



# A dualistic approach to harmonious and obsessive passion: The impact of game mechanics on mobile gaming engagement

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## Abstract

Current gaming literature lacks empirical evidence on the influence of game design elements and the process through which game engagement can transition into addictive behaviors. Drawing upon the dual theory of passion, this research explores how game design mechanics shape the dualistic experience of passion (i.e., harmonious versus obsessive passion) in mobile gaming consumption. Our netnographic study involved a 2-year participatory observation of an online mobile game community named *Empires and Puzzles*, culminating in 10,927 posts and nine relevant forum topics. Seven interviews with game developers were also conducted. Our findings reveal that specific mobile game mechanics, namely farming, loot boxing, and raiding, influence the transition from harmonious passion (HP) to obsessive passion (OP) through a pathway characterized by pre-occupying, whilst the recovery mechanism that facilitates the transition from OP back to HP include alleviating. Such findings foreground the theoretical importance of moving beyond a static perspective of gaming engagement. This study contributes to information system literature by developing an empirically grounded framework for understanding the mechanisms underlying the influence of game design on the dualistic nature of mobile gaming passion. Persistent public criticism and government skepticism can impede game businesses. Our insights have the potential to generate positive social impacts by promoting responsible game design to alleviate resistance and skepticism.

**Keywords** Passion · Dual theory of passion · Engagement · Mobile gaming · Responsible game design · Netnography

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## 1 Introduction

Digital game consumption has become an entrenched entertainment for many consumers, transforming into a significant economic and cultural phenomenon on a global scale [75]. Among the various forms of digital games, mobile gaming is one of the most promising services, experiencing remarkable growth in recent years, while the COVID-19 pandemic has accelerated the surge of the gaming industry [22]. Gaming practices such as watching, playing, chatting with other players, streaming videos, problem-solving and decision-making are conceptualized as behavioral manifestations of consumer engagement [15], which also includes motivated behaviors that extend beyond entertainment and gaming activities [69]. While some individuals engage in healthy gaming as a digital pastime, others develop obsessive behaviors [11]. Examples like an Australian man who spent his wedding savings on a mobile game [57] are not uncommon. These obsessive behaviors underpin the immense revenue-generating capabilities of the mobile gaming industry. We propose that the concept of passion, characterized by strong engagement in an activity that individuals consider important enough to invest time, energy, and money [68], can shed light on this phenomenon.

While gaming engagement has the potential to serve as a means of stress coping and emotion regulation [36], it can also induce obsessive overdependence and undesirable outcomes like addiction, depression, and social isolation [32, 80]. This duality of contrasting psychological experiences can be considered a unique aspect of passion [45]. This research links this dualism of passion with gaming engagement by employing the dual theory of passion that categorizes passion into harmonious passion (HP) (i.e., a balanced and volitional engagement in passionate activities that enhances one's life) and obsessive passion (OP) (i.e., a rigid engagement in beloved activities that misalign with one's values and identity) [68]. Scholars have linked HP to positive affect that enhances life satisfaction, while OP leads to a negative emotional state that is detrimental to one's well-being [45]. While Cheah et al. [11] systematic literature review has identified comprehensive motivational factors underlying gaming engagement—such as immersion and flow, gratification and affect, escapism, social interaction, identification, and goal orientation—the ongoing societal challenge of obsessive gaming raises important questions about how HP and OP are connected and how game design mechanics can influence this interplay.

Current literature on gaming engagement is limited in several ways. First, while information systems (IS) scholars focus on examining the motivations underlying gaming consumption (e.g., [64, 80]) the concept of passion has received limited attention within IS literature. Among these limited studies, IS scholars have focused mainly on non-gaming contexts. For instance, Wakefield and Wakefield [70] found that group identification in social media contexts predicts both HP and OP, and they argue that these dual passions help explain the diversity among individuals and the meaning they attach to group identification. Other empirical evidence indicates that higher levels of need frustration (satisfaction) are likely to promote higher levels of OP (HP), which in turn predict

higher levels of problematic behaviors (flow experiences) in screen-based activities [3]. Furthermore, Whelan and Clohessy [78] found that the type of passion a fitness app user has mediates the effect of social influence on life burnout. In the marketing domain, existing studies found that strategic CSR-brand fit positively influences brand passion indirectly through autonomy, competence, and relatedness needs [17]. Moreover, vanity moderates the effect of brand engagement (as a proxy for HP) on compulsive social media use (as a proxy for OP) [45]. In the service context, Crawford et al. [13] developed a scale for measuring frontline employee passion, which they define as strong positive feelings and identity reinforcement derived from solving problems and/or serving customers. These studies largely overlook the potential implications of embracing gaming engagement as a passion.

Second, empirical evidence on the impact of game design elements appears lacking [41, 79]. Particularly in the mobile gaming context, there is a significant gap in understanding the processes by which mobile game design elements can influence players' susceptibility to gaming addiction. Third, the extant literature has thus far been dominated by knowledge about positive manifestations of consumer engagement [33]. For example, past studies have reported a positive relationship between game enjoyment, outdoor activity, nostalgia and intentions to reuse [24], as well as between the satisfaction of competence and autonomy needs and online gamer loyalty [65]. These studies take a positive perspective on gameplay. However, excessive game engagement can easily transform into addictive behaviors due to underlying psychological influences such as escapism, social interactions, and peer pressure within gaming communities [11, 80]. Thus, the nature of gaming engagement should not be assumed to be static. Adopting a dynamic perspective that emphasizes how gaming engagement evolves can better capture its complexity. Nevertheless, the dynamics of the connection between HP and OP and how game design underlies this complexity are not sufficiently understood.

Adopting a perspective of mobile gaming as a passion and engagement as a dynamic process provides a robust theoretical lens for advancing our understanding of how an intended positive gaming engagement (i.e., HP) can transition into negative outcomes (i.e., OP). Drawing upon the dual theory of passion, we address the following research question: how does game design mechanics contribute to the transition between HP and OP in the mobile gaming context? We define mobile game mechanics as the rules, structures, goals, and interactions that govern game play in mobile games [79]. These mechanics influence how players engage with the game, what actions they can perform, and how those actions impact their progress and experience within the game. This netnographic study involved 2 years of participatory observation of the *Empires and Puzzles* online mobile game community, along with seven interviews with game developers. While public criticism and government skepticism that impede game businesses persist [77], we see responsible game design as a promising avenue to alleviate tensions among the public, government, and game enterprises.

This study makes several contributions to theory. First, by introducing the concept of passion to explain mobile gaming engagement, this study is uniquely positioned to identify the transition between HP and OP, which is an important and

yet under-explored area in IS. This focus highlights the theoretical importance of moving beyond a static perspective of gaming engagement. Second, this research advances gaming and responsible technology design literature by explaining the mechanisms underlying the influence of game design on the interplay between HP and OP. We developed an empirically grounded framework and identified three game design mechanics, namely farming, loot boxing, and raiding, that explain how various game design features facilitate the transition from HP to OP and potentially from OP to HP. This knowledge could engender positive social impacts by promoting responsible game design among game developers. By doing so, we respond to Cheah et al. [11] calls for further research to examine how game design can foster players' wellbeing. Third, by embracing the dualistic perspective of gaming engagement, our findings contribute to the literature on consumer engagement that have largely focused on positive manifestations of online engagement [25, 33] and are dominated by studies in the contexts of social media and online communities [60]. Lastly, our findings provide valuable managerial insights for not only game designers but also practitioners and policymakers interested in responsible game design and gaming services.

## 2 Conceptual background

### 2.1 Digital gaming: What do we know?

In response to the significant market size and growth of the gaming industry, digital gaming has received academic attention from various disciplines, including information systems, marketing, psychology, health, and media studies [75]. Research efforts focused on digital gaming have increased exponentially over the past decade. On a broad level, existing research can be grouped into several streams. One line of research revolves around explaining the motivations behind digital gaming. Studies within this research stream have identified factors such as social interaction [36], psychological needs [75], perceived enjoyment [39, 52], and perceived ease of use and usefulness [4] as strong influences on game engagement. Cheah et al. [11] identified several key motivations of digital gaming, including identification, gratification and affect, escapism, social interaction, goal orientation, immersion, and flow. Emerging IS studies have examined how artificial intelligence tools and virtual reality enhance consumer experiences [14, 29]. In a recent systematic literature review, several studies have identified factors influencing in-game purchase behavior. Wang et al. [74] found that game identification positively influences both functional and non-functional item purchases, and this influence is moderated by the fit between game affordances and gamer orientations. Wang et al. [73] found that both envy and conformity mediate the influence of peer purchases on players' intentions to buy non-functional items in mobile free-to-play games, with strong-tie peers having a more significant impact than weak-tie peers. Wang et al. [72] found that product differentiation in character competency and variety can undermine perceived game fairness, while character-appearance differentiation positively influences players'

in-game purchases, thus offering insights for freemium business models to increase paying customers.

One dominant line of digital gaming research has focused on how games can influence individuals' wellbeing. Scholars have investigated the impact of hedonic and utilitarian gratifications achieved from gaming on psychological and social wellbeing (e.g., [36, 81]). One natural extension of this line of research that has gained increasing attention is obsessive gaming. Past studies within this domain have enhanced our understanding of how gaming-contingent self-worth [6], online game social migration and offline social value [77], IT identity, maladaptive cognitions, and maladaptive emotions [18], and problem recognition [56] influence obsessive online gaming. Nevertheless, extensive research in this area has yet to reach a conclusion on the impact of digital game engagement on wellbeing [22].

An emerging line of scholarly inquiry focuses on how serious games can be applied to non-commercial purposes in domains such as social welfare [21], sustainability [42, 79], transformation service research [43], and managerial learning [9, 59]. Another emerging line of research centers on game design elements and outcomes. Among these limited studies, IS scholars have produced insights into how game design features influence peer recommendation [71], game immersion and experience [12, 27], cooperation in games [53], creative behavior [23], as well as their ability to facilitate learning [47]. This research picks up this thread and focuses on the mechanisms underlying the influence of game design features on mobile gaming engagement.

Although far from exhaustive, several issues emerged from our observations of the current literature. First, existing IS research seems to overlook the dualistic perspective of passion and the dynamic nature of gaming engagement. It remains unclear what underpins the transition from HP to OP. Second, although IS has begun to explore the impact of design elements, much remains to be learned regarding how game design features contribute to gaming engagement [79]. Third, mobile gaming exhibits unique characteristics, such as perpetual connectedness, instantaneity, and portability [24] designed to present a more accessible, flexible, and convenient gaming experience using handheld devices (e.g., smart phones and tablets), which is different from traditional computer gaming in terms of device limitations, monetization strategy, socialization approach, and content richness [34]. Thus, past studies on traditional computer gaming may not be applicable to mobile gaming. Next, we discuss the dualistic nature of gaming engagement as a passion.

## 2.2 Passion in a gaming engagement context

Engagement is a dynamic and complex multidimensional concept comprising cognitive, affective, and behavioral aspects of interactions and/or experiences between a focal engagement agent (e.g., gamer) and object (e.g., digital game) [7, 8]. Past research has produced a range of definitions for understanding various forms of engagement that represent different contexts (e.g., brand community) or stakeholders (e.g., customer) [7]. Notwithstanding the lack of a common definition, scholars broadly group the engagement concept into two categories—engagement as a

motivational state and a set of behavioral components [15]. Some scholars include both aspects in their definition [38]. Our definition of engagement encompasses the cognitive, emotional, and behavioral aspects of consumer-game interactions and/or experiences that go beyond purchase and sustained commitment [8, 37, 45]. Instead of choosing between embracing engagement as a motivational state or a set of behavioral manifestations, we view engagement as a dynamic concept wherein consumers' motivational state manifests itself in gaming behaviors that go beyond entertainment purposes. In turn, these behaviors (or consumers' interactions with gaming) will fuel their motivational state, suggesting an iterative engagement process [15]. More specifically, we consider mobile gaming as a manifestation of motivational states of engagement characterized by a degree of cognitive absorption (i.e., the level of concentration or interest in mobile games), emotional dedication (i.e., the feeling of inspiration, pride, and commitment regarding mobile gaming), and behavioral vigor (i.e., the level of energy, effort and time consumers invest in mobile gaming) [7, 15]. These elements align with the fundamental concept of passion [67]. In this sense, engagement can be likened to the concept of passion, which we will discuss in the subsequent explanation.

Passion is defined as a strong desire to engage in a meaningful, highly valued activity that individuals invest considerable time and energy in [68]. A key trait defining passion is the internalization of highly valued and meaningful activity into one's self-identity [67], which separates passionate activities from other interesting but not self-defining activities [35]. To illustrate, individuals passionate about gaming call themselves gamers or their favorite avatar's name in real life [76]. According to the dual theory of passion [68], passion constitutes a motivational force behind individuals' activity (e.g., work, study, leisure) engagement in their life [36]. While passion can motivate activity engagement that enhances one's wellbeing and drives behavior toward achievement, it can also produce a negative emotional state and lead to detrimental outcomes [45]. This dualism represents a unique feature of passion that distinguishes passion as either HP or OP. HP refers to volitional engagement in a beloved activity in which individuals are in control of the activity, thus keeping their passion in harmony with other life domains such as work and study [63]. In contrast, OP refers to uncontrollable behavioral engagement that absorbs time and resources, thus posing a conflict with other aspects of life [61]. In essence, a person controls the activity in the case of HP, while OP means the activity controls the person. Applying the dual theory of passion to mobile gaming suggests that individuals can form both HP and OP in their gaming engagements, depending on their level of volitional control.

Within IS literature, scholars have examined the distinct effects of psychological basic needs [3] and the social dimensions of fitness apps [78] on HP and OP. Empirical evidence also supports the relationship between passion and behavioral regulations [76], needs satisfaction [16], and users' participation in social commerce [26]. In the marketing literature, scholars have begun to study the concepts of brand passion in branding research [17, 49], employee passion in services [1, 13], and job passion in the sales management literature [66]. In the field of social psychology, empirical evidence points to a stronger association between OP and factors such as impulsivity [46] and negative affect [61] than in the case of HP. Past leisure studies

have also revealed the role of dispositional mindfulness in alleviating the severity of OP in video gaming [40]. While these studies have provided valuable insights into the significance of passion in diverse contexts, they often presuppose passion to be static in nature. Specifically, the potential translation between HP and OP remains unclear.

Highly engaged gamers show dedication, emotional attachment, and commitment to gaming activities, and passion forms a critical element in the engagement generation process [26]. Game design elements can help developers in enhancing the enjoyment of the gaming experience. However, it is important to recognize that increased immersion resulting from these design elements may pose potential issues. For example, mobile game apps (e.g., in-app purchasing and in-app advertising) can stimulate ongoing engagement with players [55], which encourages an obsessive pattern of game playing. Thus, excessive reliance on mobile gaming may transform HP into OP, which ultimately adversely affects consumer wellbeing [19]. To this end, this research seeks to understand the underlying mechanisms involved in how game design mechanics shape the dualistic experience of passion in mobile gaming consumption.

### 3 Research methods

To observe the communication and behavior patterns of players in online gaming communities, we employed participatory netnography (see Appendix 1 for a summary of previous studies that have adopted this research method), a qualitative research methodology that adapts the ethnographic approaches of anthropology [30]. We also conducted semi-structured interviews with game developers to gain insights into their motives behind specific design elements and how they implement these elements to sustain players' interest.

### 4 Research context

Guided by our research question, we used two criteria to select the empirical context. First, the context chosen needed to be a commercially successful mobile game which effectively engaged its base of players. As uncontrolled spending on gaming is one of the most obvious indications of obsessive mobile gaming [57], selecting a commercially successful game was deemed appropriate since it would increase the likelihood of observed obsessive behaviors. Second, the selected case needed to have a large gamer base, indicating successful gamer (customer) retention. Based on these criteria, *Empires and Puzzles (E&P)* was selected, being one of the most successful mobile games rated as a top 10 strategy and role-playing app on both the iOS and Android platforms [54].

*E&P* was established in 2017 by Small Giant Games, a gaming studio based in Helsinki, Finland. Zynga, one of the world's largest American social game development companies, acquired *E&P* in 2019 for US\$700 million [58]. *E&P* is a puzzle-based strategic role-playing fantasy mobile game that uses a match-three mechanic

that was popularized by *Candy Crush* (another immensely popular mobile game). The game offers ‘heroes’ and ‘troops’ that can be collected and upgraded, and each hero has unique special skills and attacks that are useful in battles. Players can form an ‘alliance’ with other players, participate in player-vs-player battles and inter-alliance wars, and fight collectively against monsters and titans. The game offers the ability to build and expand a ‘stronghold’ with various buildings that can be upgraded, and which produce resources and supplies required for upgrading heroes and battle items [82].

#### 4.1 Data collection

We employed a participatory netnographic approach involving live observations and direct engagement with participants. The study was designed with two phases: an immersive phase that provided a background understanding of *E&P* and its gaming systems and an investigative phase involving data collection specific to our research question [30].

In the immersive phase, our netnographic study began with a review of *E&P*’s official website, Facebook group, Twitter, as well as official and third-party online community forums. We selected *E&P*’s official online community as the research setting. At the time of data collection, the community had the highest traffic compared to other gaming communities, with over 78,900 online members, and the highest volume of game-related discussions and posts (<https://forum.smallgiantgames.com>). This forum was selected based on the following criteria (Kozinets, 2002): (1) it is research question-relevant; (2) it has a high traffic of postings; (3) it contains rich data; and (4) there is plenty of between-member interactions to observe. Topics discussed in the community forum include general discussions about *E&P*, game play strategies and tactics, recruitment of new alliance members, player ideas and feature requests, game-related news, and updates, and sharing of game-related community content (e.g., videos and stories). The forum features a group of key ‘insiders’ with strong ties to the in-game community and the gaming activity, who are also known as ‘lead users’ and who are frequently referred to, mentioned, referenced, and quoted by both fellow members. To achieve a more contextually informed data analysis, we also observed online conversations on other social media platforms (e.g., Facebook, Twitter) and reviewed relevant background sources (e.g., news articles and business reports) that offer insights into mobile engagement consumption.

We started conducting the investigative (data collection) phase in August 2019 and gathered approximately 10,927 posts and other visual data (e.g., videos, fan art, and pictures). While data collection began in 2019, we considered data posted prior to the fieldwork commencement, with most of the posts dating from September 2018 to May 2021. The data were then classified into topics that were relevant to our research question. For example, we captured threads and posts that expressed potential obsessive engagement, such as, “You know you’ve been playing *Empires* too much when...” and “I am constantly checking the phone, ready to collect things, upgrade, etc.” The selected posts and comments were analyzed to help us distinguish between HP and OP engagement. As the investigation

narrowed to the themes of HP (e.g., posts like, “I was excited about the event”) or OP (e.g., posts like, “You get out of bed at 3:00 a.m. to start a new upgrade”), the associated and follow-on posts were analyzed. These posts and comments were chosen for their topic relevance, content richness, and representativeness of a range of different community forum members. Off-topic conversations and promotional messages from the company were excluded, such as ‘Official update and maintenance news’. To protect their identities, those members whose comments were used as excerpts in the findings were replaced with a pseudonym.

In addition, we conducted seven interviews with game developers, with each interview lasting sixty to ninety minutes. Using chain referral sampling, we identified and recruited game developers who were well-placed to answer our interview questions, which were refined iteratively throughout the data collection and analysis process. We conducted interviews with game developers to understand game design mechanics and features and their perspectives on how they design responsible technology design. This approach allowed us to obtain relevant and first-hand accounts of the game design elements. Each interview was digitally recorded and transcribed for data analysis.

## 4.2 Data analysis

The data collected were then coded using a mix of open, axial, and selective coding [62]. More specifically, open coding involved applying conceptual labels, primarily based on the terms used by the subjects studied, to the collected data to form first-order concepts (e.g., key insiders used the terms “gacha,” “chance-taking,” and “gambling” to describe buying loot boxes that were associated with a random chance of a significant reward). Axial coding was used to abstract and categorize the first-order concepts into several second-order themes (e.g., we used the term “loot boxing” as part of a second-order theme). Finally, selective coding was carried out to further abstract the second-order themes into aggregate dimensions (e.g., “loot boxing” was conceptualized as one of the “game mechanics” pertinent to our study).

The process of revisiting and re-categorizing open codes, with continuous reference to the concepts under study, was undertaken to aid our interpretation of the events, activities, and emotional responses of the forum members in relation to the mobile game [28]. To ensure the reliability of our data interpretation, a second coder coded the same data and cross-checked the resulting codes and themes generated by the primary coder. Any discrepancies between the coders were re-evaluated until a consensus was achieved. In addition, we invited an independent third person to verify and cross-checked the sample data. Furthermore, we examined relevant visual data (i.e., photos and videos) and assigned them a code where appropriate and made observational fieldnotes. We continuously compared the fieldnotes and codes generated from the visual data with those identified from text data. The process of data analysis was juxtaposed with the existing literature and continued until the point of theoretical saturation was reached.

## 5 Findings

Through our analysis, we uncovered three dominant mobile game mechanics—farming, loot boxing, and raiding—that underpin the transition between HP and OP within the context of *E&P*. As explained in the background literature, passion and engagement are intricately linked concepts. Mobile gaming is viewed as a manifestation of motivational states of engagement, which encompass various components. These components include the level of concentration or interest in mobile games (cognitive component), the feeling of inspiration and commitment towards mobile gaming (affective component), and the level of effort and time consumers invest in mobile gaming (behavioral component) [7, 15]. These elements reflect the core premise of passion [67]. We recognize that gaming engagement is not solely defined by a singular aspect, and therefore, adopting a multifaceted approach enables us to capture the depth and intricacy of players' passion for games. In line with this notion of engagement, we propose HP and OP to be multifaceted dimensions of gaming engagement, encompassing cognitive, emotional, and behavioral dimensions (see Fig. 1). When measuring HP and OP, we rely on the definitions of HP in the mobile gaming context, that is, HP as a balanced and volitional engagement in passionate activities that enhances one's life and OP as a rigid engagement in beloved activities that misalign with one's values and identity [68].

Our findings highlight that these game mechanics shape players' engagement, interactions, and experiences by offering challenges, objectives, and rewards. Our findings provide novel insights into how these mechanisms facilitate the transition from HP to OP and the subsequent return from OP to HP through the temporality design, in which the experience of time is closely linked with the mobile gaming design that players engage in. This emphasizes that players are commonly engaged

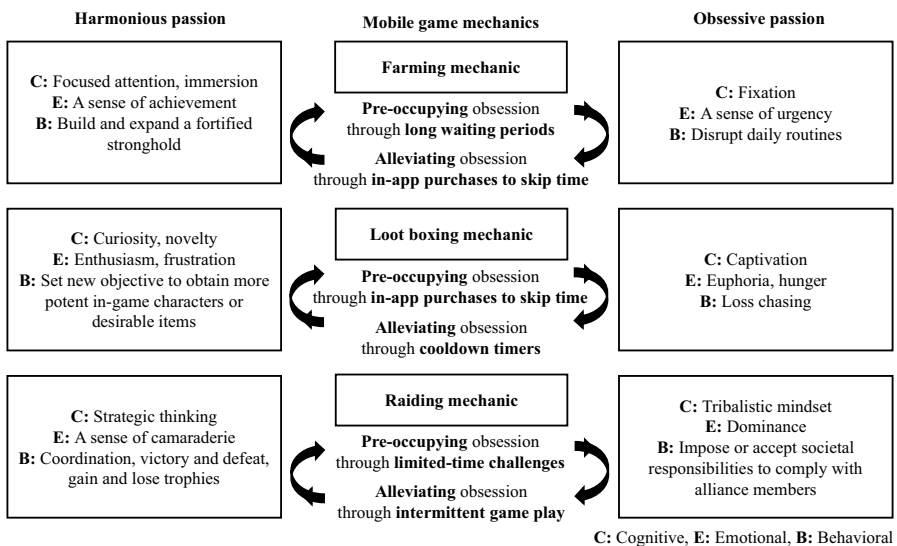


Fig. 1 The mobile gaming mechanics contributing to the transition between HP and OP

in gaming mechanics that entail temporality design, that is, particular ways of organizing time in a game that differently expresses temporal dimensions, such as duration, synchronicity, and periodicity. The imbrication of temporality design and players' game expectations and goals shape players' experiences of time and thus influence engagement in the game and the transition between HP and OP. More specifically, the farming mechanic facilitates the transition from HP to OP by imposing long waiting periods, while also diverting OP back to HP through in-app purchases that allow players to skip time. In contrast, the loot boxing mechanic induces the shift from HP to OP through in-app purchases to skip time, and eases OP back to HP through imposing cooldown timers. Lastly, the raiding mechanic attaches HP to OP by giving limited-time challenges and switches OP back to HP by providing intermittent game play. Therefore, the transition from HP to OP is stimulated by the pre-occupying mechanism, whereas the transition back from OP to HP is explained by the alleviating mechanism with a different temporality design. Understanding these mechanisms contributes to a fuller comprehension of players' engagement and illuminates the intricate dynamics involved in mobile game engagement. Figure 1 provides a summary of our key findings.

## 5.1 Farming mechanic

The findings demonstrate that the farming mechanic plays a crucial role in both pre-occupying obsession through implementing long waiting periods and diverting obsession through enabling in-app purchases to skip time. In the context of this research, the farming mechanic refers to the repetitive acquisition of in-game resources necessary for survival during a raid and for overall game progression. Players engage in farming activities by constantly replenishing their avatar's energy to combat enemies, collecting in-game resources to purchase useful equipment, producing goods beneficial for their avatar, and constructing a fortified stronghold. As they build and expand their stronghold with the collected resources, players pay more attention to and are immersed in gaming. Their experienced sense of achievement induces them to experience HP throughout the gaming journey.

To obtain these in-game resources, players must wait for them to become collectible, which can vary in duration from a few hours to several days, depending on the player's advancement within the game. This waiting period introduces a sense of urgency, compelling players to heighten their attention and constantly intervene in the game even as far as disrupting their daily routines to ensure a steady supply of resources. The continuation of farming activities serves to pre-occupy players with this ongoing quest for resources, amplifying their sense of urgency and commitment to the game. A player (Forum user ID: not\*\*\*; hereafter, the forum user ID will be provided in parenthesis) described that they are urged to farm by a sense of urgency: "I am constantly checking the phone, ready to collect things, upgrade, etc.... I don't have any timers set BUT I do wake up a lot in the night to check—so clearly it's on my mind. Or I will stay awake till way too late so I don't waste 1, 2, 3, 4 flags on the titan (a series of difficult bosses to defeat)."

In addition, certain mobile gaming features related to the farming mechanic are intertwined to enable this transition as demonstrated by various players. For example, another way of collecting resources is by scavenging resources from other players' strongholds. A player (Luc\*\*\*) described this feature as accelerating their engagement, taking up most of their waking time while attempting to defend the stronghold from being hunted by other players: "You know you've been playing Empires too much when you stay awake and online to not get (a stronghold) raided in your sleep although you have hardly no energy and literally nothing to do but look at your hero, lol." In addition, the mobile game features of simplicity and portability further empower players to focus their concentration on the game and satisfy their obsessive passion to play since they can take the game with them anywhere, anytime. Their gaming behavior disrupts their daily lives and responsibilities, for example, by interrupting the sleep cycle, diverting time away from other tasks, and posing a conflict with other aspects of life. A player (Cho\*\*\*) also described: "I farm resources and fight the titan as soon as you wake up, before showering or brushing your teeth or anything else because I must open the hero chest to open another one tonight."

On the other hand, the farming mechanic diverts obsession through implementing in-app purchases to skip time. For example, a player (Inf\*\*\*) explained that the long waiting periods experienced by a free-to-play (F2P) player create a sense of urgency, turning them into a pay-to-win (P2W) player who purchases speed-up resource collection tickets to skip time: "The longer you have to wait, the longer you spend (time) in game. The longer everyone spends (time) in game (not just you) the more likely you are to buy something." The option to skip waiting periods instantly grants players a degree of relief from the previously experienced urgency and thus brings them back to the experience of HP. By skipping the waiting periods, players can streamline the acquisition of resources, reduce the need for constant manual intervention, and experience a respite from the immediate demands of farming.

In sum, the temporal aspect of the farming mechanic functions by facilitating the transition from HP to OP by pre-occupying obsession through long waiting periods. In contrast, the transition from OP to HP is a result of diverting obsession through in-app purchases that enable a player to skip time. The temporal aspect thus creates a continuous drive for resource accumulation and stronghold expansion, while also offering moments of respite through in-app purchases. However, the transition between HP and OP forms a cycle because players cannot constantly make in-app purchases to skip time and when they experience long waiting periods again, they enter the realm of fixation and experience a sense of urgency.

## 5.2 Loot boxing mechanic

Based on our data analysis, we observed that the loot boxing mechanic encompasses a distinct set of game features that contribute to the transition from HP to OP and the return to HP. Specifically, the loot boxing mechanic involves the random allocation of in-game items to players, determined by a probability distribution encompassing all possible items. This feature of loot boxes serves to stimulate players' curiosity

about the items they will get from loot boxing. When players successfully acquire their desired rewards through winning, they often experience enthusiasm due to the rarity of such rewards that have a probability of less than 1% within the game environment. Conversely, when players fail to obtain their desired rewards or face losses, they may exhibit frustration. Our findings reveal that the implementation of an incremental content release feature plays a pivotal role in engaging players by presenting a perpetual flow of fresh and novel challenges. This approach ensures that players constantly have new objectives to pursue, and they aspire to obtain more potent in-game characters or desirable items. It was observed that players consistently yearn for ongoing progression, heightened status, and increased influence within the in-game community. A developer explained that: “Mobile games regularly introduce new titles every 2 to 3 months. Consequently, the enduring success of these games heavily relies on user engagement. A crucial factor for long-term survival is the ability to embrace user feedback and incorporate it into the game effectively (e.g., develop new content based on user feedback). This adaptability plays a significant role in ensuring the game’s longevity.”

Given that only one free loot box ticket is distributed daily to players who opt for a F2P model, they are driven to spend money on purchasing additional chances, hoping to obtain rare and valuable in-game items. This dynamic exemplifies the loot boxing mechanic facilitating the transition from HP to OP by compelling players to make in-app purchases to skip time and obtain more powerful in-game characters or items. As a result, they experience euphoria (i.e., when they win the desired item) and hunger (i.e., when they lose the desired item), as well as irrational loss chasing behavior. This behavior is defined as continued engagement in game play accompanied by an increased monetary investment following a series of consecutive losses, akin to patterns observed in gambling behavior [20]. A player (thu\*\*\*) described the compulsive need to either upgrade their avatars (e.g., heroes) or obtain a more powerful avatar by spending an inordinate amount of money on chance-taking through loot boxing: “Get a hero and spend (money) forever upgrading it and hoping for a rare ascension item(s). You need to upgrade your hero to get the ascension item and you can’t get the ascension item without an upgraded hero. Wait, I had an epiphany, if I spend a bunch of money, I can get an ascension item!!” Another player (Alm\*\*\*) described the potential of limitless chance-taking in E&P: “Know that you won’t get what you want. Occasionally you will. But unless you’re going to be a whale (i.e., a gamer who spends an inordinate amount of money on the game), there’s never enough to guarantee you can just buy your desired outcome.” Another player (Her\*\*\*) described their obsessive behavior as resulting from the loot boxing mechanic: “I wonder if I suffer from a serious CEPD, Compulsive Empires and Puzzles Disorder. My main symptoms are investing time daily in the game and getting a feeling of growing depression and senselessness. It started around 14 months ago. Till now, I invest quite some time daily in the game and a bit of money monthly in the game.”

Our research findings highlight the influence of two key mobile game features, namely simplicity and portability, in facilitating the ease of loot box engagement. These features can captivate players and potentially lead to excessive time and/or monetary investments, thereby magnifying the impact of loot boxes and effectively

creating a portable casino-like experience, reminiscent of slot machines. A player (Tg\*\*\*) vividly described how the uncomplicated nature of the loot box feature can goad players into spending an excessive amount of money on mobile games, drawing parallels with gambling behaviors: “Is buying summons in this game the equivalent of gambling? Many would say it is. I’m inclined to agree. ... the gacha system (a.k.a. loot boxes) itself is very, very evil. Mostly because they hide behind the facade of an innocent, fun, simple game. That should require one to fill out liability waivers before signing up for.” This player’s account provides valuable insight into the persuasive power of loot boxes, which can evoke a sense of obsession and drive players towards disproportionate financial expenditures, similar to those witnessed in gambling contexts.

On the other hand, the loot boxing mechanic alleviates obsession through imposing cooldown timers. For example, a player (Ank\*\*\*) described that “The game is designed to stop players taking advantage of the skip chest function to get unlimited elemental chests. I have to be patient.” From a company perspective, a game developer explained that “The job of a developer is to make a game engaging and profitable. As a manager, we adjust and coordinate different teams such as developers, programmers, and business divisions to deploy engaging but responsible game design (e.g., some functions of the game controls obsessive gaming behavior). We mediate between multiple teams in and out of the organization.” The necessary cooldown timers grant players a degree of relief from the previously experienced loss chasing behavior and thus bring them back to experiencing HP. By designing cooldown timers, players are given an opportunity to control their obsessive behavior.

In sum, the temporal aspect of the loot boxing mechanic serves as an interplay that facilitates the transition from HP to OP by pre-occupying obsession through in-app purchases that enable players to skip time, whereas the transition from OP to HP and the subsequent alleviation of obsession is achieved through cooldown timers. The loot boxing mechanic thus instills continuous commitment and spending, while also offering moments of respite through daily cool down timers. The transition between HP and OP occurs in a cyclical fashion because while developers aim at creating games that constantly induce engagement and in-app purchases, they simultaneously take responsible game design into account.

### 5.3 Raiding mechanic

Lastly, our data analysis reveals that the raiding mechanic encompasses a combination of other game features, which in turn contribute to the transition between HP and OP. The raiding mechanic entails the challenging task of defeating a series of formidable bosses, such as titans, strategically positioned in different times and areas within the game’s framework, and often referred to as battles or wars. To effectively engage in raiding, players form alliances, which serve as collective entities composed of multiple players. These alliances voluntarily commit themselves to coordinate game play strategies synchronously and asynchronously with the primary goal of achieving victory and earning prestigious trophies for their respective alliances. The inter-alliance wars necessitate a consistent and

frequent presence, active interactions, and strategic coordination among alliance members, as it is typically easier to defeat an opposing alliance through a series of synchronized attacks from within the same alliance. A player (Lil\*\*\*) described how they were socially connected with fellow players within their alliance through continuous coordination: “Our alliance members are all from different countries using different languages but are connected with each other. We discuss about the preparation for a war and the defence teams before starting a war.” Another player (Rap\*\*\*) explained that many thoughts and plans are required to win in the game: “Alliance wars have brought a whole new aspect to team building. You not only have to plan how to set up your team to defeat the current enemy, but also what heroes to leave for the other five teams.”

More specifically, *E&P* demarcates the boundaries of different alliances using constrained communication. In this situation, players are not allowed to freely communicate and interact with each unless it is with members of their own alliance, as opposed to traditional computer games that allow players to freely search for and communicate with other players in the game. The feature of constrained communication creates a sense of camaraderie between alliance members by amplifying a player’s personal connections with fellow players. The focal players genuinely feel and care for their alliance members and become increasingly dependent on their dedicated alliance, which stems from interacting almost exclusively with members for a prolonged period. In particular, a player (Imp\*\*\*) illustrated that limited time challenges to defeat a titan lead them to obsessively interact with their alliance members, especially after a sense of camaraderie is formed, as this imposes the social obligation of conforming to alliance norms, routines, and rules and further promotes obsession: “I think it is important for everyone playing this game to be very mindful of the pressure that comes with being part of a group or alliance. I am talking mainly about the subconscious effect of the hive mind present in every alliance. Whether people realize this or not, every alliance exerts pressure on its members to do better. Not only because it is expected or even demanded, but also because of the bond you form with each other and your personal drive to help these people as much as you can. Inadvertently, you will get sucked into this game and get peer pressure. It will undoubtedly deplete not only your financial resources, but also your time and your mental state. Your desire to help your alliance grow will push you to spend more time and money on the game and increase the pressure on you to succeed in the game.”

On the other hand, the obsession is lessened by the features of simplicity and portability that enable players to play the game asynchronously and intermittently. A player (Hcm\*\*\*) described that they play the mobile game while going about their daily life: “I was wondering what other people are experiencing when it comes to alliance member participation in wars and titans. This is a mobile game, and you can knock out titan or was hits during one trip to the toilet. You know you do it.” Another player (Ran\*\*\*) added: “With this game, I can raid during my daily walks, complete the Atlantis map, or do my hits in war wherever and whenever.” The asynchronous raiding option alleviates those players’ dominance over fellow players and lessens the fellow players’ pressure to comply with

the alliance norms and routines by enabling them to raid whenever and wherever without specific time limit. This brings them back to experiencing HP again.

In sum, the temporal aspect of the raiding mechanic serves as an interplay that facilitates the cyclical transition from HP to OP by creating obsession through limited time challenges. On the other hand, the transition from OP to HP reflects a lessening of obsession as a result of intermittent game play and the need to accept societal responsibilities in order to comply with alliance members during time-limited challenges.

#### **5.4 Time design that facilitates the transition between HP and OP**

The IS literature has, thus far, provided limited acknowledgement of the connection between time design and engagement in system design. Our findings reveal that time design is associated with engagement in mobile gaming and that it emerges from game design elements. These temporalities give rise to specific temporal experiences that shape the ways in which players engage with a game and experience the transition between HP and OP. The study also emphasizes the significant role played by game designers, highlighting how the game design shapes particular temporalities through the implementation of specific design elements.

The temporality design of the farming mechanic entails long waiting periods that gradually increase the difficulty of and impatience toward the game progression. The sense of urgency engendered by the temporality design also leads to continuous engagement in the pursuit of endless in-game objectives, resulting in a state of OP. At the same time, however, this mechanic provides the option of in-app purchases that enable players to skip time, thus requiring less of their attention, effort, and intervention. This option to skip time provides a sense of game progression and achievement that brings players back to a state of HP.

The loot boxing mechanic is generated by casino-like game design elements (e.g., randomization of rewards) with regular cooldown timers; however, players are attracted to endless in-app purchases that allow them to skip waiting period for a daily reward, but which also result in loss chasing behavior. The temporal design encourages repeat in-app purchases with the hope of gaining desired rewards, but which ultimately leads to a state of OP by ensuring players frequently return to the game. At the same time, this mechanic provides regular cooldown timers, which alleviate the previously experienced loss chasing behavior and thus bring players back to HP.

The raiding mechanic requires synchronous and asynchronous strategic coordination among alliance members, who share common in-game goals, norms, and routines. To encourage more co-presence and bonding between alliance members, limited time challenges are provided. This temporality promotes a tribalistic mindset among alliance members, while also requiring the social responsibility of complying with the rules. Any uncontrollable dominance over fellow members manifests as the state of OP. At the same time, this mechanic entails game design elements such as intermittent game play that create a sense of asynchronous game play, thus alleviating obsession as players feel they can fulfill alliance goals with less peer pressure.

The empirically grounded theoretical framework depicted in Fig. 1 provides a novel and important understanding of the role played by an information system's temporalities and the connection with HP and OP, and how game design underlies this complexity. In mobile gaming, the temporality design is based on the game mechanics and practices that are specific to the game. The game mechanics identified in this study are shared by almost all strategy and role-playing mobile games and the theoretical framework may therefore be applicable to this entire game category. This enables greater analysis and understanding of how the transition between HP and OP is elicited in highly engaging mobile games. The framework may also be useful to IS designers who aim to promote responsible technology design that facilitates a transition from OP back to HP.

## 6 Discussion and conclusion

### 6.1 Theoretical implications

This paper explores how game design contributes to the transition between HP and OP in the context of mobile gaming. Our main theoretical contribution revolves around the empirically developed model of mobile gaming mechanics that explains the transition from HP to OP and vice versa, highlighting the dynamic nature of gaming engagement. Our contribution is threefold. First, our study introduces the dualistic nature of mobile gaming engagement through the dual theory of passion [68]. While the relationship between HP and OP has been acknowledged [45], limited empirical research has explored how this relationship connects with gaming engagement. We contribute to the engagement literature by showing how the concept of passion applies to the double-edged nature of mobile game engagement involving HP and OP. This insight is significant as the dualism of engagement has often been overlooked in prior literature. Our findings highlight the importance of both HP and OP engagement, extending the predominantly positive framing of engagement found in prior literature [33], which often neglects the duality of engagement [80].

Second, our study contributes by presenting a nomological network that elucidates the role of game design in the transition between HP and OP within the realm of mobile gaming consumption. Existing literature on passion has acknowledged the transition from HP to OP [36], but it has not extensively explored the influence of game design on this process. Moreover, previous research has primarily focused on negative consequences, portraying the shift from HP to OP as detrimental to consumer wellbeing [18]. Our study departs from this perspective by demonstrating that the transition from OP to HP can also occur through the temporal aspect of game design. This finding challenges the prevailing notion that passion can only be transferred from harmony to obsession [36]. By illustrating a bidirectional transition, where passion can transition from HP to OP and subsequently from OP to HP, our research reveals a cyclical pattern. Such insights emphasize the dynamic nature of the transition and extend the current understanding beyond a static perspective. This knowledge is vital for future research endeavors, highlighting the need to consider the nuanced dynamics involved in passion and engagement within gaming contexts.

Lastly, we extend previous literature by proposing that game design plays a role in the transition between HP and OP through its temporal aspect. It builds on the work of Rapp [51] that revealed temporalities may stimulate engagement in various ways. It also complements Cheah et al. [11] conceptual development that game design can foster players' wellbeing. Our study complements this literature by focusing on the game mechanics and temporalities that facilitate the transition between HP and OP among players. Our research enriches the current body of knowledge on the role of time design in shaping engagement [51]. Specifically, we highlight how game mechanics are designed to incorporate significant waiting periods while also offering players the option to skip time through in-app purchases. Our findings reveal the interdependencies between the game mechanics (i.e., farming, loot boxing, and raiding), and how they contribute to transitions through their temporal aspects. Our findings suggest that temporality is a significant factor in explaining the transition between HP and OP and thus presents valuable insights into the passion and game design literature.

## 6.2 Practical implications

Beyond its theoretical contributions, our study has important practical implications for two stakeholder groups. First, our research provides valuable insights for game designers, developers, and organizations seeking to promote responsible mobile gaming experiences. By understanding how game design influences the transition between HP and OP, these stakeholders can make informed decisions to minimize the risk of obsessive engagement among players. Our study proposes that the temporal aspect of game design can serve as an effective intervention to prevent or curb obsessive engagement and guide players back to a state of harmonious engagement. For example, our findings propose that when a farming mechanic in a game incorporates substantial waiting periods, it generates a sense of urgency that contributes to OP. On the other hand, when the game provides an option to skip time through in-app purchases, players tend to divert obsessive tendencies, such as fixation, urgency, and disruption to their daily routines, and return to HP. However, it is important to note that the provision of in-app purchases to skip time may not necessarily alleviate obsession with all game mechanics. In contrast to the farming mechanic, our findings suggest that the loot boxing mechanic intensifies obsession through its features, that is, promoting captivation, hunger, and loss chasing behavior among players. Therefore, our findings indicate that different game mechanics contribute to the distinct mechanisms that facilitate the transition between HP and OP. This understanding can inform the design and development of responsible gaming experiences that prioritize players' wellbeing.

Second, our research also offers insights for policymakers seeking to mitigate the negative social implications of mobile gaming. For example, time-based mechanics add an element of anticipation and can create a sense of reward or achievement when players finally reach the end of a waiting period. However, these mechanics can also be perceived as monetization strategies, tempting players to spend real money to expedite progress or bypass waiting times. Balancing time-based mechanics is

crucial to ensure players feel engaged and motivated without becoming frustrated by long waiting periods. Therefore, game developers should consider player feedback and fine-tune these mechanics to strike a balance that restrains obsessive engagement while maintaining harmonious engagement. In parallel, policymakers can consider implementing regulations, such as limiting monthly spending on mobile games, to protect players from becoming easily obsessed with gaming.

## 7 Limitations and conclusion

While our study has produced valuable insights, there are several limitations. First, we acknowledge that the data collection period, from September 2018 to May 2021, encompasses the COVID-19 pandemic, which may have influenced changes in the dynamic behavior of game users. Therefore, interpretations of the findings should consider this specific timeframe. Future research should replicate this study to establish external validity. Second, while this study offers theoretical insights into the mechanisms underlying mobile gaming engagement, it was confined to the context of mobile games. Given the impracticality of comprehensively addressing all game genres in a single study, exploring the impact of other genres could be a promising direction for future research. For instance, future research could compare mechanisms underlying gaming engagement across different game genres (e.g., puzzle, racing, fighting) and social features (e.g., in-game chat, social integration) and explore how these differences may trigger excessive gaming. Another promising direction for future research is to examine how game personalization and customization features evoke different emotional responses and potentially lead to obsessive engagement. Third, this study does not examine the evolution of gaming engagement over an extended period of time. Future research could conduct longitudinal studies to examine how changes in game design might affect gaming habits over time. Lastly, this study relies on a qualitative approach. Future research could also utilize mixed methods by integrating diverse research methodologies. For instance, subsequent studies might include empirical validation through surveys or experiments to statistically verify the propositions of the theoretically grounded model established in this research. This approach would help to more precisely define the boundaries of the current findings.

In conclusion, our research makes a significant contribution to IS literature by presenting an empirically grounded framework for understanding the mechanisms underlying game design and its influence on the dualistic nature of mobile gaming engagement. Our findings emphasize the importance of moving beyond a static perspective when examining gaming engagement. Furthermore, our study underscores the importance of recognizing the interplay between game design and its impact on the transition between HP and OP. This recognition empowers policymakers, game developers, and players to actively promote responsible gaming practices. By adopting a balanced approach to game design and considering the temporal aspects of gameplay, we can mitigate potential negative outcomes associated with obsessive engagement and foster a healthier gaming environment for all.

## Appendix 1: Previous studies that adopted netnography

Source	Descriptions
Chan and Li [10]	Analyzes consumer to consumer interactions in virtual communities to examine how structural and experiential routes of interactivity influence reciprocity and affect commitment and online co-shopping. It was found that reciprocity has critical effects on social system maintenance by enhancing commitment to the community and intention to co-shop
Arruda-Filho et al. [2]	Analyzes communities of early iPhone users. It was found that innovative users gain experiential outcomes from the technology along with utilitarian benefits. Observed a unique social behaviour and brand devotion in the community of iPhone users
Brodie et al. [8]	Interprets the nature and scope of engagement in online brand communities for consumer engagement. It was found that the consumers exhibit different stages and intensity of engagement, starting from triggering to the development of trust, loyalty, and emotional attachment
Oakes et al. [44]	Introduces the concept of metaphysical branding, consisting of five constituent elements: rite of passage, believers, non-believers, self-improvement, and ritual. Analyzes online textual discourse posted on a music-rating website. Postings indicate that consumers are both passively responding to marketing communications and actively co-creating transcendent meaning
Quinton and Wilson [50]	Investigates the role of social media in the development of business relationships and performance enhancement. It was found that social media can help in building networks and relationships for business growth
Kozinets et al. [31]	Investigates how is consumer desire transformed by contemporary technology through analyzing online food image sharing including friend networks and food bloggers
Bauer et al. [5]	Explores the characteristics and functioning of a norms-based intellectual property system in the setting of online communities. Analyzes the system's characteristics and functioning, and the intellectual property rights in online communities
Potdar et al. [48]	Identifies different consumer engagement patterns leading to brand recommendation. Presents a process model, comprising of seven dimensions, which are communication, interaction, experience, satisfaction, continued involvement, bonding, and recommendation

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### Declarations

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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