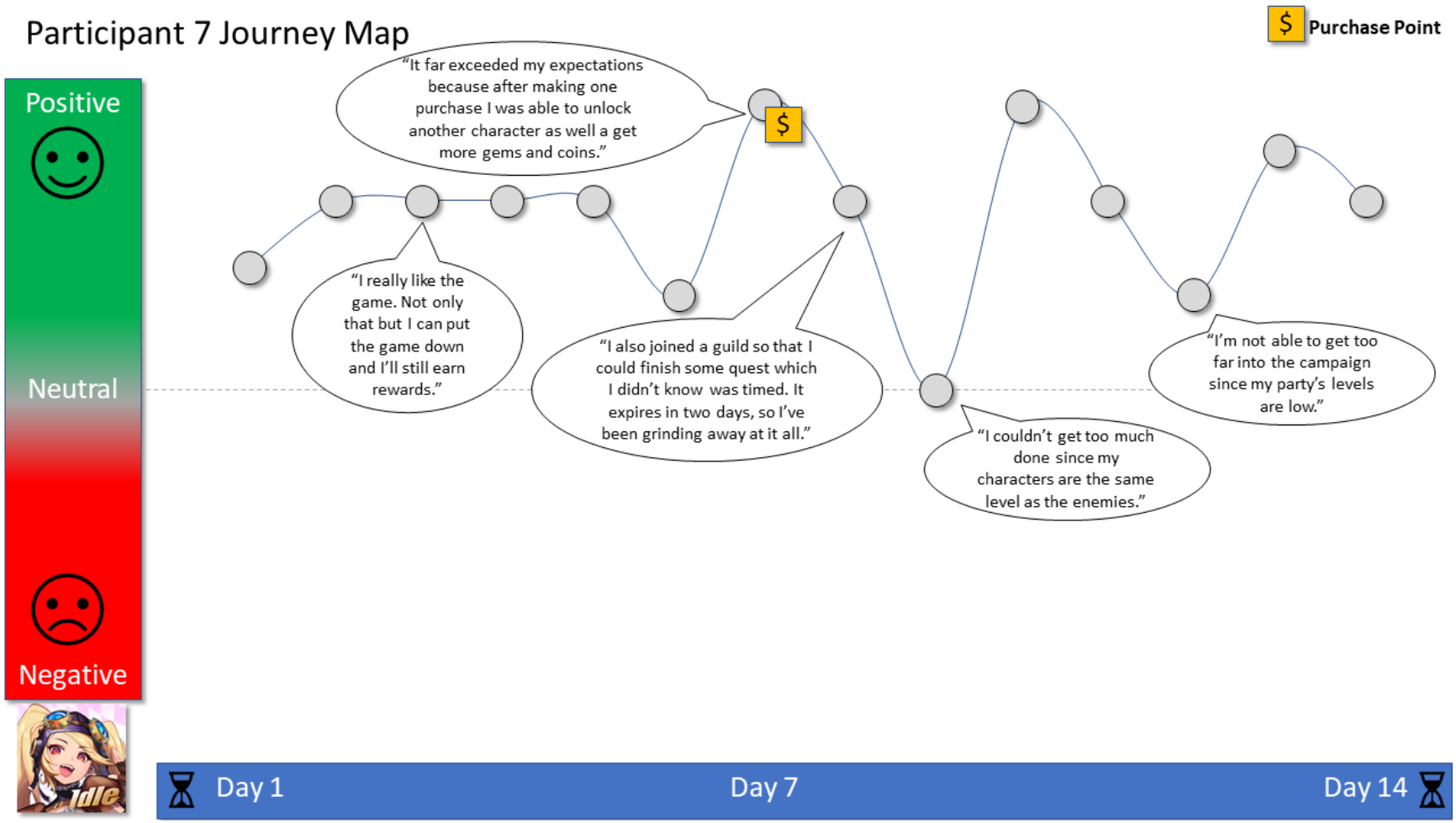
Appendix N P5 Journey Map



Appendix O P6 Journey Map



Appendix P P7 Journey Map



Appendix Q P8 Journey Map