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How to Achieve Goals in Digital Games: An Empirical Test of a Goal-Oriented Model in Pokémon GO

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Abstract

To effectively design digital games and gamified systems, it is important to properly understand the psychological and behavioral processes that players use to reach goals. Although numerous prior studies have examined individuals' adoption, use, and continued use of digital games, few attempts have been made to understand how people desire and strive to achieve goals. The objective of this study is to develop and test a model of individuals' achievement of goals in digital gaming. Drawing upon theories of goal-directed behavior, we propose a conceptual model describing goal setting, goal striving, goal attainment, and feedback evaluations in the context of mobile gaming. To empirically test the proposed model, we collected two sets of (cross-sectional and longitudinal) data from 407 users of Pokémon GO. The results generally indicate that goal-directed effort plays an important role in translating goal desire into goal attainment. In addition, we found prior game points and goal desire have interaction effects on goal-directed effort and the subsequent acquisition of game points. Finally, this study shows that action strategies such as in-game payment and deliberate planning have differential effects on goal-directed effort and satisfying experiences. Overall, our findings provide empirical support for the efficacy of our goal-oriented model as a theoretical tool for explaining the process of goal striving to obtain game points. Our findings not only have important implications for digital gaming but also contribute to emerging research on gamified systems.

Keywords: Goal-Directed Behavior, Goal Setting, Goal Striving, Goal Attainment, Action Strategy, Game Points, Digital Game, Pokémon GO

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1 Introduction

Digital games are gaming software that may run on a variety of devices. They include console/video games (e.g., Super Mario Bros), mobile games (e.g., Pokémon GO), social games (e.g., Haboo), and massively multiplayer online games (MMORPG) (e.g., World of Warcraft) (Guo et al., 2019). In 2020, there were approximately 2.7 billion global users of digital games, which generated over $159 billion in revenue (FinancesOnline, 2021). Moreover, digital games are not just for children; 64% of American adults play them (Entertainment Software Association, 2020). Inspired by the popularity of digital games, organizations have used game elements and mechanisms in various nongame contexts such as services, marketing, innovation, training, and education (Huotari & Hamari, 2012; Santhanam et al., 2016). This trend is known as gamification (Deterding et al., 2011). In recent years, gamification has received increasing attention from researchers and practitioners because it can effectively engage users and increase productivity (Hamari, 2013; Kwak et al., 2019; Suh et al., 2017).

Despite the abundant literature on game-based research (i.e., digital games and gamification), there has been little research on gaming behavior from the goal perspective. A goal refers to a certain end state that a person desires or expects to attain (Bagozzi & Dholakia, 1999).[1] The goal perspective helps explain how goals are established, pursued, and fulfilled as well as how actors evaluate the outcomes of their actions (Bagozzi, 2007; Sheldon & Elliot, 1999). We argue that the goal perspective as a theoretical lens can provide several opportunities to improve our knowledge of information systems (IS) research related to digital games and goals. The importance of the goal perspective in IS research is discussed in detail below.

First, many researchers have examined individuals' adoption, use, and continued use of digital games (e.g., Ha et al., 2007; Hou et al., 2011; Hsu & Lu, 2004; Merikivi et al., 2017; Wu & Liu, 2007). Their studies are rooted in traditional frameworks such as the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), the theory of planned behavior (TPB) (Ajzen, 1991), and the technology acceptance model (TAM) (Davis et al., 1989). These traditional theories generally highlight a variety of factors that motivate people to play a game, including attitudes, subjective norms, perceived usefulness, perceived enjoyment, and perceived behavioral control (Chang et al., 2014; Hsu & Lu, 2004; Liu & Li, 2017). Although these frameworks help explain what drives the adoption or use of a game, they are limited in explaining how people attempt to achieve goals designed and implemented in games. The traditional theories work reasonably well when the focus of research is on the adoption or use of a specific game or a gamified system (Ha et al., 2007; Liu & Li, 2011; Merikivi et al., 2017). However, they lack consideration of the various psychological and instrumental processes—such as planning, maintaining effort, and monitoring progress—that are necessary for achieving goals in games (Bagozzi, 2007). To address the limitations of these traditional theories, theories of goal-directed behavior have been used to identify and understand the processes through which people develop and strive to achieve goals (Bargh, 1990; Gollwitzer, 1996; Sheldon & Elliot, 1999). This new framework particularly intends to explain users' decisions and behavior related to goal setting, goal striving, goal attainment, and feedback reactions (Bagozzi & Dholakia, 1999; Loock et al., 2013; Sheldon & Elliot, 1999).

Second, prior game-based research has identified various game elements that increase users' engagement and activities. Among these game elements are points, levels, badges, leaderboards, teams, competition, rewards, and status (Hamari, 2013; Kuem et al., 2016; Kwak et al., 2013; Liu et al., 2013; Santhanam et al., 2016; Suh & Wagner, 2017). Prior research has noted that effectively conveying affordances (or action possibilities) enabled by game elements is critical to designing IS that motivate users (Suh et al., 2017; van Vugt et al., 2006). For example, Suh et al. (2017) found that status and competition affordances can increase users' flow and aesthetic experiences, which in turn, influence continued intention to use a gamified system. This stream of research has helped develop the understanding of how specific types of game elements engage users, but has been limited in explaining how game elements are viewed as selectable goals (e.g., my goal is to level up) and how users devise psychological and instrumental efforts to attain selected goals (e.g., I collaborate with my guild members to level up). Simply including game elements without an understanding of the motivations for attaining goals in a game is a major reason that many games and gamified systems have failed to fulfill their potential (Gartner, 2012). Therefore, to effectively design and implement various game elements and further engage users in games and gamified systems, it is critical to understand what drives the pursuit of game elements as goals and how people strive to earn them (e.g., game strategies, amount of effort).

Third, in the IS domain, goal-oriented perspectives have been applied to various contexts such as software project management (Abdel-Hamid et al., 1999), group collaboration (Jung et al., 2010), energy-efficient behavior (Loock et al., 2013), contribution behavior in virtual communities (Tsai & Bagozzi, 2014), online question-and-answer community participation (Khansa et al., 2015), and online knowledge exchange (Goes et al., 2016). Although prior research has highlighted the importance of goals in many IS domains, it has mainly focused on the role of goal setting in influencing behavioral performance. For example, Jung et al. (2010) found that goal setting and performance feedback increased the quantity and quality of idea generation. Also, Loock et al. (2013) showed that goal-setting functionality with default goals implemented in a Green IS can increase energy saving. To the best of our knowledge, however, little IS research has explained how people navigate through obstacles to achieve goals when using an information

[1] It is important to note that while people often play games for the experience, goal is fundamentally different from experience. For example, Ermi and Mäyrä (2005) defined gameplay experience as a collection of the player's sensations, thoughts, feelings, actions, and meaning-making in the game and argued that it is not a "direct cause of certain elements of a game but something that emerges in a unique interaction process between the game and the player" (p. 91). On the contrary, goals can be direct triggers of players' actions.

system. To achieve various goals implemented in a game, game players often need to carefully devise strategies and persist in implementing them. Although prior goal-based IS research has focused on goal setting (Abdel-Hamid et al., 1999; Jung et al., 2010; Loock et al., 2013), it has largely overlooked users' striving for goal attainment. Thus, a better understanding of goal striving would provide valuable insights into how users achieve goals and, eventually, into how to effectively design gamified systems.

Several goal-related conceptual frameworks have been developed to understand individuals' goal setting, pursuit, achievement, and evaluation (Bagozzi et al., 2003; Bagozzi, 2007; Sheldon & Elliot, 1999). This stream of research views a related series of actions directed toward a desired wish as a goal-directed behavior. Its theories have been successfully applied to a variety of research areas, including psychology (Sheldon & Elliot, 1999), management (Fishbach & Choi, 2012), marketing (Bagozzi & Dholakia, 1999), and IS (Loock et al., 2013). We regard playing a game with the aim of achieving various game elements as a goal-directed behavior because it involves goal setting, goal striving, goal attainment, and feedback reaction. This new perspective of goal-directed behavior is expected to shed valuable light on the entire process in which people want and strive to be high achievers in their games.

The objective of this study is to develop and test a model of individuals' attainment of goals in digital games. We treated game points (GP) as a proxy of goal attainment in the context of digital games. In the games, certain points are assigned to different in-game activities (e.g., beating bosses, clearing missions, collecting items), and thus players' achievements in different in-game activities are translated into points. Game developers have used GP in various forms such as experience points (e.g., XP in Pokémon GO), virtual currency (e.g., Gold in World of Warcraft), skill points (e.g., Diablo), and stars (e.g., Angry Birds) (Marczewski, 2015). Game points are an abstract indicator to track behavior, keep score, and provide feedback in gameplay (Marczewski, 2015; Werbach & Hunter, 2012). Universally implemented in digital games, they are one of the most important driving forces for players. In many digital games, regardless of whether a player aims at obtaining GP, most gaming activities increase GP. Examples of such point-oriented digital games are The New Zealand Story in video games, StarCraft II Co-Op Mission in online games, and Pokémon GO in mobile games.

To develop a conceptual framework, we specifically drew on theories of goal-directed behavior that shed light on the goal setting and striving required to fulfill an individual's needs and wants (Bagozzi & Dholakia, 1999; Sheldon & Elliot, 1999). The model proposed in this study provides a theoretical account of the underlying mechanisms that enable game players to formulate and execute strategies to overcome the obstacles presented within digital games. In general, our model posits that goal desire leads to goal-directed effort, which, in turn, affects the total GP earned over a certain period of time. We also propose the existence of interaction effects between goal desire and prior GP on goal-directed effort and subsequent GP. A unique characteristic of our model is its inclusion of two action strategies, in-game payment and deliberate planning. Both are expected to affect goal-directed effort and need satisfaction. Finally, our model suggests that need satisfaction is a function of both earned points and action strategies.

We chose mobile gaming as the context of our study from the possible choices presented by numerous digital games and gamified systems. Mobile games are digital gaming applications played on mobile devices, such as smartphones, tablets, and handheld gaming consoles (Ha et al., 2007; Merikivi et al., 2017). These games have become increasingly popular because of the proliferation of mobile devices (Graham, 2017). In 2020, the revenue from mobile games in the US reached $10.73 billion (Statista, 2021). We collected data from users of Pokémon GO, one of the most popular mobile games. As of January 2021, it ranked among the top 10 mobile apps in terms of total revenue (Chapple, 2021). This mobile app offers an ideal setting for evaluating our model. Specifically, within Pokémon GO, a variety of gaming activities are translated into GP, and thus these points are considered a critical part of the experience (Reynolds, 2016). Moreover, Pokémon GO provides people with various types of challenges that require deliberation, planning, and strategizing (e.g., Adams, 2014). Thus, we deemed this setting proper for examining our model of goal setting and striving.

This study makes several contributions. First, we theoretically developed and empirically tested a new goal-oriented framework intended to explain players' goal attainment as represented by an accumulation of GP. Our goal-oriented model yields valuable insights into individuals' goal setting and goal striving that are critical for high-level achievements in digital games and gamified systems. Second, our study deepens prior goal-based IS research by showing the significance of goal striving in goal attainment, an element largely ignored in the literature. Third, we extend the existing literature by adding action strategies (i.e., in-game payment and deliberate planning) into the goal-directed behavior and by demonstrating the differential effect of action strategies on goal-directed behavior. Fourth, this study is the first to demonstrate how prior GP moderate the relationship between goal setting and goal striving and how goal setting moderates the effect of prior GP on subsequent GP. Fifth, in this study, we provide a theoretical account and empirical support for the role of goal feasibility as a direct determinant of GP. Overall, our findings contribute to IS research by highlighting goal striving and action strategies that help IT users navigate the challenges of reaching a desired end state. They also extend the knowledge on the special roles of goal feasibility, goal setting, and prior achievements in regulating goal-directed behavior.

2 Theoretical Background

2.1 Prior Research on Design Games and Gamification

Appendix A summarizes prior research on digital games and gamification. As shown in Appendix A, our review of game-based research shows that prior literature has largely focused on explaining users' intentions to play various digital games such as online games (Hsu & Lu, 2004; Koo, 2009, Lee, 2009; Lee & Tsai, 2010), mobile games (Liu & Li, 2011; Wei & Lu, 2014), and social networking games (Shin & Shin, 2011). In addition to the intention to play, other researchers have examined the intention to purchase virtual items (Mantymaki & Salo, 2011; Hamari, 2015). In explaining users' intentions, much prior research has used traditional theories such as the TRA, the TPB, and the TAM. Perceived usefulness, perceived ease of use, and perceived enjoyment are the most popular factors used to explain the intention to play a digital game (e.g., (e.g., Hamari, 2015; Liu & Li, 2011). Meanwhile, some studies have focused on social factors such as subjective norms and network externalities to explain users' behavior (Lee & Tsai, 2010; Wei & Lu, 2014).

Other studies have investigated the effects of game characteristics on gaming behavior. For example, Liu et al. (2013) examined the role of competition structure in digital games. They found that players who compete with players of similar skill levels expend more effort, and players who compete with players of lower skill levels report higher enjoyment and lower arousal. In a study on the effect of the free version of mobile apps on the downloads of their paid version, Liu et al. (2014) found that hedonic apps benefit most in sales from offering a free trial. In addition, Li et al. (2014) showed that lesser game complexity and higher familiarity increased engagement when playing mobile games. Meanwhile, Steinmann et al. (2016) found that the primary color of the icon of a mobile game influences users' intention to download. Merikivi et al. (2017) showed that game characteristics such as challenge, variety, novelty, aesthetics, and interactivity positively influence enjoyment. In gamification research, prior research has shown that game affordances (reward, competition, status) can increase users' hedonic experiences, which in turn increase the intention to use a gamified system and knowledge contributions (Suh et al., 2017; Suh & Wagner, 2017).

Another stream of research has examined factors that benefit game developers. For instance, Arakji and Lang (2007) suggested that video game developers can maximize their profits by opening proprietary content and giving monetary incentives to consumers who participate in modifying the games. Nandhakumar et al. (2013) studied collaboration between computer developers and found that envisioning practices positively influence users' experience. Roquilly (2011) examined how game companies control and develop virtual worlds and make recommendations on how to modify their contracts with their users.

In general, our review of the literature found a lack of research on in-game achievements. Although games use various game elements that can be selected as goals, no studies have examined why and how players achieve goals in digital games. Thus, to better understand gaming behavior, it is critical to understand how goals are established and pursued.

2.2 Process Model of Goal-Directed Behavior

Figure 1 shows a process model of goal-directed behavior adapted from Bagozzi and Dholakia (1999). This model is similar to other theoretical frameworks in the psychology literature, such as the model of action phases (Gollwitzer, 1996) and image theory (Beach & Mitchell, 1998). Moreover, it is generally consistent with the views of goal-directed behavior in the IS discipline (Bagozzi, 2007; Khansa et al., 2015; Loock et al., 2013). As shown in Figure 1, the process model consists of four major activities: goal setting, goal striving, goal attainment, and feedback reaction.

In the first stage of the process model, game players choose goals that are expected to lead to desirable outcomes (e.g., I want to level up because it will unlock new items!). People generally consider two aspects when setting goals: the desire and feasibility of their proposed goals. Whereas goal desire represents the value of an outcome when the goal is achieved, goal feasibility refers to the ease or difficulty of its fulfillment; this is a function not only of personal characteristics such as self-efficacy, but also of environmental factors such as the availability of resources (Gollwitzer, 1996).

The second stage of goal-directed behavior is goal striving. Goal striving involves the choice of means to fulfill the goal and the actual initiation of actions. For example, game players with the goal of leveling up may choose to purchase expensive in-game items to make the process easier and faster.

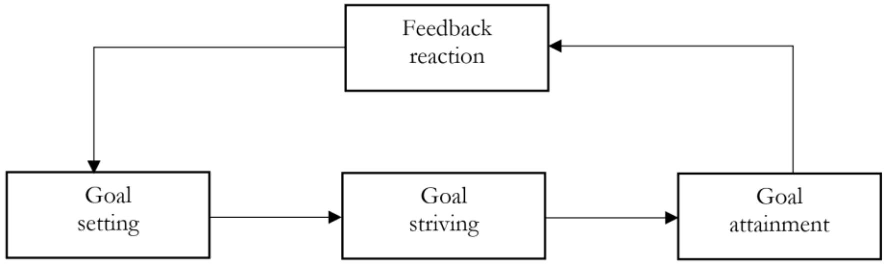

Figure 1. Process Model of Goal-Directed Behavior

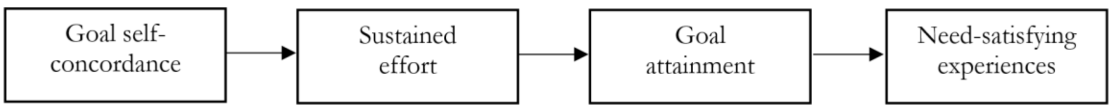

Figure 2. Variance Model of Goal-Directed Behavior

Alternatively, other players may be willing to expend more time and effort to devise sophisticated strategies and action plans. Thus, at this stage, game players tend to consider when, where, how, and how long they should play to fulfill their goals (Bagozzi & Dholakia, 1999). In addition to such planning, goal striving is associated with control and the initiation of action. Thus, actually playing a game is considered to be a part of goal striving.

In the third stage, goal attainment is the outcome of goal striving. Individuals who carefully execute established goals are likely to achieve their goals. In contrast, when goal striving is hindered by other forces or abandoned, goal attainment is unlikely. It is noteworthy that the deliberative processes of goal setting and goal striving can be skipped in highly routine environments (e.g., reading of emails and online news). Initially, conscious processing is required for goal setting and goal striving. However, such deliberation is not required when a mental schema for those goals has been established as a result of repeated performance (Bagozzi & Dholakia, 1999). In the IS literature, this type of goal-directed behavior is known as routine behavior and is described as occurring spontaneously with little conscious effort (Kim, 2009; Polites & Karahanna, 2012). A model of goal-directed behavior should simultaneously take into account these two distinct modes of goal setting and goal striving, i.e., conscious and routine processes.

The final stage, feedback reaction, involves the personal evaluation of the gap between people's goals and their actual achievements. In this stage, game players have positive or negative feelings, depending on the outcomes of goal-directed behavior. In turn, such a reaction to goal attainment is expected to change the goal-setting process, thus creating a feedback loop as shown in the process model (Figure 1).

2.3 Variance Model of Goal-Directed Behavior

Although the process model in Figure 1 shows a temporal sequence of activities that constitute goal-directed behavior, it is not a variance model and thus cannot help predict levels of outcome factors from the levels of antecedent factors. Much research in psychology (Bagozzi et al., 2003) and in IS (Khansa et al., 2015; Loock et al., 2013) has been devoted to the development of variance models related to goal-directed behavior. The self-concordance (SC) model by Sheldon and Elliot (1999) is arguably one of the most well-known variance models of goal-directed behavior (Smith et al., 2011). In general, this model consists of four factors: goal self-concordance, sustained effort, goal attainment, and need-satisfying experiences. Figure 2 depicts a simplified version of the original SC model. We believe that the SC model serves as a sound starting point for the development of a goal-oriented framework for digital gaming. This is because it has been widely used as a parsimonious representation of goal-directed behavior (Smith et al., 2007, 2011), and all the four factors mentioned in it seem highly relevant to a better understanding of digital gaming. Besides, given that the SC model is a variance model, it is also expected to be conducive to a rigorous comparison and synthesis with other variance models common in IS research.

According to Sheldon and Elliot (1999), SC refers to "the degree to which stated goals express enduring interests and values" (p. 482). The SC model posits that goals resulting from intrinsic motivation are associated with stronger willpower than those pursued because of external pressure. SC corresponds well to goal-setting activity. Thus, this factor is likely to affect goal striving. In this study, sustained effort, or goal-directed effort, is defined as the amount of mental and physical effort spent on goal striving. The variance model (Figure 2) indicates that self-concordant goals have a positive relationship with goal-directed effort, which in turn affects goal attainment. Finally, it suggests that IT users with a higher level of goal attainment will have more satisfying experiences through positive feelings of autonomy, relatedness, and competence (Sheldon & Elliot, 1999). This outcome variable, i.e., need-satisfying experiences, is highly consistent with the last stage of the process model: feedback reaction. More specifically, need-satisfying experiences indicate perceived differences between needs and acquired outcomes, and these subjective evaluations correspond well to the notion of feedback in the process model.

It is important to clarify the differences between the SC model and traditional models used in the IS areas such as the TRA (e.g., Bock et al., 2005), the TPB (e.g., Pavlou & Fygenson, 2006), and the TAM (e.g., Turel et al., 2012). First, goal-directed effort plays an important role in achieving desired goals, but traditional frameworks have largely ignored this essential factor. Second, the focus of the goal-oriented model is on achievement, but the traditional frameworks were mainly designed to describe whether people performed a certain behavior. We believe that the two factors, goal-directed effort and goal attainment, are the key concepts for a better understanding of mobile gaming because of the considerable effort required to achieve GP, badges, or levels (Hamari et al., 2014; Werbach & Hunter, 2012).

3 Research Model and Hypotheses

3.1 Research Model

Drawing on the literature on goal-oriented behavior, we propose a conceptual model primarily designed to explain the GP that an individual player accumulates over time. This model represents four phases of goal-directed behavior, i.e., goal setting, goal striving, goal attainment, and feedback reaction,[2] as proposed by Bagozzi and Dholakia (1999) (Figure 1). Moreover, it draws on and extends Sheldon and Elliot's SC model (Figure 2). It is important to note that each of the process and variance models is treated differently for the development of the proposed model (Mohr, 1982; Shaw & Jarvenpaa, 1997). In particular, the proposed model is based primarily on the variance-based SC model, whereas the process model is adopted as a supplementary tool. Accordingly, a single event in the process model is not simply translated into a single factor in the proposed model; in other words, as indicated by shaded boxes representing events, the associations between factors and events may not be clear-cut (Figure 3). Such a conceptual treatment of events is made to better reflect the nature of factors in a variance model like the proposed model. In particular, our model is built on such goal-oriented concepts as goal desire, goal feasibility, goal-directed effort, earned GP, and need satisfaction.[3] It also takes into account several control variables that may affect mobile gaming: gender, age, intrinsic motivation, extrinsic motivation, weather conditions, time availability, playing days since the game started, the number of goals related to GP goals, and the number of goals unrelated to GP (Liu & Li, 2011; Venkatesh et al., 2012).

First, the proposed model begins with goal desire, which is a motivational force that transforms psychological needs into actions. This factor is similar to goal self-concordance in the SC model but more widely used in IS research as an antecedent of goal-directed behavior (Bagozzi, 2007; Loock et al., 2013; Tsai & Bagozzi, 2014). Second, our model posits that goal desire leads to goal-directed effort; it also includes two action strategies: deliberate planning and in-game payment. Based on prior research on gaming (Mäntymäki & Salo, 2011) and coping strategy (Carver et al., 1997), two constructs, i.e., internal control and external assistance, are important to predict one's task performance. Specifically, the behaviors of people who carefully devise the planning based on their skills and ability (i.e., internal control) are different from those of people who seek assistance (i.e., external assistance) (Carver et al., 1997). Thus, we presume that one way to accomplish goals in digital games is to take action to develop gaming ability/power to achieve better performance (i.e., deliberate planning); the other way is to get help from others, e.g., team members or purchasing and using virtual items (i.e., external assistance). In the latter case, Lehdonvirta (2009) noted that players purchase virtual goods in-game as the main method of improving game performance. In fact, in Pokémon GO, many users reportedly pay for items to improve their game performance (e.g., Grubb, 2016). Thus, we chose in-game payment as the major manifestation of external assistance and hypothesized that both deliberate planning and in-game payment will be positively related to goal-directed effort and needs satisfaction.

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[2] The essence of feedback reaction lies in the reevaluation of the gap between personal goals and actual outcomes (Bagozzi & Dholakia, 1999). Such a reevaluation is expected to occur through the update of need satisfaction (Smith et al., 2011). Thus, in the proposed model, the process of feedback reaction incorporates the causal link between prior need satisfaction and current need satisfaction.

[3] We treated GP as a proxy of goal attainment. Before testing the proposed model, we ensured that (1) most goals are related to GP (e.g., catching new Pokémon, leveling up), and (2) even goals unrelated to GP (e.g., exercising, hanging out with friends, meeting new people) tend to be associated with GP in the context of Pokémon GO. Moreover, when we tested the proposed model, we explicitly controlled for goals related and unrelated to GP. Finally, we have included a discussion of a potential limitation of the study that could arise from the use of GP as a proxy for goal attainment.

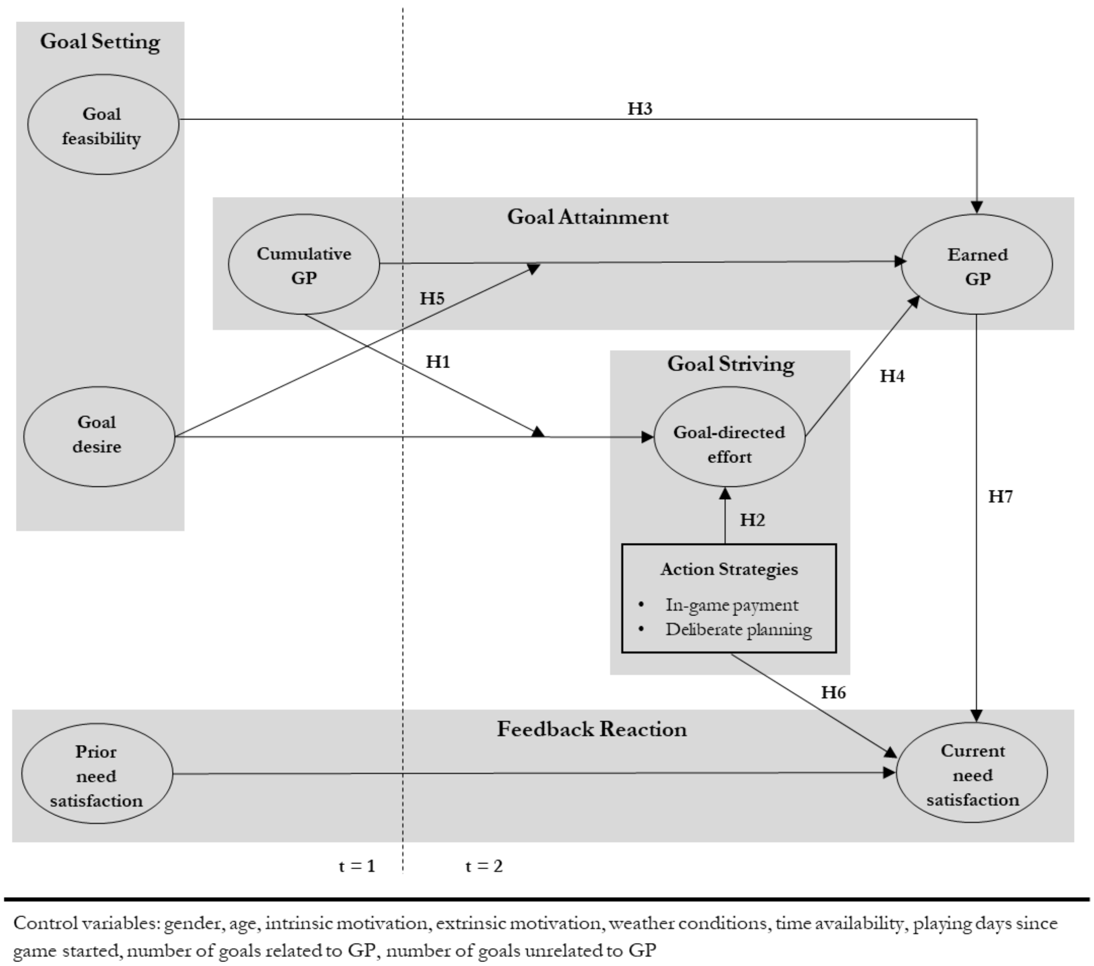

Figure 3. Conceptual Model

Third, we argue that goal-directed effort has a positive relationship to the GP earned over a certain time period. Whereas this relationship represents a conscious aspect of goal-directed behavior, game playing can also be routine with little conscious processing if players frequently interact with the same game (Ma et al., 2014). Thus, the proposed model also takes into account the effect of prior GP on earned GP to represent the routine nature of goal-directed behavior. Moreover, goal feasibility—one of the two factors evaluated with goal desire in the phase of goal setting—is specified as an additional predictor of earned GP (Bagozzi et al., 2003). Finally, our model suggests that need satisfaction is determined not only by earned GP and prior need satisfaction but also by action strategies. These additional paths are based on research findings that subjective experiences during goal striving affect need satisfaction (Fishbach & Choi, 2012). Figure 3 shows our proposed model of mobile gaming.

3.2 Research Hypotheses

We propose research hypotheses based on the antecedents of goal-directed effort, earned GP, and current need satisfaction. Our hypotheses suggest causal relationships that were largely ignored or relatively new in the literature. Thus, we do not hypothesize the relationships between goal desire and goal-directed effort (e.g., Tasi & Bagozzi, 2014), between cumulative GP and earned GP (e.g., Ma et al., 2014), or between prior need satisfaction and current need satisfaction (e.g., Sheldon & Elliot, 1999; Smith et al., 2011) because prior research has established similar relationships.

3.2.1 Goal-Directed Effort

We posited earlier that goal desire drives goal striving.[4] Yet this relationship likely changes in light of prior attainment. Bagozzi (2007) posited that personal

[4] When goal desire does not exist, goal striving will not occur. The model proposed in this study assumes that the case of no goals can be represented by the lowest level of goal desire, which in turn is expected to lead to the complete lack of goal striving. Yet, this basic assumption in our model may not be true, and this possibility is mentioned in the

characteristics moderate how goal desire affects the pursuit of a goal because the nature of inner desire is perceived as having a distinct meaning, depending on individual beliefs, learned values, and experiences. For example, people who rarely play mobile games and even look down on such behavior may consider their interest in a popular game disconcerting. Meanwhile, people who already appreciate the excitement of mobile gaming will favorably view their desire to try a new game. Thus, personal history likely moderates the effect of goal desire on goal-directed effort. This type of psychological process is called self-regulation, which is rarely examined in deterministic frameworks such as the TAM, the TRA, and the TPB (Bagozzi, 2007).

Prior attainment is one of the most important factors impacting individuals' beliefs, learned values, and experiences (Khansa et al., 2015). In general, high achievers in a game are known to exhibit more dexterity, persistence, and positive attitudes toward it than low achievers (Bartle, 1996; Taylor, 2009). Accordingly, the fact that a person desires to play better may be viewed differently by different levels of mobile game players. For example, those with high numbers of accumulated points will consider their desire natural because the same types of beliefs, learned values, and experiences motivated them to continue to pursue the same game (Huffaker et al., 2009; Yee, 2006). Thus, the transition from goal setting to goal striving is expected to be smooth. In contrast, people with few accumulated points may assess their desire more cautiously, evaluating many aspects of the outcomes of game-playing against their beliefs, learned values, and experiences (Huffaker et al., 2009; Xu et al., 2012). Thus, for low achievers, the effects of goal desire on goal-directed effort are likely weaker than for high achievers.

Taken together, because of the self-regulation process that imposes self-evaluative standards on goal desire, the effect of goal desire on goal-directed effort will vary with the level of prior attainment. Specifically, we hypothesize that prior attainment facilitates a transition from goal setting to goal striving; thus, it will strengthen the relationship between goal desire and goal-directed effort.

H1: The impact of goal desire on goal-directed effort increases with the increase in prior attainment in the context of digital gaming.

The goal literature suggests that goal striving is determined not only by goal desire but also by how goals are pursued (Gollwitzer, 1996). As discussed earlier, goal striving involves the planning and enactment of actions regarding the strategies for achieving a desired goal. It includes devising action plans, overcoming obstacles, and the coordination of goal progress (Bagozzi, 2007). In general, two different action strategies are believed to exist (Rothbaum et al., 1982; Schwarzer & Taubert, 2002). One strategy relies mainly on internal controls, including active, attentive, mastery responses, whereas the other is associated with external assistance (Carver, 1997; Smith et al., 2011).[5] In the course of playing mobile games, for example, people often develop carefully detailed plans to achieve various goals despite obstacles. This type of deliberate action planning corresponds well to internal control (Carver et al., 1989). In contrast, in-game payment, which refers to purchasing virtual goods or services, is considered a form of external assistance (Adams, 2014; Mantymaki & Salo, 2011). For example, in the context of Pokémon GO, players who spend money to buy incubators and hatch more eggs likely have more new Pokémon and higher GP than players who do not.

To achieve a higher game score, some players may develop a detailed plan and carefully follow it. Conversely, others may choose a quick solution by purchasing game-related items that almost instantly make them competitive players (Adams, 2014; Lehdonvirta, 2009). The strategy of in-game payment is relatively quick to implement and requires less effort, although it is associated with monetary costs. In contrast, the alternative strategy of deliberate planning takes relatively more time and effort with minimal or no cost. On balance, we expect that both action strategies positively influence the amount of goal-directed effort, but because of their different natures, the impacts of the two strategies on goal-directed effort are unlikely to be identical. Specifically, we hypothesize that deliberate planning has a stronger impact than in-game payment on goal-directed effort.

H2: The impact of deliberate planning on goal-directed effort is stronger than the impact of in-game payment on goal-directed effort in the context of digital gaming.

discussion section as a potential limitation of this study. We thank an anonymous reviewer for pointing out this important notion.

[5] These two action strategies do not have to be mutually exclusive. For example, in-app payment could be a part of internal control. Yet, such purchases are associated with expectations of some assistance outside internal control. Thus, in-app payment itself can be conceptually treated as external assistance vis-à-vis internal control. Similarly, some external assistance (e.g., peer support) may need to inevitably involve an active, attentive, conscious process of self-navigation. This type of self-navigation driven by peer support can be categorized as internal control. We thank an anonymous reviewer for pointing out this important issue.

3.2.2 Earned Game Points

Goal feasibility, along with goal desire, is considered one of the two major issues that a person gauges during the goal-setting phase (Gollwitzer, 1996). However, despite the importance of goal feasibility, it is not yet incorporated into the framework of the SC. In the context of mobile gaming, goal feasibility is a mobile game user's subjective judgment concerning the likelihood of achieving an implied goal. Numerous factors could influence goal feasibility. For example, some factors are the ease or difficulty of the game in question, one's game-specific skill level, and the availability of time and resources for purchasing game-related items (Ha et al., 2007; Kondo & Ishida, 2014). These internal and external factors are expected to affect the eventual success of getting a game user to the anticipated outcome. For example, in a two-wave field study on the enactment and pursuit of personal goals in everyday life, Bagozzi et al. (2003) reported that goal feasibility was significantly correlated with goal attainment ($r = 0.31$, $p < .05$) ($n = 177$). Such a significant correlation contrasted with the fact that goal attainment had little relationship with attitude ($r = 0.10$, p = ns), subjective norm ($r = 0.12$, p = ns), perceived behavioral control ($r = 0.15$, p = ns), or even goal desire ($r = 0.16$, p = ns). Although Bagozzi et al. (2003) did not examine the direct effect of goal feasibility on goal attainment, their findings strongly suggest that goal feasibility plays an important role in regulating goal attainment. Likewise, in the context of mobile game playing, the perceived likelihood of becoming a skilled player is significantly associated with the actual accumulation of GP. Thus, it would be interesting to examine whether goal feasibility has a positive effect on earned GP even after controlling for cumulative GP and goal-directed effort. Specifically, our hypothesis is as follows:

H3: Goal feasibility has a positive relationship with earned GP in the context of digital gaming.

Several goal frameworks posit that goal achievement is the result of goal-directed effort (Bagozzi & Dholakia, 1999; Sheldon & Elliot, 1999). For example, the SC model suggests that sustained effort leads to increased goal attainment. Based on the SC model, Smith et al. (2007) showed that goals pursued with striving are likelier to be attained. Also, athletes' start-of-season autonomous goal motives are related to midseason goal-directed effort, which in turn influences end-of-season goal achievement (Smith et al., 2011). In an achievement-based context such as gaming, goal striving is prevalent and various goal striving strategies are highly encouraged (e.g., Hardy et al., 1996). Thus, game players strive to achieve goals they have established (e.g., catching new Pokémon, leveling up to unlock content). In turn, players are likely to strive for various in-game achievements as goals, which directly translates into increased GP. Thus, game players who invest more goal-directed efforts are likely to earn more GP playing Pokémon GO.

H4: Goal-directed effort has a positive relationship with earned GP in the context of digital gaming.

The proposed model posits that past achievements have a positive impact on subsequent achievements. As discussed previously, this relationship is expected to reflect the routine nature of game playing that occurs separately from the deliberative processes of goal desire and goal pursuit. Moreover, the literature further suggests that routine behavior becomes stronger when people have a higher level of motivational commitment (Khansa et al., 2015). The rationale behind this proposition is that highly motivated people tend to be less distracted by external stimuli. Such a motivational force is likely to strengthen the habitual tendency of repeated behavior, providing it continues to serve these individuals' needs and wants. Within the framework of goal-directed behavior, goal desire indicates such a motivational state of mind (Bagozzi, 2007). Thus, it is reasonable to expect that goal desire moderates the relationship between past and present achievements. Specifically, when goal desire is high, the relationship between prior and current GP will remain strong because repeated behavior becomes "part of ceremonies and rhythms of" everyday life (Rafaeli & Ariel, 2008, p. 255). In contrast, if goal desire is low, such a relationship will not be strongly maintained because people can easily question the benefit of performing the behavior in question and therefore explore other alternatives. Accordingly, we propose the following hypothesis:

H5: The impact of cumulative GP on earned GP increases with an increase in goal desire in the context of digital gaming.

3.2.3 Current Need Satisfaction

Fishbach and Choi (2012) theoretically and empirically demonstrated that a positive experience is determined not only by goal attainment but also by how a goal is pursued. Specifically, when an activity is pursued for the sake of pursuing it, it is called an experiential activity. For example, if people play Pokémon GO for the pure enjoyment of catching Pokémon, their gaming activity is considered an experiential activity. In contrast, when an activity is pursued as a means to an end, it is called an instrumental activity. Thus, if people play Pokémon GO to show off high GP to others, playing the game is considered an instrumental activity. Fishbach and Choi (2012) examined dental flossing to study the differential impacts of experiential and instrumental activities on positive experience. Consistent with their hypothesis, a focus on an activity's instrumentality in dental flossing (e.g., to prevent tooth decay) makes an experience less positive, whereas attending to the instant delight of dental flossing (e.g., the feeling of a fresh mouth) is associated more strongly with a positive experience.

We examined two action strategies, each of which can be used for either an experiential or an instrumental activity. Nevertheless, it is reasonable to expect that those who tend toward instrumentality will choose the quick and easy option (i.e., in-game payment) over the engaging yet challenging option (i.e., deliberate planning) (Lin & Sun, 2007). Similarly, those who enjoy the gaming experience will be more willing to navigate through the challenges of game playing with less reliance on the help of game items (Guo & Barnes, 2009). Thus, we argue that deliberate planning has a positive relationship with need satisfaction. More importantly, the discussion mentioned previously leads us to believe that the relationship between deliberate planning and need satisfaction is significantly stronger than the relationship between in-game payment and need satisfaction. Thus, we hypothesize as follows:

H6: The impact of deliberate planning on current need satisfaction is stronger than the impact of in-game payment on current need satisfaction in the context of digital gaming.

According to the SC model, need satisfaction arises from a feeling of accomplishment (Sheldon & Elliot, 1999). It implies that mobile game players who strive and achieve high scores are likely to have satisfying experiences. Prior research findings have supported the positive effect of goal attainment on need satisfaction. For example, Brunstein (1993) found that longitudinal goal achievement leads to changed well-being. Likewise, Smith et al. (2007, 2011) showed that athletes' goal attainment increases need satisfaction. Also, Harris et al. (2003) found in a daily diary study using call-center staff that goal achievement positively influences well-being. In the context of Pokémon GO, a user who accomplishes various activities (e.g., obtaining new Pokémon, catching more Pokémon to level up) is likely to have high levels of earned GP. In turn, the user with highly earned GP will feel effective, able, and meaningful in playing Pokémon GO.

H7: Earned GP has a positive relationship with current need satisfaction in the context of digital gaming.

4 Methods and Results

We conducted two studies to test our proposed research model. Table 1 summarizes the two studies and describes their objectives, designs, and measurement variables.

4.1 Preliminary Study

As a mobile game, Pokémon GO has a system to track various personal activities. As players progress and collect Pokémon, they gain various achievement medals such as Jogger, Kanto, Collector, Scientist, Breeder, Backpacker, Battle Girl, and Ace Trainer. Table 2 shows these medals and their different characteristics. Achievements in these activities are translated to GP that determine a player's level. Although accomplishments of different in-game activities result in increased GP, earning GP itself is important because a player can (1) receive rewards, (2) unlock different content (e.g., gym battle, high-level items), and (3) catch or power up high-level Pokémon. Appendix B shows the level, GP, rewards, and unlockable content of Pokémon GO. Overall, we are interested in examining the role of GP as a summary measure, succinctly capturing the different achievements represented by the different medals.

Meanwhile, whereas some players have goals directly related to the accumulation of GP (e.g., level up), others may use the game for other purposes (e.g., exercise). For this study, we identified three major goals related to GP, namely, (1) catching many new Pokémon, (2) leveling up, and (3) winning gym battles and conquering gyms (Casey, 2016; Panumate et al., 2015). Also, three goals unrelated to GP were selected, namely, (1) exercising and losing weight by walking, (2) hanging out with friends, and (3) meeting new people (Alexander, 2016; McCarthy, 2016). We are particularly interested in identifying whether goals related to GP are dominant in the context of Pokémon GO and how GP are associated with the achievement of goals unrelated to GP.

4.1.1 Subjects and Procedures

To collect data, this study used a nationwide online panel maintained by a market research firm that has about 800,000 panels. We initially specified the demographics of our targets (i.e., current Pokémon GO users between 18 and 30 years old), and the firm randomly sent email invitations with a survey link to targets who met the criteria. At the beginning of the survey, subjects were asked to select the most important goal(s) in playing Pokémon GO within the next week. In addition, we asked participants to log in to their Pokémon GO accounts and find their GP, Level, and other medal achievements for the survey. A total of 106 participants completed the survey. The average age was 28.8 years, and 71.7% of the participants were female.[6]

[6] We suspect that the skewed gender distribution resulted from the timing of data collection. A Forbes article in July 2016 shows that in the United States 63% of Pokémon GO users are female (Mac, 2016).

Table 1. Summary of Study 1 and Study 2

Study		**Study 1: Preliminary study**	**Study 2: Main study**
Objective		Justify the use of GP to represent goal attainment. Justify the use of global goal desire to represent the specific types of desire in Pokémon GO.	Test the research model
Study design		Cross-sectional study	Longitudinal field study
Subjects		Panels from a marketing company (n = 106)	Undergraduate and graduate students (n = 301)
Measured variables	Objective measures	GP, Level, Jogger, Kanto, Collector, Scientist, Breeder, Backpacker, Battle Girl, Ace Trainer	t_1: cumulative GP (GP at t = 1) t_2: earned GP (difference between GP at t = 2 and GP at t = 1)
	Self-reported measures	Goal selection	t_1: goal selection, goal feasibility, goal desire, prior need satisfaction t_2: goal-directed effort, in-game payment, deliberate planning, need satisfaction
	Controls		t_1: gender, age, intrinsic motivation, extrinsic motivation, playing days since the game started, number of goals related to GP, number of goals unrelated to GP t_2: weather conditions, time availability

Table 2. Medal Information and Sample Screenshot

Progression	**Definition (GP gained)**	**Sample screenshot**
Jogger	Total kilometers of walking	
Kanto	No. of Pokémon registered in Pokédex (500)	
Collector	No. of Pokémon captured (100)	
Scientist	No. of Pokémon evolved (500)	
Breeder	No. of eggs hatched (200, 500, 1000)	
Backpacker	No. of PokéStops visited (50, 100)	
Battle Girl	No. of battle attacks won (100, 150)	
Ace Trainer	No. of battle trainings won (10-150)	

4.1.2 Measures

The preliminary study consisted of self-report and objective measures. First, there were six options as goals: (1) catching many new Pokémon, (2) leveling up, (3) winning gym battles and conquering gyms, (4) exercising, (5) hanging out with friends, and (6) meeting new people. Each option was indicated with a check box, and multiple goals could be selected. Objective measures included GP, Level, Jogger, Kanto, Collector, Scientist, Breeder, Backpacker, Battle Girl, and Ace Trainer. This information is available in the mobile app, and participants were asked to enter this information in the Web-based survey. The measures used in this preliminary study are listed in Table C1 of Appendix C.

4.1.3 Results

To justify the use of GP as a summary measure, we conducted a correlation analysis between GP and other achievements. Table 3 shows the correlations between the GP and other measures. We found that GP was significantly related with other measures ($ps < 0.05$), suggesting that GP can represent other key achievements of Pokémon GO.

To further illustrate that GP is closely associated with other achievements, we split the sample into two groups based on GP. The high GP group includes participants whose GP are in the top 50% (n = 53). Accordingly, the low GP group includes those whose GP are in the bottom half (n = 53). Figure 4 shows the standardized scores of other achievements for both groups. It can be easily seen that the high GP group and the low GP group exhibit clear differences across all other achievements. Table 4 provides summary statistics by group for each of the other achievements. It also includes the t-test results for group differences. Overall, the high GP group scored significantly higher in each of the other achievements. This suggests that GP is a representative measure of various types of achievements in digital games such as Pokémon GO.

Table 3. Correlations Between GP and Other Achievements

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) GP	367124	469836	1									
(2) Level	18.45	6.18	.71	1								
(3) Jogger	114.45	127.09	.86	.71	1							
(4) Kanto	77.50	31.55	.67	.94	.71	1						
(5) Collector	1083.93	1267.02	.99	.74	.86	.71	1					
(6) Scientist	122.23	199.12	.97	.63	.80	.58	.95	1				
(7) Breeder	46.78	58.87	.88	.67	.89	.67	.87	.81	1			
(8) Backpacker	1290.30	1536.98	.94	.76	.85	.72	.96	.88	.81	1		
(9) Battle Girl	89.92	270.17	.89	.44	.76	.41	.86	.91	.79	.76	1	
(10) Ace Trainer	44.40	116.03	.62	.44	.56	.40	.60	.64	.49	.61	.60	1
Note: n =106												

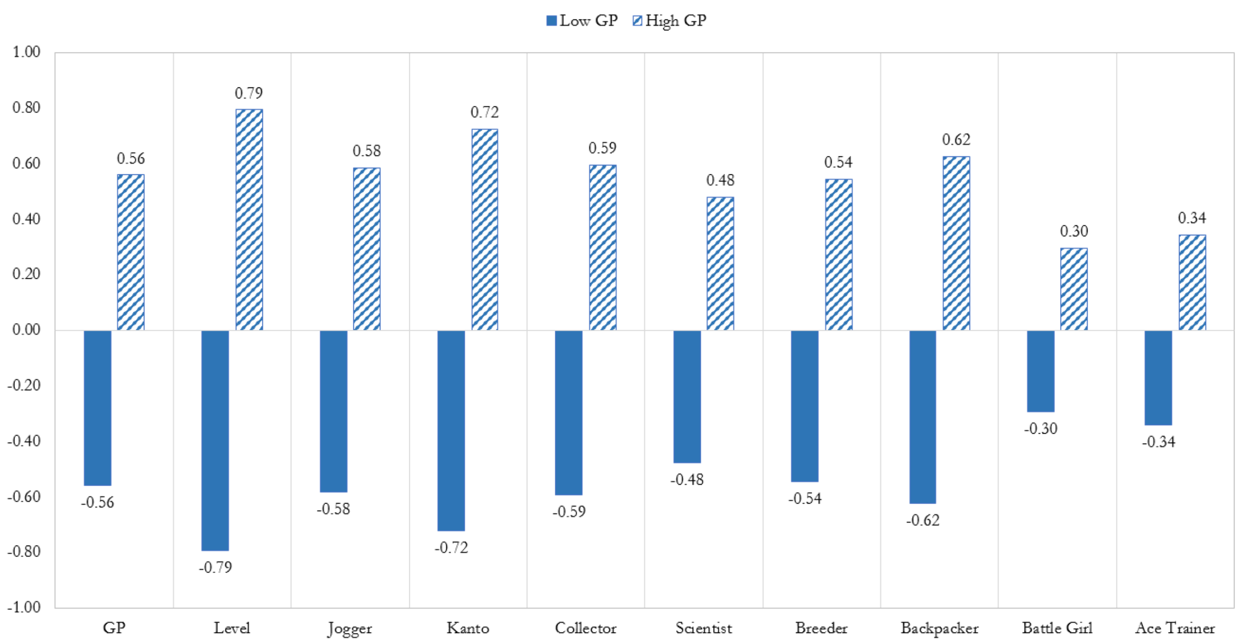

Figure 4. Results of Comparisons Between Low and High GP Groups (Standardized mean scores were used)

Table 4. Comparisons Between Low and High GP Groups

Game element	Group	Mean	SD	Min	25%	Median	75%	Max	Difference test		
									Difference		*t*-value
GP	High GP	6297850.7	548492.0	237383	319926	472285	668200	3628383	Mean	525320	6.92*
	Low GP	1044640.1	65264.0	3260	51755	96205	150222	226446	S.D.	75872	
Level	High GP	23.4	2.5	20	21	23	24	32	Mean	9.81	13.51*
	Low GP	13.6	4.7	3	10	14	17	20	S.D.	0.73	
Jogger	High GP	188.8	141.9	41.15	96	149	233.45	829.8	Mean	148.62	7.40*
	Low GP	40.1	35.1	0.25	14.8	33.34	53.5	137.5	S.D.	20.07	
Kanto	High GP	100.3	17.9	70	84	100	114	140	Mean	10.79	10.79*
	Low GP	54.7	25.1	5	40	56	71	123	S.D.	45.64	
Collector	High GP	1837.0	1428.9	647	1026	1386	2298	9616	Mean	1506.17	7.59*
	Low GP	330.9	208.9	7	165	293	462	716	S.D.	198.37	

Scientist	High GP	217.6	245.9	20	97	142	226	1517	Mean	190.72	5.60*
	Low GP	26.9	32.3	0	6	22	40	209	S.D.	34.07	
Breeder	High GP	78.8	68.8	21	43	62	86	453	Mean	64.09	6.66*
	Low GP	14.7	13.1	0	3	12	22	51	S.D.	9.62	
Backpacker	High GP	2250.4	1676.4	632	1097	1708	2639	9548	Mean	1920.26	8.22*
	Low GP	330.2	286.0	0	137	265	441	1275	S.D.	233.55	
Battle Girl	High GP	169.6	366.3	1	32	64	126	2399	Mean	159.43	3.17*
	Low GP	10.20	16.2	0	0	1	14	65	S.D.	50.36	
Ace Trainer	High GP	84.2	154.5	0	10	33	102	1026	Mean	79.55	3.74*
	Low GP	4.6	9.5	0	0	0	3	45	S.D.	21.26	

Note: $^{*}p < 0.001$

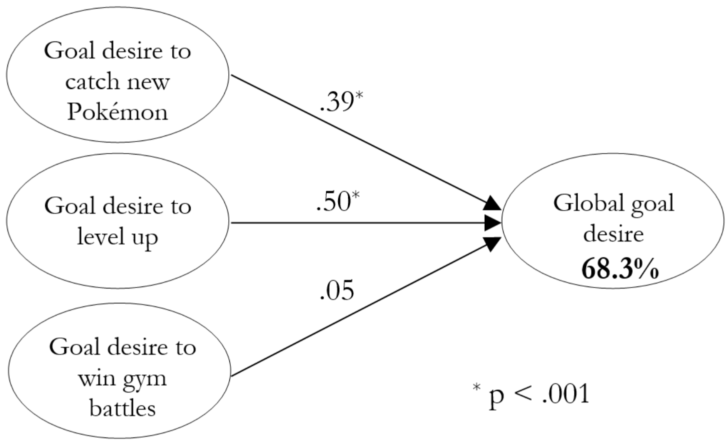

Figure 5. Influence of Three Specific Goal Desires on Global Goal Desire

To identify whether global goal desire can adequately represent GP-related goal desire, we regressed three specific measures of goal desire on global goal desire. As shown in Figure 5, they explain 68.3% of global goal desire, suggesting that global goal desire can well reflect GP-related goal desire. Our results show that goal desire to win gym battles is not significantly related to global goal desire. There are two plausible explanations: (1) data collection time and (2) problematic gym battle system. First, when we collected the data about two months after launching Pokémon GO, most players had low or intermediary levels (3-32 in the preliminary study). At the beginning stages of playing Pokémon GO, catching rare Pokémon and leveling up may be the most important goals. Because Pokémon GO uses a content unlocking system based on levels (i.e., GP), only certain levels of players can play gym battles and obtain high-level items. In addition, it is difficult for low-level players to conquer gyms because they will not have high-level Pokémon. Second, when we collected the data in 2016, the battle system was unattractive because it was difficult to beat the other team's gym and put a player's Pokémon in the same team's gym. Thus, Niantic, which developed Pokémon GO, significantly updated the gym system in July 2017 so that more players can easily conquer gyms.[7]

Meanwhile, we evaluated whether most people chose goals related to GP in this context. The results indicated that 77.4% of the participants used the game to catch many new Pokémon, 67.9% for leveling up, 29.2% for winning gym battles, 50.0% for exercising, 30.2% for hanging out with friends, 11.3% for meeting new people, but 1.8% had no goal. Specifically, 92% of the participants selected at least one goal related to GP. Only 8% used the game exclusively for purposes unrelated to GP. These results show that most participants indeed selected goals related to GP, implying that GP are a proper dependent variable in our study. It is important to note that goals unrelated to GP (e.g., exercising, hanging out with friends, meeting new people) tended to increase GP while increasing walking distance or Jogger points. As shown in Table 2, Jogger and earned GP are strongly correlated ($r = 0.86$), which suggests that GP are a reasonable measure for goal attainment even for those goals unrelated to GP.

[7] The new gym system can be viewed at https://pokemongolive.com/en/post/raids/. We thank an anonymous reviewer for the comments on the nonsignificant relationship between the desire to win gym battles and global goal desire.

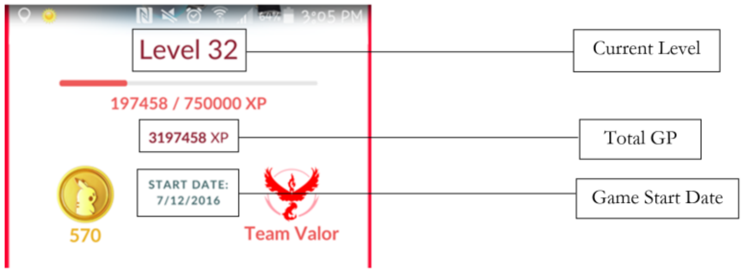

Figure 6. Sample Screenshot of Account Information

4.2 Main Study

The preliminary study pointed out that a large majority of Pokémon GO players have goals related to GP, and GP succinctly capture numerous achievements related to Pokémon GO. Because the major assumption behind our proposed model was largely satisfied, we attempted to formally test the proposed model itself.

4.2.1 Subjects and Procedures

We collected data for this study from undergraduate and graduate students in large public universities in the United States. Survey participants received $7 or extra course credits upon completion of both surveys. At the beginning of the study, subjects were asked to select the most important goal(s) in playing Pokémon GO within the next week. Like the preliminary study, goals related to GP included catching many new Pokémon, leveling up, and winning gym battles and conquering gyms. Goals unrelated to GP included exercising, hanging out with friends, and meeting new people. At the end of both surveys, we asked participants to send a screenshot of their accounts (see Figure 6) to the principal investigator. This procedure was to confirm participants' objective information such as GP, level, and the date they started the game.

Four hundred-seventeen participants with active Pokémon GO accounts completed the first wave of the survey. Thirty-one observations were discarded because of missing data or failure to follow instructions (e.g., not sending a screenshot), resulting in 386 usable observations. One week later, we sent an invitation for the second survey; 331 participants completed the second wave of the survey. We discarded the data from 30 participants for failure to follow instructions. Ultimately, 301 users completed both waves. The average age was 22.6 years, and 33.6% of the participants were female. Percentages of goal selection were 70.1% for catching many new Pokémon, 55.8% for leveling up, 19.1% for winning gym battles, 24.4% for exercising, 39.8% for hanging out with friends, 11.7% for meeting new people, and 13.0% for no goal.

To investigate possible nonresponse bias, a wave analysis was conducted to compare the indicators of key constructs as well as demographic information between early and late respondents. A *t*-test of the key variables indicated there were no significant differences in gender (Pearson χ^2 value = 2.58, p = 0.11), age (t = 0.46, p = 0.65), goal feasibility (t = -0.41, p = 0.68), goal desire (t = -0.11, p = 0.91), and goal-directed effort (t = 0.93, p = 0.36) between the early and late respondents, suggesting that nonresponse bias was not problematic.

4.2.2 Measures

Like Tasi and Bagozzi (2014), we designed a longitudinal field study that included a combination of both self-reported and objective behavioral measures. To ensure construct validity, we adapted the items from previously validated scales; these items are listed in Table C2 of Appendix C. Three items concerning goal feasibility and goal desire were adapted from Bagozzi et al. (2003). Need satisfaction was measured by a multi-item scale consisting of three items borrowed from Sheldon and Elliot (1999). Based on prior research (Sheldon & Elliot, 1999; Smith et al., 2007, 2011), we used a composite score of need satisfaction by averaging the three need satisfaction variables (i.e., competence, autonomy, and relatedness). We used two items to measure goal-directed effort (based on Smith et al., 2007). The deliberate planning scale included two items, and it was operationalized based on the measures of "planning" in Carver (1997). We developed the two items of in-game payment ourselves by referring to prior research on mobile purchasing and use (e.g., Kondo & Ishida, 2014; Venkatesh et al., 2012). We also included the measure of goal selection with six possible goals in Pokémon GO. Measures of goal selection, cumulative GP, goal feasibility, goal desire, and prior need satisfaction were obtained at Time 1, but in-game payment, deliberative planning, goal-directed effort, and current need satisfaction were assessed at Time 2. Earned GP was attained by using the difference between GPt_2 and GPt_1. Log transformation was used for cumulative GP and earned GP. Measures of control variables—intrinsic motivation, extrinsic motivation, weather conditions, time availability, and playing days since the game started—were also included, along with demographic measures for age and gender.

4.2.3 Overview of Structural Equation Modeling

We evaluated alternative models using AMOS 22.0. Following Gefen et al. (2000), we used a two-step approach: (1) confirmatory factor analysis (CFA) to assess the measurement model and (2) structural equation modeling (SEM) analysis to test research hypotheses. First, the CFA step was conducted on the entire set of items at the same time, with each observed variable restricted to load on its latent factor. For the SEM step, we examined two models: the base model and the proposed model. The base model includes only the effects of the control variables such as demographic and motivational variables. The proposed model contains research variables for testing the hypothesized relationships. Detailed descriptions of the measurement and structural models are provided below.

4.2.4 Measurement Model

To assess the psychometric properties of the measures, we conducted CFA. We evaluated model fit through various fit criteria. Specifically, the seven fit indices we used in the current study were the Tucker-Lewis Index (TLI), the Normed Fit Index (NFI), the comparative fit index (CFI), the goodness-of-fit index (GFI), the adjusted goodness of fit (AGFI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) (Gefen et al., 2000; Hu & Bentler, 1999). As shown in Table 5, the results reveal a good fit of the measurement model, and the fit indices were at or better than the cut-off values.

The measurement quality of constructs was further examined by assessing various psychometric properties such as reliability, convergent validity, and discriminant validity. The cut-off value of standardized factor loadings was 0.60 (Chin et al., 1997) or more strictly 0.707 (Hair et al., 2009). We found that all factor loadings exceeded 0.707, except GF2 (0.67), adequately demonstrating convergent validity. Reliability was assessed using the internal consistency of each construct with Cronbach's alpha, composite reliability, and average variance extracted (AVE). Threshold values of Cronbach's alpha, composite reliability, and AVE were 0.70, 0.70, and 0.50, respectively (Nunnally & Bernstein, 1994). The results showed acceptable measurement reliability for all constructs. Discriminant validity was evaluated through exploratory factor analysis (EFA) using SPSS 22.0. The results of EFA indicated that all predefined indicators of each construct loaded properly and there was no significant cross-loading, suggesting discriminant validity (see Appendix D). In addition, discriminant validity was assessed by comparing the square root of AVE for each construct with the correlations it had with the other constructs (Gefen & Straub, 2005). As shown in Appendix E, the square root of the AVE for each construct (see diagonal) exceeded its correlations with other constructs, demonstrating the discriminant validity of all the constructs.

4.2.5 Common Method Bias

Common method biases (CMB) are especially problematic in cross-sectional designs and for research based solely on perceptual measures (Sharma et al., 2009). To reduce CMB, we used a longitudinal design and objective measures of real behavior (i.e., GP). Such an approach is known to be least susceptible to CMB (Sharma et al., 2009). In addition, we formally tested for potential CMB by using a marker-variable technique (Malhotra et al., 2006). Specifically, we included a theoretically unrelated variable, fashion involvement, as a marker variable and tested correlations between it and other study constructs. With this technique, no correlations between it and the research constructs are expected. Accordingly, the average correlations were close to 0 (r = 0.04); the correlation coefficients were 0.07 (goal feasibility), 0.05 (goal desire), 0.03 (prior need satisfaction), 0.01 (in-game payment), 0.08 (deliberate planning), -0.02 (goal-directed effort), and 0.04 (current need satisfaction). Based on these diagnostic analyses, CMB is unlikely to have caused issues in our data.

4.2.6 Structural Model Evaluation

We tested the proposed model and a base model with only the effects of the control variables. Table 6 shows the results of the two alternative models. As shown in Table 6, the overall fit indices of both models suggest a good fit. Nevertheless, the proposed model explained more variances in endogenous variables than the base model. Specifically, the differences in R2 between the two models were 37.6% in goal-directed effort, 27.1% in earned GP, and 18.1% in current need satisfaction. These results indicate that the new goal concepts included in the proposed model offer additional explanatory power over and above the traditional factors, e.g., intrinsic and extrinsic motivation, which are often considered in IS research. In light of these results, we used the proposed model to evaluate the research hypotheses.

Table 5. Goodness of Fit of Measurement and Structural Models

Goodness of fit	χ^2	df	χ^2/df	TLI	NFI	CFI	GFI	AGFI	SRMR	RMSEA
Measurement model	232.09	182	1.28	.98	.96	.99	.95	.89	.031	.030
Base model	26.05	33	.77	1.00	.99	1.00	.99	.96	.011	.000
Proposed model	262.65	201	1.31	.98	.95	.99	.94	.89	.032	.032

Table 6. Results of Structural Models

	Base model			Proposed model		
	Goal-directed effort	**Earned GP**	**Current NS**	**Goal-directed effort**	**Earned GP**	**Current NS**
Research variables						
Cumulative GP				.19***	.32***	
Goal desire				.21***	.08	
Cumulative GP × Goal desire				.08*	.11*	
Goal feasibility					.17*	
In-game payment				.08		-.06
Deliberate planning				.48***		.21**
Goal-directed effort					.35***	
Prior need satisfaction						.51***
Earned GP						.09†
Controls						
Age	.08	.09†	.03	-.02	.02	.01
Gender	-.01	.03	.09†	.03	.03	.05
Intrinsic motivation	.20**	.36***	.41***	-.03	.16*	.05
Extrinsic motivation	.22***	-.07	.07	.03	-.25***	-.01
Weather conditions	.08	.12*	-.03	.05	.07	-.01
Time availability	.04	-.04	.01	.04	-.03	.00
Playing days since game started	-.01	-.00	.03	-.05	-.14*	.04
No. of goals related to GP	.21***	.11†	.11*	.11**	.00	.09†
No. of goals unrelated to GP	.08	-.02	.14**	-.01	-.07	.05
R^2	24.3%	16.1%	32.0%	61.9%	43.2%	50.1%
Change in R^2	-	-	-	37.6%	27.1%	18.1%
Note: *** $p < .001$, ** $p <. 01$, * $p < .05$, † $p < .10$						

4.2.7 Results of Research Hypotheses

Figure 7 depicts the results of the research hypotheses. For the predictors of goal-directed effort, we found a positive and significant effect of goal desire ($\gamma = 0.21$, $p < 0.001$). The results also support a significant positive moderating effect of cumulative GP on the relationship between goal desire and goal-directed effort ($\gamma = 0.08$, $p < 0.05$), demonstrating support for H1. As for action strategies, deliberate planning is a significant predictor ($\gamma = 0.48$, $p < 0.001$) but in-game payment is not ($\gamma = 0.08$, ns). This result indicates that the impact of deliberate planning is stronger than the impact of in-game payment, demonstrating support for H2. These drivers explain 61.9% of the variance in goal-directed effort.

For the determinants of earned GP, the results show a positive and significant effect of cumulative GP ($\gamma = 0.32$, $p < 0.001$). In addition, goal feasibility and goal-directed effort ($\beta = 0.35$, $p < 0.001$) had positive effects on earned GP ($\gamma = 0.17$, $p < 0.01$), demonstrating support for H3 and H4, respectively. We also found a positive moderating effect of goal desire on the relationship between cumulative GP and earned GP ($\gamma = 0.11$, $p < 0.05$), indicating support for H5. These determinants explain 43.2% of the variance in earned GP.

Our results show that deliberate planning has a significant effect ($\gamma = 0.21$, $p < 0.001$) on current need satisfaction, but in-game payment does not ($\gamma = -0.06$, ns), providing empirical support for H6. Also, we found that current need satisfaction is positively influenced by prior need satisfaction ($\gamma = 0.51$, $p < 0.001$). Our results show that earned GP have a marginally significant effect on current need satisfaction ($\beta = 0.09$, $p = 0.067$), demonstrating partial support for H7. The predictors explain 50.1% of the variance in current need satisfaction.

To further confirm the relative importance of deliberate planning over in-game payment, we performed a chi-square difference test (Bollen, 1989). Specifically, we specified two path coefficients with the same value and examined whether the constrained coefficients significantly caused deterioration of fit. Since this difference proved significant, we can conclude that the original model without constraints is superior to the constrained model. As shown in Table 7, the χ^2 difference tests are significant, suggesting that the effect of deliberate planning exceeds that of in-game payment.

We also examined the effects of the seven control variables on the three endogenous variables in the proposed model based on the variance framework. As shown in the proposed model of Table 7, among 27 relationships, four were statistically significant at the level of 0.05 (14.8%). Specifically, we found that goal-directed effort was influenced by the number of goals related to GP ($\gamma = 0.11$, $p < 0.01$) but not by goals unrelated to GP ($\gamma = -0.01$, p = ns).

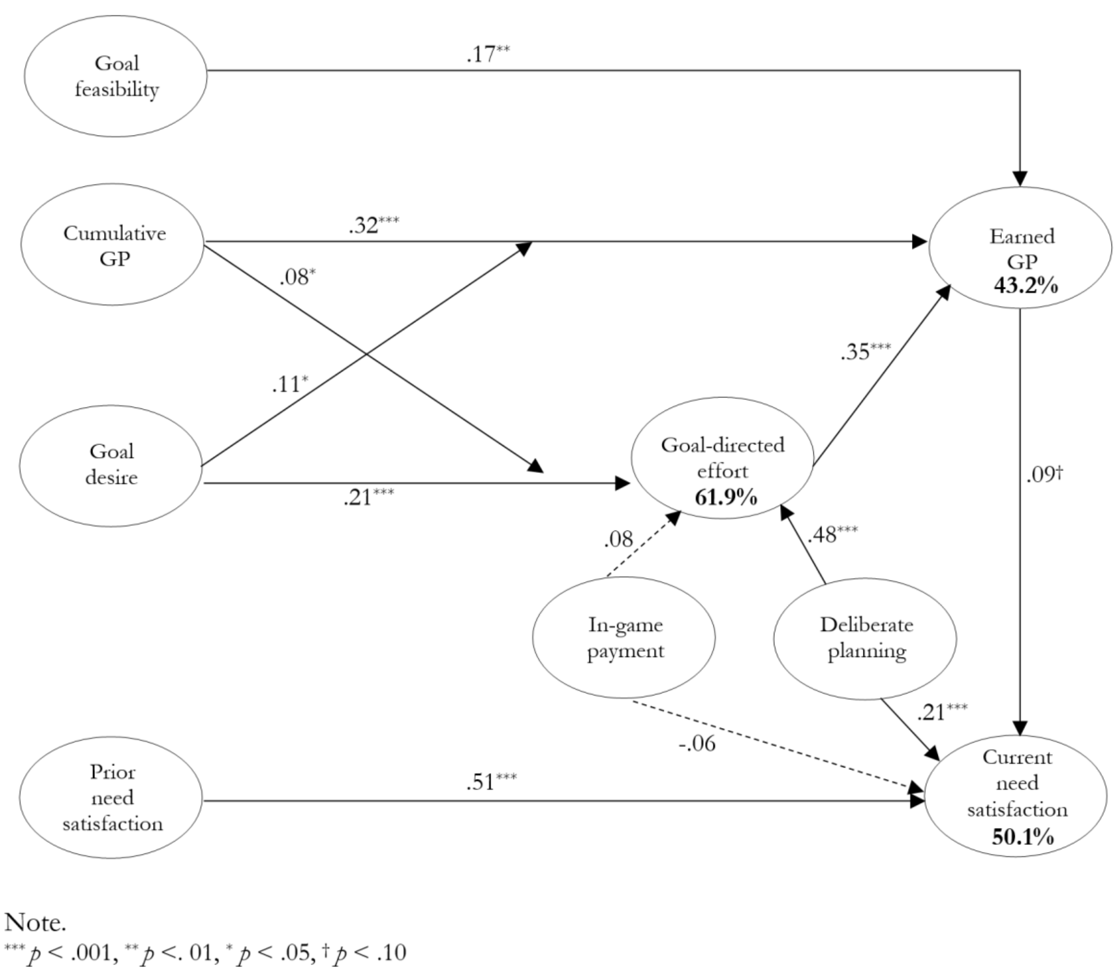

Figure 7. Results of Research Hypotheses

Table 7. Results of Relative Importance

Model	Fixed path	χ^2 value	Difference test
M_1	Baseline model: Hypothesized path	$\chi^2(201) = 262.65$	
M_2	In-game payment, Deliberate planning → Goal-directed effort	$\chi^2(202) = 283.02$	M_2 - M_1: $\Delta\chi^2(1) = 20.37$, p < .001
M_3	In-game payment, Deliberate planning → Current need satisfaction	$\chi^2(202) = 270.98$	M_3 - M_1: $\Delta\chi^2(1) = 7.75$, p < .001

These results imply that if people pursue easily traceable outcomes from point-oriented mobile gaming, they tend to exert extra effort to achieve those goals. Meanwhile, earned GP were found to be influenced by intrinsic motivation ($\gamma = 0.16$, $p < 0.05$), extrinsic motivation ($\gamma = -0.25$, $p < 0.001$), and the number of days since the start of playing the game ($\gamma = -0.14$, $p < 0.05$) in the proposed model.

The negative impact of extrinsic motivation on earned GP was unexpected. However, because the same path was not significant in the base model ($\gamma = -0.05$, p = ns), the negative coefficient in the proposed model could be the result of overfitting when such powerful predictors as cumulative GP and goal feasibility were introduced to the model. Perhaps extrinsic motivation is unnecessary in the model because other research variables (namely, cumulative GP and goal feasibility) have already successfully reflected this aspect of motivation (Bagozzi & Dholakia, 1999). To determine whether these variables reflect motivational factors, we examined the effects of intrinsic and extrinsic motivations. We found that goal feasibility is significantly influenced by intrinsic motivation ($\gamma = 0.24$, $p < 0.001$) and extrinsic motivation ($\gamma = 0.17$, $p < 0.05$). Similarly, cumulative GP is significantly affected by intrinsic motivation ($\gamma = 0.36$, $p < 0.001$) and extrinsic motivation ($\gamma = 0.14$, $p < 0.05$). The two motivations explain 12.1% of goal feasibility and 19.5% of cumulative GP.

Another plausible explanation of the negative effect of extrinsic motivation on earned GP is that playing digital games such as Pokémon GO is mainly driven by intrinsic motivation (e.g., fun) and users' goal setting (e.g., leveling up) rather than extrinsic motivation (e.g., useful for exercising). Specifically, in-game activities such as earning GP may increase when users have high hedonic motivation and game-related goals and may decrease when users have high extrinsic motivations that are less relevant to in-game activity. Lastly, none of the control variables had any significant effect on current need satisfaction, which provides further support for the efficacy of the proposed model based on the variance framework.

5 Discussion and Conclusions

Our objective was to develop and test a conceptual model of the psychological and behavioral process that people use to earn points in digital gaming. Drawing upon theories of goal-directed behavior, we propose a theoretical framework describing goal setting, goal striving, goal attainment, and feedback reaction in the context of digital gaming. To empirically test the proposed model, we collected two sets of data from 407 users of Pokémon GO. As hypothesized, cumulative GP moderated the effect of goal desire on goal-directed effort GP. We also found differential impacts of in-game payment and deliberate planning on goal-directed effort. As expected, we found that goal feasibility has a positive effect on earned GP and that goal desire moderates the relationship between cumulative GP and earned GP. Finally, we found that in-game payment and deliberate planning had differential impacts on current need satisfaction. Overall, our findings provide empirical support for the efficacy of our goal-oriented model as a theoretical tool for explaining digital gaming.

5.1 Theoretical Contributions

A major contribution of this study to IS research is the theoretical development and empirical test of a new goal-oriented framework intended to explain individuals' accumulation of GP. Earning GP essentially differs from the mere use of digital games and gamified systems because to achieve a higher score, users must exert a considerable amount of time and effort to implement different action strategies (Bagozzi, 2007; Goes et al., 2016). The present study highlights the importance of goal setting and pursuit for a high level of achievement. This framework is not only relevant to digital gaming but also important to gamified systems, such as training and fitness tracking in which GP are used extensively (Goes et al., 2016; Hamari et al., 2014; Werbach & Hunter, 2012). The effective design of gamified systems, as with that of digital games, calls for a better understanding of how users set goals and how they strive to reach them.

In addition, our study extends existing goal-based IS research by demonstrating the importance of goal-striving in goal attainment, a link between goal desire and goal attainment mostly unexamined in prior IS studies. When various goal-setting strategies are available, and the goals are difficult to achieve, users go through a series of goal-striving activities such as planning, overcoming obstacles, readjusting actions, and maintaining efforts (Bagozzi, 2007; Sheldon & Elliot, 1999). Thus, goal-based IS research should examine goal striving in the contexts in which achievement, as opposed to mere use, matters—for example, in gaming, online community participation, energy-saving, and IT projects. Drawing on the process model of goal-directed behavior (Bagozzi & Dholakia, 1999), we highlight the central role of goal striving as an event that precedes goal setting and follows goal achievement (Figure 1). This process model further helps develop the variance model in which goal desire is specified to influence goal-directed effort, which in turn is expected to affect earned GP (Figure 3). Taken together, by building on the insights related to goal setting from the process framework, this research demonstrates the importance of goal-directed effort as a major factor of game playing within the variance framework.

Another contribution of this study is the addition of action strategies into the variance model of goal-oriented behavior. Consequently, different action strategies have different influences on the effort that people invest in goal striving (Smith et al., 2011). As hypothesized here, deliberate planning has stronger impacts on goal-directed effort (H2) and current need satisfaction (H6) than in-game payment. Meanwhile, the results show that in-game payment (e.g., external assistance) influences neither goal-directed effort nor need satisfaction. Since buying items as a temporary expedient can help raise scores easily and instantly, gamers are not likely to put much effort into improving their gaming skills. Further, although in-game payment may help increase game performance, this increase in performance was offset by monetary loss and did not lead to an actual improvement in skills. Accordingly, in-game payment may not be perceived by gamers as an inherently satisfying experience.

Action strategies are important concepts in a goal-oriented model because people evaluate and adopt different action strategies when they experience difficulties during goal striving (Carver, 2007; Smith et al., 2017). Despite their importance for goal striving, prior IS research has made little attempt to understand how people use different action strategies to achieve challenging goals (e.g., being a high-level player in the context of gaming). Our study is unique in that it takes into account two forms of game-playing strategies, i.e., in-game payment and deliberate planning, and then shows that their impacts on goal-directed effort are not identical. This study contributes to the body of knowledge in goal-directed behavior by highlighting the differential impacts of action strategies on goal-directed effort.

In a routine environment, goal setting and goal pursuit can be bypassed, and, eventually, goal-directed behavior can become highly routine. This study is among the first to show that past GP affect subsequent GP, which suggests the routine nature of goal-directed behavior. More importantly, our findings indicate that the relationship between prior and current points becomes stronger as goal desire increases. Accumulating GP is challenging, and without a driving motivation, continual improvement becomes difficult. Our study contributes to the IS literature by showing that goal desire changes the nature of routine behavior, as represented by the effect of prior points on subsequent points. Meanwhile, this study also shows that, with the increase in prior achievements, the relationship between goal desire and goal-directed effort becomes stronger. In most circumstances, past behavior tends to weaken the effect of psychological factors on current behavior. However, drawing on the notion of self-regulation by Bagozzi (2007), we posit that the transition from goal desire to goal pursuit is further facilitated by the experience accumulated in earning points. We are the first to show this interesting role of past achievements as a moderator in further cementing the critical link between goal desire and goal pursuit.

This study contributes to the IS literature on goal-directed behavior by showing that goal feasibility is one of the most important considerations in goal setting; furthermore, goal feasibility has a direct impact on goal attainment, even after controlling for prior attainment and for goal-directed effort. Goal feasibility differs from self-efficacy in that self-efficacy is concerned with ability, whereas goal feasibility takes into account not only one's ability but also external factors such as resources and conditions (Bagozzi et al., 2003). Despite the importance of the concept of goal feasibility in the framework of goal-directed behavior, it has received little attention in IS research. More research should be directed toward a better understanding of the role of goal feasibility as a component of goal setting, a role that is expected to have significant ramifications on all phases of goal-directed behavior.

To the best of our knowledge, this study is the first to show the role of action strategies in regulating need-satisfying experiences. Much research shows the relationship between achievements and positive experiences. However, few researchers have examined whether and, if so, how action strategies affect users' evaluation of goal-directed behavior. Our study shows that to a certain extent, earned GP determine need satisfaction; however, it is also affected by the way that game players pursue their goals. More importantly, we found that deliberate planning and its implementation translated into positive experiences, but in-game payment did not significantly affect need satisfaction. Overall, this study reveals an initial piece of evidence: engaging experiences are more strongly associated with positive evaluations than quick-and-easy fixes.

5.2 Practical Contributions

Mobile platforms can offer business opportunities beyond revenues from in-game purchases or fee-based games. However, such business opportunities can be realized only if game players' goals are well-established and properly supported. Thus, a critical question that game developers must address is how to encourage players' goal-directed behavior.

Our study indicates that goal feasibility increases earned GP and that the number of goals related to GP slightly improves the level of need satisfaction. These results suggest that practitioners should focus on designing feasible goals (e.g., leveling up with reasonable effort) to facilitate goal-oriented activities instead of merely incorporating features not directly relevant to the goals (e.g., taking walks and exercising). In the case of Pokémon GO, game elements such as a leaderboard can be incorporated to help people aspire to higher ranks on the leaderboard. Beyond this, for people who want to exercise and lose weight, Pokémon GO could reward them in the form of points or items when they finish walking a certain distance. Goal feasibility can be facilitated in a variety of different ways, including those that are not currently implemented in any existing game. Thus, game developers should focus on incorporating more new game features that help people elicit meaningful and attainable game-related goals.

We found that deliberate planning has a positive effect on goal-directed effort and need satisfaction, whereas in-game payment does not. An important implication of these findings is that game developers need to encourage individuals' deliberate planning. Games should incorporate features that help players make a detailed action plan and facilitate the enjoyment of implementing it. For instance, Pokémon GO could display the historical probability of detecting a certain type of Pokémon that a person is looking for in the immediate vicinity. For players who want to catch a specific Pokémon, this feature could provide useful information, e.g., "Your chance of catching Pikachu will increase by 65% if you take the left path instead of the right path." Such a game feature would likely reduce random exploration while fostering strategic planning and committed pursuit that could eventually lead to greater goal-directed effort and need satisfaction. In fact, this type of feature could be implemented not only in Pokémon GO but also in other games as an effective method to facilitate deliberate planning. We hope that game providers take full advantage of our findings because their applicability is unlikely to be confined to the specific setting examined in this study.

5.3 Limitations and Further Research

This study has some limitations that should be considered in interpreting the results. First, it is unclear whether our findings can be generalized to all types of digital games. We studied Pokémon GO, which uses a few unique features such as GPS tracking and augmented reality on a mobile platform. The factors we examined may differ in other types of games. More insights may be revealed from future research on different types of digital games across different platforms. Second, our findings suggest that earned GP are a good proxy of goal attainment in this specific context because a majority of players selected goals related to GP, and GP are believed to reasonably represent achievements, even for goals unrelated to GP. However, it remains unclear how different goals can lead to different achievements. Thus, future research could investigate the relative importance of different goals in influencing goal achievements other than earned GP. Third, although we received a screenshot of participants' account information to validate game usage data, we did not use the system to collect such data. Using system-log data would enable future researchers to gain more information on gaming behavior such as duration of play, log-on and log-off times, and specific Pokémon caught. Fourth, we proposed two action strategies in this study, but they are not intended to be an exhaustive list. For example, some people might give up on their goals in the face of challenges; others may simply hope for good luck without any specific plan (Litman, 2006). Although deliberate planning and in-game payment are believed to be among the most dominant strategies in the context of digital gaming, our findings should be interpreted cautiously until the effects of other action strategies are fully understood. In relation to this issue, it is also important to note that each action strategy in this study was analyzed separately from the other. However, the two strategies may be intertwined, and we did not examine their effect when intertwined. Further research is required to better understand the joint effect of multiple action strategies on digital gaming. Fifth, another potential limitation of this study is our assumption that the lowest level of goal desire represents no goals. While this assumption seems reasonable, at least for the purpose of this empirical study, it may not be entirely proper to simply equate the lowest level of goal desire with no goals. Finally, although we tried to include relevant control variables, we did not include other potential control variables such as the participants' disposable income, their willingness to pay toward the in-app purchase, and their experience with an in-app purchase. Future research could include the control variables in our model and examine users' goal striving and attainment.

This study opens up several opportunities for further research. A possible extension of this research is to consider the role of online communities in regulating individual performance in mobile gaming (e.g., Tsai & Bagozzi, 2014; Xue et al., 2012). For example, in the case of Pokémon GO, numerous players visit online communities to get useful game-related information (e.g., where rare Pokémon are located in their local areas). Such community activities likely influence individual performance in mobile gaming, which may in turn affect subsequent community activities. Thus, we encourage researchers to examine the complex dynamics that occur within the dual contexts of online community and mobile gaming behavior. In addition, a potentially fertile area for further research would be to investigate how the difference between desired and actual performance affects subsequent evaluations and goal formation. Individuals' judgments and behavior are likely to unfold in a fundamentally different manner depending on the gap between expectation and reality. For example, even if actual performances are identical, outperformance and underperformance may have vastly distinct ramifications on subsequent gaming experiences. We further expect that such relationships will not be simple but complex and nonlinear. Thus, researchers could develop a nuanced understanding of how the differences between desired and actual performances change the way that people play mobile games.

5.4 Concluding Remarks

Prior research on digital games, which is rooted in traditional adoption and use theories, has generally examined individuals' adoption, use, and continued use of digital games. As a result, little was known about individuals desire and striving to achieve in-game activities in digital gaming. This study is one of the first attempts to explain digital game playing as a process of setting, striving, accomplishing, and evaluating the outcome of personal goals. Numerous IT applications are currently associated with the end states that people wish to achieve (e.g., learning, gaming, physical training). This study offers helpful insights into the nature of goal-directed behavior in both existing and newly emerging areas of IS research (e.g., gamified systems). We hope that our model will be helpful for future endeavors that seek to investigate individuals' achievements within IT-related settings.

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Appendix A: Selected Research on Digital Games and Gamification

Table A1. Selected Research on Digital Games and Gamification

Source	Category	Focus	IV	(Intermediary) DV	Key findings
Choi & Kim (2004)	Online game	Factors in customer loyalty	▪ Personal interaction ▪ Social interaction	▪ Flow ▪ Customer loyalty	▪ Design aspects (personal and social interactions) positively influence players' experience of flow, which in turn influence their loyalty
Hsu & Lu (2004)	Online game	Antecedents of intention to play an online game	▪ Social norms ▪ Critical mass ▪ Perceived usefulness ▪ Perceived ease of use ▪ Flow experience	▪ Attitude ▪ Intention	▪ Critical mass, perceived usefulness, and perceived ease of use positively influence attitude toward playing an online game. ▪ Social norms, attitude, flow experience positively influence intention to play an online game.
Yee (2006)	Online game	Motivational factors in playing MMORPG	N/A	N/A	▪ Achievement (e.g., advancement, mechanics, competition), social (e.g., socializing, relationship, teamwork), and immersion (e.g., discovery, role-playing, customization) components are key motivating factors for playing MMORPG.
Ha et al. (2007)	Mobile game	Determinants of attitudes toward playing mobile games	▪ Perceived usefulness ▪ Perceived ease of use ▪ Perceived enjoyment ▪ Flow experience ▪ Perceived attractiveness ▪ Perceived lower sacrifices	▪ Attitude	▪ Flow experience, perceived ease of use, perceived enjoyment, and perceived attractiveness predict attitude toward playing mobile broadband wireless access technology-based (MBWA) games. ▪ Perceived enjoyment is the most important factor in explaining attitude toward MBWA games.
Wu & Liu (2007)	Online game	Predictors of intention to play online games	▪ Trust in online game websites ▪ Online gaming enjoyment ▪ Subjective norms	▪ Attitude ▪ Intention	▪ Trust and enjoyment predict attitude, which positively influences intention to play online games.
Lu & Wang (2008)	Online game	Antecedents and consequences of online game addiction	▪ Perceived behavioral control ▪ Descriptive norms ▪ Perceived playfulness ▪ Satisfaction	▪ Online game addiction ▪ Loyalty	▪ Perceived behavioral control, descriptive norm, and perceived playfulness influence online game addiction, affecting loyalty. ▪ Online game addiction negatively moderates the relationship between satisfaction and loyalty.
Wang & Wang (2008)	Online game	Predictors of perceived playfulness	▪ System characteristics (challenge, feedback, speed) ▪ Individual differences (computer self-efficacy, computer anxiety) ▪ Gender	▪ Perceived playfulness ▪ Intention	▪ Challenge affects perceived playfulness, which influences intention to play online games. ▪ The positive effect of computer self-efficacy on intention is significantly higher for men. ▪ The negative effect of computer anxiety on intention is significantly higher for women.

Wu et al. (2008)	Online game	Determinants of online gaming enjoyment	▪ Online game story ▪ Online game graphics ▪ Online game sound ▪ Online game length ▪ Online game control	▪ Enjoyment ▪ Intention	▪ Online game story, graphics, length, and control predict online gaming enjoyment, which in turn affects intention to play online games.
Koo (2009)	Online game	Moderating role of locus of control	▪ Concentration ▪ Enjoyment ▪ Escape ▪ Epistemic curiosity ▪ Social affiliation ▪ Locus of control	▪ Intention	▪ Perceived enjoyment, escape, and social affiliation predicts intention to play online games. ▪ Effects of concentration, perceived enjoyment, and escape on intention are higher for people with external locus of control than for people with internal locus of control.
Lee (2009)	Online game	Predictors of intention to play online games	▪ Human-computer interaction ▪ Social interaction ▪ Flow experience ▪ Perceived enjoyment ▪ Attitude ▪ Subjective norm ▪ Perceived behavioral control ▪ Perceived usefulness ▪ Perceived ease of use	▪ Intention ▪ Behavior	▪ While both TAM and TPB predict players' intention to play online games well, extended TPB provides better explanatory power. ▪ Flow experience is a more important factor than perceived enjoyment in influencing intention to play online games.
Bourgonjon et al. (2010)	Video game	Determinants of preferences for video games	▪ Gender ▪ Experience ▪ Perceived ease of use ▪ Perceived usefulness ▪ Learning opportunity	▪ Preference for video game	▪ Perceived usefulness, perceived ease of use, learning opportunities, and personal experience predict preference for video games in the classroom.
Lee & Tsai (2010)	Online game	Antecedents of continued intention to play online games	▪ Perceived enjoyment ▪ Perceived ease of use ▪ Human-computer interaction ▪ Social interaction ▪ Flow experience ▪ Attitude ▪ Subjective norm ▪ Perceived behavioral control	▪ Continued intention	▪ Human-computer interaction and social interaction positively influence flow experience. ▪ Attitudes, subjective norm, perceived behavioral control, flow experience, and perceived enjoyment predict players' continued intention to play online games.
Lin & Bhattacherjee (2010)	Online game	Predictors of intention to use online video games	▪ Technical quality ▪ Interactive quality ▪ Perceived enjoyment ▪ Social image	▪ Attitude ▪ Usage intention	▪ Technical quality positively influences perceived enjoyment. ▪ Interactive quality positively affects social image. ▪ Perceived enjoyment and social image positively affect attitude, which in turn influences the intention to use interactive hedonic technologies.
Wu et al. (2010)	Online game	Determinants of proactive stickiness to online games	▪ Gratification (achievement, presence, social interactions) ▪ Presence (spatial, social)	▪ Continuance motivation ▪ Proactive stickiness	▪ Gratifications and service mechanisms positively influence continued motivation to play, which affects proactive stickiness to online games.

			▪ Service mechanisms (fairness, security, incentive)		
Hou et al. (2011)	Online game	Factors in switching intentions of online gamers	▪ Push (enjoyment, service satisfaction, perception of sufficient participants) ▪ Mooring (switching costs, social relationships, need for variety, prior switching experience) ▪ Pull (attractiveness of alternative)	▪ Switching intention	▪ The mooring effect has a stronger impact on a player's switching intention than the pull effect, but the push effect has no influence.
Huang & Hsieh (2011)	Online game	Predictors of online game loyalty	▪ Entertainment ▪ Sociality ▪ Challenge ▪ Control ▪ Interactivity	▪ Loyalty	▪ Users' sense of control, perceived entertainment, and challenge predict loyalty toward online games.
Liu & Li (2011)	Mobile game	Determinants of intention to adopt a mobile game	▪ Use context ▪ Perceived ease of use ▪ Perceived usefulness ▪ Perceived enjoyment ▪ Cognitive concentration	▪ Attitude ▪ Intention	▪ Use context significantly influences perceived ease of use, perceived usefulness, perceived enjoyment, cognitive concentration, attitude, and behavioral intention.
Mantymaki & Salo (2011)	Social online game	Continuous use and purchasing behavior in the virtual social world	▪ Perceived aggregate network exposure ▪ Perceived usefulness ▪ Perceived enjoyment ▪ Perceived ease of use	▪ Attitude ▪ Continuance intention ▪ Purchasing intention	▪ Purchasing intention is predicted by perceived aggregate network exposure and continuous use intention. ▪ Perceived enjoyment, perceived usefulness, and attitude affect continuous use intention.
Shin & Shin (2011)	Social network game	Factors in social network game adoption	▪ Perceived playfulness ▪ Perceived security ▪ Perceived enjoyment ▪ Perceived usefulness ▪ Flow	▪ Attitude ▪ Intention ▪ Behavior	▪ Perceived playfulness and perceived security affect attitude. ▪ Perceived enjoyment, perceived usefulness, and flow predict intention.
Lowry et al. (2012)	Video game	Proposing a hedonic-motivation system adoption model	▪ Perceived ease of use ▪ Perceived usefulness ▪ Curiosity ▪ Joy ▪ Control	▪ Immersion ▪ Intention	▪ Flow-based cognitive absorption is an important mediator of perceived ease of use and of intention to use hedonic-motivation systems.
Xu et al. (2012)	Online game	Antecedents of online game addiction	▪ Motivational factors / functional needs (relationship, escapism, mechanics, advancement) ▪ Prevention and harm reduction factors (attention switching, dissuasion, rationalization / education, parental monitoring, resource restriction, perceived cost)	▪ Game playing ▪ Addiction	▪ Gaming playing and online game addiction are driven by functional needs (e.g., functional needs (e.g., need for relationship and need for escapism) and prevention and harm reduction factors (e.g., dissuasion).

Billieux et al. (2013)	Online game	Motivations to play online games	▪ Motivation to Play in Online Games Questionnaire (advancement, mechanics, competition, socializing, teamwork, discovery, role play, customization, escapism)	▪ Actual in-game behavior (quest, exploration, player vs. player, dungeons and raids, miscellaneous achievements)	▪ Teamwork- and competition-related motivations are the most accurate determinants of fast progression in the World of Warcraft.
Chang (2013)	Social network game	The mediating role of flow experience	▪ Human-computer interaction ▪ Social interaction ▪ Utilitarian value ▪ Hedonic value	▪ Satisfaction ▪ Flow experience ▪ Continued intention	▪ Human-computer interaction, social interaction, utilitarian value, and hedonic value significantly affect satisfaction and flow experience, influencing continued intention to use social network games.
Hamari (2013)	Gamification	Role of the badge as game mechanism	▪ Social comparison (ability to view other users' badges) ▪ Goal setting (ability to see from which actions one can unlock badges)	▪ Usage activity (numbers of trade proposals, accepted transactions, comments, page views)	▪ Mere implementation of gamification mechanisms does not automatically increase use activity in the context of peer-to-peer trading services. ▪ Users who actively monitored their own badges showed increased usage activity.
Liu et al. (2013)	Digital game	Role of competition	▪ Competition structure	▪ Effort ▪ Enjoyment ▪ Arousal	▪ Players who compete with players of similar skill levels expend more effort. ▪ Players who compete with players of lower skill levels report higher enjoyment and lower arousal.
Koivisto & Hamari (2014)	Gamification	Demographic differences in perceived benefits from gamification in the context of exercise	▪ Age ▪ Gender ▪ Time using the service	▪ Network exposure ▪ Ease of use ▪ Social influence ▪ Reciprocal benefit ▪ Recognition ▪ Playfulness ▪ Enjoyment ▪ Usefulness ▪ Continued exercise intention	▪ Time using the service decreases perceived enjoyment and usefulness. ▪ Women show greater social benefit from the use of gamification. ▪ Age reduces the ease of use of gamification
Li et al. (2014)	Software game	Role of cognitive-related gaming elements of a software game in user engagement	▪ Game complexity ▪ Game familiarity	▪ User-game engagement (density of theta oscillations from left side of the dorsolateral prefrontal cortex)	▪ Game complexity and familiarity increase the density of theta oscillations from the left side of the dorsolateral prefrontal cortex.
Wei & Lu (2014)	Mobile social game	Factors in intention to play mobile social games	▪ Network externalities ▪ Individual gratification ▪ Time flexibility	▪ Intention to play	▪ Network externalities, individual gratification, and time flexibility have positive effects on intention to play socially interactive games on mobile devices.
Hamari (2015)	Social network,	Factors in purchasing intention for virtual goods in	▪ Subjective norms toward purchasing virtual goods	▪ Continuous use intention for the core service	▪ Perceived enjoyment increases users' intention to play more of

	online, and digital games	different gaming contexts	▪ Attitude toward purchasable virtual goods ▪ Perceived enjoyment of core service	▪ Purchase intention for virtual goods	the game but reduces the intention to buy virtual goods. ▪ Continued use positively influences intention to purchase virtual goods.
Darban et al. (2016)	Gamification	Antecedents and consequences of perceived knowledge updates	▪ Team collaboration effectiveness ▪ Individual effort	▪ Perceived knowledge update ▪ Intention to learn about ERP systems	▪ Team collaboration effectiveness at the team level positively influences individual effort and perceived knowledge updates at the individual level. ▪ Perceived knowledge update affects intention to learn about ERP systems.
Santhanam et al. (2016)	Gamification	Competitive structure in gamified training	▪ Competition structure	▪ Cognitive absorption ▪ Self-efficacy ▪ Learning outcomes	▪ Trainees who competed with a lower-skilled trainee reported higher belief of self-efficacy and better learning outcomes. ▪ Trainees who completed with equally skilled trainees reported higher levels of engagement.
Shchiglik et al. (2016)	Mobile game	Developing measures of mobile game quality	N/A	N/A	▪ Mobile game quality consists of five factors: ease of use, content quality, responsiveness, gaming experience, and aesthetical appeal.
Merikivi et al. (2017)	Mobile game	Determinants of perceived enjoyment in mobile gaming	▪ Game design (challenge, variety, novelty, design aesthetics) ▪ Playability (ease of use, interactivity)	▪ Perceived enjoyment ▪ Continuance Intention	▪ Challenge, novelty, design aesthetics, and perceived ease of use have positive influences on perceived enjoyment, which in turn affects continuance intention.
Suh et al. (2017)	Gamification	Effects of gamification affordance on user engagement	▪ Rewards affordance ▪ Status affordance ▪ Competition affordance ▪ Self-expression affordance	▪ Flow experience (FE) ▪ Aesthetics experience (AE) ▪ Continuance intention	▪ Status and competition affordances positively influence both FE and AE. ▪ Self-expression affordance positively affects AE. ▪ AE is more salient than FE for explaining continuance intention.
Suh & Wagner (2017)	Gamification	Role of gamification affordance in perceived hedonic value	▪ Rewardability ▪ Competition ▪ Visibility of achievement	▪ Perceived hedonic value ▪ Quality and quantity of knowledge contribution	▪ Three gamification affordances, rewardability, competition, and visibility of achievement, predict employees' perceived hedonic value of an enterprise collaboration system, which in turn increases knowledge contribution.
Kwak et al. (2019)	Gamification	The moderating role of team cohesion	▪ Team performance rank ▪ Team cohesion ▪ Perceived quality ▪ Perceived enjoyment	▪ Attitude toward learning via ERP simulation game ▪ Intention to learn about ERP systems	▪ Team performance rank influences team cohesion. ▪ Team cohesion at the team level positively moderates the relationship between perceived quality and attitude and negatively moderates the relationship between perceived enjoyment and attitude at the individual level.

Appendix B: Level, GP, Rewards, and Unlockable Content

Table B1. Levels, GP, Rewards, and Unlockable Content

Level	GP required	Total GP	Rewards received	Unlockable content
1	0	0	None	
2	1,000	1,000	15 Poké Balls	
3	2,000	3,000	15 Poké Balls	
4	3,000	6,000	15 Poké Balls	
5	4,000	10,000	10 Potions, 1 Incense, 10 Revives	Choosing a team, gyms, Great Potions, Revives
6	5,000	15,000	15 Poké Balls, 10 Potions, 10 Revives, 1 Egg Incubator	
7	6,000	21,000	15 Poké Balls, 10 Potions, 10 Revives, 1 Incense	
8	7,000	28,000	15 Poké Balls, 10 Potions, 5 Revives, 10 Razz Berries, 1 Lure Module	
9	8,000	36,000	15 Poké Balls, 10 Potions, 5 Revives, 3 Razz Berries, 1 Lucky Egg	
10	9,000	45,000	15 Poké Balls, 10 Super Potions, 10 Revives, 10 Razz Berries, 1 Incense, 1 Lucky Egg, 1 Egg Incubator, 1 Lure Module	Super Potions
11	10,000	55,000	15 Poké Balls, 10 Super Potions, 3 Revives, 3 Razz Berries	
12	10,000	65,000	20 Great Balls, 10 Super Potions, 3 Revives, 3 Razz Berries	Great Balls
13	10,000	75,000	15 Great Balls, 10 Super Potions, 3 Revives, 3 Razz Berries	
14	10,000	85,000	15 Great Balls, 10 Super Potions, 3 Revives, 3 Razz Berries	
15	15,000	100,000	15 Great Balls, 20 Hyper Potions, 10 Revives, 10 Razz Berries, 1 Incense, 1 Lucky Egg, 1 Egg Incubator, 1 Lure Module	Hyper Potions
16	20,000	120,000	10 Great Balls, 10 Hyper Potions, 5 Revives, 5 Razz Berries	
17	20,000	140,000	10 Great Balls, 10 Hyper Potions, 5 Revives, 5 Razz Berries	
18	20,000	160,000	10 Great Balls, 10 Hyper Potions, 5 Revives, 5 Razz Berries	
19	25,000	185,000	10 Great Balls, 10 Hyper Potions, 5 Revives, 5 Razz Berries	
20	25,000	210,000	20 Ultra Balls, 20 Hyper Potions, 20 Revives, 20 Razz Berry, 2 Incense, 2 Lucky Eggs, 2 Egg Incubators, 2 Lure Modules	Ultra Balls
21	50,000	260,000	10 Ultra Balls, 10 Hyper Potions, 10 Revives, 10 Razz Berries	
22	75,000	335,000	10 Ultra Balls, 10 Hyper Potions, 10 Revives, 10 Razz Berries	
23	100,000	435,000	10 Ultra Balls, 10 Hyper Potions, 10 Revives, 10 Razz Berries	
24	125,000	560,000	10 Ultra Balls, 10 Hyper Potions, 10 Revives, 10 Razz Berries	
25	150,000	710,000	25 Ultra Balls, 20 Max Potions, 15 Revives, 15 Razz Berries, 1 Incense, 1 Lucky Egg, 1 Egg Incubator, 1 Lure Module	Max Potions
26	190,000	900,000	10 Ultra Balls, 15 Max Potions, 10 Revives, 15 Razz Berries	
27	200,000	1,100,000	10 Ultra Balls, 15 Max Potions, 10 Revives, 15 Razz Berries	
28	250,000	1,350,000	10 Ultra Balls, 15 Max Potions, 10 Revives, 15 Razz Berries	
29	300,000	1,650,000	10 Ultra Balls, 15 Max Potions, 10 Revives, 15 Razz Berries	
30	350,000	2,000,000	30 Ultra Balls, 20 Max Potions, 20 Max Revives, 20 Razz Berries, 3 Incense, 3 Lucky Eggs, 3 Egg Incubators, 3 Lure Modules	Max Revive
31	500,000	2,500,000	10 Ultra Balls, 15 Max Potions, 10 Max Revives, 15 Razz Berries	
32	500,000	3,000,000	10 Ultra Balls, 15 Max Potions, 10 Max Revives, 15 Razz Berries	
33	750,000	3,750,000	10 Ultra Balls, 15 Max Potions, 10 Max Revives, 15 Razz Berries	
34	1,000,000	4,750,000	10 Ultra Balls, 15 Max Potions, 10 Max Revives, 15 Razz Berries	
35	1,250,000	6,000,000	30 Ultra Bells, 20 Max Potions, 20 Max Revives, 20 Razz Berries, 2 Incense, 1 Lucky Egg, 1 Lure Module	
36	1,500,000	7,500,000	30 Ultra Balls, 20 Max Potions, 10 Max Revives, 20 Razz Berries	
37	2,000,000	9,500,000	20 Ultra Balls, 20 Max Potions, 10 Max Revives, 20 Razz Berries	
38	2,500,000	12,000,000	20 Ultra Balls, 20 Max Potions, 10 Max Revives, 20 Razz Berries	
39	3,000,000	15,000,000	20 Ultra Balls, 20 Max Potions, 10 Max Revives, 20 Razz Berries	
40	5,000,000	20,000,000	40 Ultra Balls, 40 Max Potions, 40 Max Revives, 40 Razz Berries, 4 Incense, 4 Lucky Eggs, 4 Egg Incubators, 4 Lure Modules	

Appendix C: Measures

Table C1. Measures for the Preliminary Study

Variable	Measures
Goal Selection	Among these several goals, please choose the most important goal(s) for you in playing Pokémon GO within the next week. Choose as many as you like. □ Catching many new Pokémon □ Leveling up □ Winning gym battles and conquering gyms □ Exercising or losing weight by walking □ Hanging out with friends □ Meeting new people □ Others _______________ □ I don't have any goals.
GP	What is your total XP[A]?
Level	What is your current level?
Jogger	How many kilometers did you walk?
Kanto	How many Pokémon did you register in the Pokédex?
Collector	How many Pokémon did you capture?
Scientist	How many Pokémon did you evolve?
Breeder	How many eggs did you catch?
Backpacker	How many PokéStops did you visit?
Battle Girl	How many Gym battles did you win?
Ace Trainer	How many times did you train?
Gender	What is your gender? (1 = male; 2 = female)
Age	How old are you?

[A] Pokémon GO uses the term, XP (experience points), to indicate its game point system.

Table C2. Measures for the Main Study

Variable	Measures	Sources
Goal selection	Among these several goals, please choose the most important goal(s) for you in playing Pokémon GO within the next week. Choose as many as you like. □ Catching many new Pokémon □ Leveling up □ Winning gym battles and conquering gyms □ Exercising or losing weight by walking □ Hanging out with friends □ Meeting new people □ Others _______________ □ I don't have any goals.	Newly developed
Cumulative GP[A]	What is your total XP?	Newly developed
Earned GP[A]	Difference between GP at t = 2 and GP at t = 1	Newly developed
Goal desire	In playing Pokémon GO, within the next week, GD1: My desire to attain the goal(s) I chose can best be described as (no desire at all – very strong desire) GD2: I feel an urge or need to attain the goal(s) I chose (does not describe me at all – describes me very well) GD3: My overall wish to attain the goal(s) I chose can be summarized as follow: (no with at all – very strong wish)	Bagozzi et al. (2003)
Goal feasibility	In playing Pokémon GO, within the next week, GF1: to attain the goal(s) I chose will be (highly infeasible – highly feasible) GF2: to achieve the goal(s) I chose will be (very difficult – very easy) GF3: the possibility to attain the goal(s) I chose will be (very low – very high)	Bagozzi et al. (2003)
Need satisfaction[B]	To what extent are you having these three types of experiences? NS1: I feel competent and able while playing Pokémon GO. NS2: I feel autonomous and choiceful while playing Pokémon GO. NS3: I feel related and connected to the people I spent time with while playing Pokémon GO.	Sheldon & Elliot (1999)
Goal-directed effort	In playing Pokémon GO during the last week, GE1: how much effort did you devote toward the goal(s) you chose? (none at all – very much) GE2: how hard did you try to pursue the goal(s) you chose?	Smith et al. (2007)

		(not at all – very hard)	
In-game payment		To attain the goal(s) I chose during the last week, IGP1: I bought/used necessary items or Pokécoins. IGP2: I bought/used items or Pokécoins when I needed to.	Newly developed
Deliberate planning		DP1: I tried to come up with a strategy about what to do. DP2: I thought hard about what steps to take.	Carver (1997)
Controls	Intrinsic motivation	IM1: I play Pokémon GO because it is enjoyable. IM2: I play Pokémon GO because it is fun.	Sheldon & Elliot (1999)
	Extrinsic motivation	EM1: I play Pokémon GO because it is useful. EM2: I play Pokémon GO because it is beneficial.	Sheldon & Elliot (1999)
	Weather condition	In playing Pokémon GO, the weather during the last week was: (overall very bad – overall very good)	Newly developed
	Time availability	I had enough time to play Pokémon GO, during the last week.	Newly developed
	Days Since game started[A]	Difference between the first survey date and the game start date.	Newly developed
	Gender	What is your gender? (1 = male; 2 = female)	
	Age	How old are you?	

[A] Used log transformation; [B] t_1: Prior need satisfaction, t_2 Current need satisfaction
All items were measured with seven-point scales. Most were anchored with strongly disagree—strongly agree unless noted as described below.

Appendix D: Results of Exploratory Factor Analysis

Table D1. Results of Exploratory Factor Analysis

	GF	GD	NS (t = 1)	IGP	DP	GE	NS (t = 2)	IM	EM
GF1	**.780**	.189	.233	.087	-.054	.141	.090	.077	.096
GF2	**.858**	-.044	-.014	-.057	.070	-.099	.021	.079	.105
GF3	**.818**	.264	.073	-.014	.067	.040	.123	.009	-.026
GD1	.207	**.838**	.110	.141	.154	.144	.087	.157	.152
GD2	.087	**.877**	.099	.109	.121	.176	.015	.094	.129
GD3	.148	**.857**	.131	.139	.147	.171	.100	.146	.186
NS1	.160	.161	**.718**	.038	-.058	.170	.322	.230	.121
NS2	.107	.144	**.787**	.006	.002	.110	.304	.200	.133
NS3	.072	.066	**.776**	.102	.244	-.051	.253	.196	.117
IGP1	.004	.148	.073	**.916**	.174	.178	.055	.040	.096
IGP2	-.011	.154	.034	**.929**	.151	.156	.075	.049	.033
DP1	.057	.248	.053	.271	**.743**	.361	.220	.091	.067
DP2	.065	.223	.114	.204	**.824**	.293	.125	.079	.096
GE1	.008	.261	.105	.224	.284	**.832**	.123	.099	.119
GE2	.039	.278	.080	.235	.308	**.806**	.145	.099	.121
NS1	.108	.096	.220	.027	.056	.154	**.878**	.157	.056
NS2	.153	.029	.245	.054	.045	.144	**.853**	.171	.096
NS3	-.014	.061	.343	.107	.273	-.055	**.747**	.097	.094
IM1	.094	.174	.278	.066	.094	.077	.211	**.860**	.174
IM2	.097	.229	.330	.048	.073	.117	.242	**.822**	.142
EM1	.080	.150	.134	.067	.037	.097	.102	.142	**.891**
EM2	.085	.222	.137	.062	.094	.082	.090	.104	**.873**

Note: GF: goal feasibility, GD: goal desire, NS (t = 1): prior need satisfaction, IGP: in-game payment, DP: deliberate planning, GE: goal-directed effort, NS (t = 2): current need satisfaction, IM: intrinsic motivation, EM: extrinsic motivation

Appendix E: Correlation Matrix

Table E1. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Cumulative GP	-																	
(2) Earned GP	.39	-																
(3) Goal feasibility	.14	.31	***.76***															
(4) Goal desire	.22	.37	.44	***.91***														
(5) Prior need satisfaction	.37	.19	.39	.42	-													
(6) In-game payment	.31	.27	.09	.38	.21	***.94***												
(7) Deliberate planning	.28	.36	.22	.53	.34	.54	***.92***											
(8) Goal-directed effort	.39	.52	.20	.57	.34	.51	.71	***.96***										
(9) Current need satisfaction	.30	.30	.32	.29	.72	.20	.42	.36	***.86***									
(10) *Gender*	-.13	.04	.02	.04	.12	-.08	-.07	-.03	.10	-								
(11) *Age*	.02	.10	-.07	.07	.00	.10	.06	.06	.04	.10	-							
(12) *Intrinsic motivation*	.42	.35	.31	.49	.70	.21	.35	.37	.54	.03	-.01	***.95***						
(13) *Extrinsic motivation*	.30	.10	.27	.48	.44	.24	.31	.36	.32	-.03	-.11	.43	***.87***					
(14) *Weather conditions*	-.03	.06	.00	.00	-.12	.06	-.03	.05	-.09	-.01	.02	-.13	.00	-				
(15) *Time availability*	-.07	-.01	-.04	-.01	-.01	.07	.03	.06	-.02	-.04	.00	-.01	.01	.30	-			
(16) *Playing days since game started*	.61	.10	.04	.02	.22	.07	.07	.11	.19	-.15	-.13	.30	.11	-.02	-.02	-		
(17) *No. of goals related to GP*	.30	.22	.05	.24	.27	.19	.21	.32	.30	-.10	.03	.36	.13	-.06	-.01	.19	-	
(18) *No. of goals unrelated to GP*	.20	.01	.06	.18	.26	.18	.21	.18	.20	.01	-.01	.13	.27	-.03	.00	.13	.09	-
Mean	11.10	4.83	4.47	3.55	4.34	2.39	3.00	3.55	4.24	1.34	22.55	5.23	2.88	3.99	3.01	4.21	1.48	.77
Standard deviation	2.01	4.06	1.39	1.64	1.51	1.88	1.71	1.64	1.52	.47	4.44	1.44	1.52	1.56	1.94	1.10	4.06	.97
Cronbach's alpha	-	-	.80	.93	-	.94	.92	.96	-	-	-	.95	.86	-	-	-	-	-
Composite reliability	-	-	.80	.94	-	.94	.92	.96	-	-	-	.95	.86	-	-	-	-	-
AVE	-	-	.57	.83	-	.89	.85	.93	-	-	-	.90	.76	-	-	-	-	-
Lowest factor loading	-	-	.67	.87	-	.92	.87	.95	-	-	-	.91	.87	-	-	-	-	
Highest factor loading	-	-	.81	.95	-	.97	.97	.97	-	-	-	.98	.88	-	-	-	-	

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