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Uses and Gratifications of Pokémon Go: Why do People Play Mobile Location-Based Augmented Reality Games?

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ABSTRACT

In recent years, augmented reality games (ARGs) such as Pokémon Go have become increasingly popular. These games not only afford a novel gaming experience but also have the potential to alter how players view their physical realities. In addition to the common experiences and gratifications people derive from games, (location-based) ARGs can afford, for example outdoor adventures, communal activities, and health benefits, but also create problems stemming from, for example privacy concerns and poor usability. This raises some important research questions as to what drives people to use these new applications, and why they may be willing to spend money on the content sold within them. In this study, we investigate the various gratifications people derive from ARGs (Pokémon Go) and the relationship of these gratifications with the players' intentions to continue playing and spending money on them. We employ data drawn from players of Pokémon Go ($N = 1190$) gathered through an online survey. The results indicate that *game enjoyment*, *outdoor activity*, *ease of use*, *challenge*, and *nostalgia* are positively associated with *intentions to reuse (ITR)*, meanwhile *outdoor activity*, *challenge*, *competition*, *socializing*, *nostalgia* and *ITR* are associated with *in-app purchase intentions (IPI)*. In contrast with our expectations, *privacy concerns* or *trendiness* were not associated with reuse intentions or IPI.

KEYWORDS

Augmented reality; freemium; location-based games; gamification; Uses and Gratifications

1. Introduction

Launched in the USA on 6 July 2016 (and currently available in over 130 countries), Pokémon Go is a free-to-play/freemium mobile game based on a Japanese transmedia franchise and built on a pre-existing mobile game platform by Niantic, Inc. During the first two months of its launch, the game was downloaded more than 500 million times (Takahashi, 2016). That year, Pokémon Go won the titles of “best mobile/handheld game,” as well as “best family game” (“Winners - The Game Awards” 2016). Early statistics by Niantic Labs state that since the launch of the game, Pokémon Go players have collectively walked over 8.7 billion kilometers and caught 88 billion Pokémons (“Niantic Labs - Pokémon Go” 2016). The popularity of Pokémon Go is also evident in the fact that the term “Pokémon Go” was the leading search term in the recently published Google search trends 2016 (“Google’s Year in Search” 2016). Beyond being a location-based game (LBG), Pokémon Go and others like it can also be classified as augmented reality games (ARGs), games that are particularly focused on overlaying digital content onto everyday surroundings. Common to these games and activities is that they create hybrid spaces that challenge the dichotomy of the physical and the digital; spaces that “merge the physical and the digital in a social environment created by the mobility of users connected via mobile technology devices” (De Souza E Silva, 2006).

While there has been a remarkable amount of research on players, player experiences, and the gratifications they derive from games (e.g. Chen, Duh, Phuah, & Lam, 2006; Chen & Leung, 2016; Hamari & Keronen, 2017b; Hamari & Sjöblom, 2017; Hou, 2011; Hsu & Lu, 2004; Huang & Hsieh, 2011; Korkeila & Hamari, 2018; Sherry, Lucas, Greenberg, & Lachlan, 2006; Sjöblom & Hamari, 2017; Wu, Wang, & Tsai, 2010), as well as on player types and orientations (Hamari & Tuunanen, 2014; Kallio, Mäyrä, & Kaipainen, 2011; Vahlo, Kaakinen, Holm, & Koponen, 2017; Yee, 2006), LBGs and ARGs are a novel and multifaceted development, not only in the games space but also culturally. As such they can be seen to afford several kinds of experiences and gratifications for their users that are not necessarily found in more traditional forms of games or media, and especially not in such combinations. These include experiences such as outdoor adventures, communal activities, health benefits, and gratifications, which relate to games in general. Also, having recently broken through to a more mainstream audience with the success of Pokémon Go, these games and their players provide a culturally and historically opportune vector for closer study. Moreover, Pokémon Go is also a free-to-play game implying that it generates revenues mainly through the sales of in-game content and virtual goods (refer e.g. free-to-play Hamari et al., 2017a; Hamari, Hanner, & Koivisto, 2017; Kimppa, Heimo, & Harviainen, 2016; Lehdonvirta, 2009).

All of these above-mentioned aspects prompt interesting and relevant research questions as to what gratifications people derive from ARGs/LBGs (such as Pokémon Go) and which gratifications lead to more active playing and purchasing behavior in these new forms of games. Therefore, in this study, we investigate the relationships between the gratifications people derive from alternate reality games (Pokémon Go), and their intentions to continue playing and spending money in them. To investigate this, we employ data gathered among players of Pokémon Go.

2. Theoretical foundation and hypotheses

2.1. Uses and gratifications

Uses and Gratifications (U&G) is one of the extensively employed framework to understand media use and consumption. U&G helps in assessing consumer motives for accessing and using a particular media (Katz, Haas, & Gurevitch, 1973). Understanding the potential uses and gratifications can aid in predicting the media usage, as well as its recurring use (Kaye & Johnson, 2002). As a tool for explaining peoples' media choices, U&G has been considered highly suitable in new-media research (Sundar & Limperos, 2013) and adapted to investigate usage and motivations of Internet in general (Stafford, Stafford, & Schkade, 2004; Weiser, 2001), blogs (Hollenbaugh, 2011), tablets (Leung & Zhang, 2016), and social media (Khan, 2017; Malik, Dhir, & Nieminen, 2016; Quan-Haase & Young, 2010).

Pertinent to the focus of the present investigation, recent years have seen the rapid diffusion of digital games as a highly popular and alternative media outlet. Researchers from various domains have opted for the U&G framework to investigate motives associated with various genres and forms of games, including video games in general (Kim & Ross, 2006; Sherry et al., 2006), online games (Merhi, 2016; Wu et al., 2010), social games (Chen & Leung, 2016; Hou, 2011), mobile games (Wei & Lu, 2014), eSports (Hamari & Sjöblom, 2017), online video game streaming (Hilvert-Bruce, Neill, Sjöblom, & Hamari, 2018; Sjöblom & Hamari, 2017), and rather recently Pokémon Go (Kaczmarek, Misiak, Behnke, Dziekan, & Guzik, 2017; Khalis & Mikami, 2018; Kogan, Hellyer, Duncan, & Schoenfeld-Tacher, 2017; Rauschnabel, Rossmann, & Tom Dieck, 2017; Ruiz-Ariza, Casuso, Suarez-Manzano, & Martínez-López, 2018; Zsila et al., 2017).

In-line with the research continuum on U&G (e.g. Katz et al., 1973) and later expansions of it into AR/VR space (Rauschnabel, 2018), the gratifications investigated in this study can be categorized as follows in a non-exclusive manner: tension-release/hedonic (enjoyment), affective/sensual (nostalgia, challenge), cognitive/utilitarian (outdoor activity, challenge), social integrative/social (socialization, outdoor activity), and personal integrative/symbolic (trendiness, competition).

2.2. Related research

To position our study in relation to pervasive games and other games that utilize the blending of play spaces with everyday spaces, we identify four key concepts of digital and technological play which closely relate to Pokémon Go. ARGs focus on

the personal experience of augmenting one's every day with digital content (Wetzel, Blum, Broll, & Oppermann, 2011), such as re-contextualizing the city through a virtual map overlay in Ingress or finding Pokémon creatures mapped onto physical locations using the map overlay and the phone's camera in Pokémon Go. This is in contrast to, for example, *alternate reality games* which typically include Internet-based collaboration, physical treasure hunts, and puzzle-oriented social gameplay (Montola, Stenros, & Waern, 2009), making their play hinge more on communication and social factors rather than the real-time technological augmentation of physical space. Also, when compared to *virtual reality games*, augmented reality applications specifically aim to combine "virtual and real elements instead of totally replacing the real space by the virtual one" (Bernardes, Tori, Nakamura, Calife, & Tomoyose, 2008). Indeed, in games such as Ingress and Pokémon Go, much of the design is focused on the game space and everyday space blending into each other in a hybrid reality that takes cues from both, but is restricted to neither. Furthermore, *location tracking* is a common theme in these playful activities, varying in relevance from crucial to cursory. Some ARGs such as Pokémon Go rely heavily on positioning technology to overlay a one-to-one representation of the player's surroundings through a playful lens; whereas, other ARGs such as Nintendo's *AR Cards* for the 3DS handheld system use positioning triangulation, but the player's movement in the physical space is tracked only insofar as it affects the orientation of the 3DS. Likewise, some alternate reality games track player movement (refer e.g. Disney's *Ghost Post*) but mostly function as social networking and puzzle-solving platforms, void of any active or pervasive tracking. In VR technology, location tracking is generally limited to tracking, for example the head and controller movement of a stationary player, but recent developments such as the HTC Vive have taken steps toward what could be called as actual location-based play, affording players a space for movement of up to several meters.

Following from these discussions and taking into account the recent developments in the field, we can position Pokémon Go (and similar games) as location-based ARGs: "games that use mobile tracking technology to supplement the player's every day with a playful frame of interaction." Thus, through the use of technology, a bubble of casual play can be created, be invoked whenever and wherever, and integrated into other daily activities or played for its own sake or as a primary activity.

Games such as Pokémon Go stem from, and further contribute to, this wider cultural and technological development of appropriating physical space to meet playful ends. As Pokémon Go has been regarded as the leading ARG (Landi, 2016; Zsila et al., 2017), there has been a strong interest among researchers from various domains. A dominant number of studies have investigated the physical activity and sociality aspects (Althoff et al. 2016; Kaczmarek et al., 2017; Kogan et al., 2017; Sobel et al., 2017), meanwhile some of the investigations have focused on exploring potential benefits and negative ramifications (Ruiz-Ariza et al., 2018; Serino et al., 2016; Tran, 2018; Wagner-Greene, Wotring, Castor, Mshe, & Mortemore, 2017), as well as the motives associated with playing the game (Rauschnabel et al., 2017; Yang & Liu, 2017; Zsila et al., 2017).

In one of the preliminary studies, utilizing an extensive corpus of log and sensor data Althoff et al. (2016) determined a significant increase in physical activity of Pokémon Go players. Likewise, a number of later studies confirmed that players were driven to spend time outdoors as the game facilitated in socializing with friends, bonding with family members, and making new connections (Kogan et al., 2017; Kaczmarek et al., 2017; Lindqvist et al., 2018; Tran, 2018). Moreover, studies have also determined that the salient attributes of the game (physical activity and socialization) improves mental health and provide sustenance to people with social withdrawal, depression, autism, ADHD, and anxiousness (Kato et al., 2017; Kogan et al., 2017; McCartney, 2016). In the workplace context, the game improved psychological stress of adult workers leading to positive effects on mental health of Japanese workers (Watanabe et al., 2017). Contrariwise, the game has also

been referred to cause serious consequences such as traffic accidents, physical injuries, addictive and obsessive behaviors, and threats to child safety (Ayers et al., 2016; Lindqvist et al., 2018; Raj, Karlin, Backstrom 2016; Sobel et al., 2017; Tran, 2018). A summary of some of the notable work studying various aspects of the game is presented in Table 1.

2.3. Hypotheses

Likewise other digital games, while ARGs are geared toward leisure use (e.g. Hamari & Keronen, 2017b; Wei & Lu, 2014), they also pose interesting further aspects that suggest that enjoyment of the game is an important aspect of ARGs and further has a positive impact on engagement with the game. However, there is a growing literature on in-app purchases in games that has still remained somewhat inconclusive on whether the enjoyment of a game increases in-app purchases, or in fact, reduces it. While

Table 1. Summary of studies on Pokémon Go.

Study	Methods and sample	Theoretical framework	Variables studied	Key findings
Khalis and Mikami (2018)	Mixed methods (Questionnaire and game data) $N = 101$ (30% males, 70% females - Canadian university students)	Exploratory research	Personality traits, social anxiety, social competence, gameplay behavior	Higher social competence, conscientiousness, agreeableness, extraversion, and lower social anxiety predicted more gameplay behaviors (e.g. visiting more pokéstops, catching more Pokémon, and travelling greater distances).
Ruiz-Ariza et al. (2018)	Randomized control trial. $N = 103 + 87$ (50.5% males, 49.5% females - Spanish school students)	Exploratory research	Sociability, Well-being, Self-control, Emotionality, Memory, Concentration, Attention, Mathematical calculation, Linguistic reasoning	Boys were more active and involved with the game. Higher level of sociability, attention, and concentration was observed among the experimental group.
Sung, Sigerson, and Cheng (2017)	Online survey. $N = 349$ (43% females, 57% males)	Social capital theory	Face to face interaction, Communication frequency, Self-disclosure, Social capital	Pokémon Go promotes face to face interactions resulting in higher communication and self-disclosures. Players of the game show higher levels of bridging/bonding social capital.
Kaczmarek et al. (2017)	Online survey. $N = 444$ (50.7% males, 49.3% females)	Exploratory research	Physical activity, Outdoor time, Health motives, Social motives, Immersion, Achievement	Users having stronger motives for playing the game derived more health benefits. Health based motives led the players spend more times outdoors and higher physical activity. Older participants and males derived higher health benefits.
Kogan et al. (2017)	Online survey. $N = 269$ (68% females, 32% males in USA)	Exploratory research	Time spent with family, Time spent with pets, Physical activity, Anxiety levels	Players spent more time with family and pets. They increase walking time with pets and exercising. Anxieties (leaving house, interaction with strangers, visiting new places) got reduced.
Rauschnabel et al. (2017)	Online survey. $N = 642$ (53% females, 47% males in Germany)	Uses and Gratification (U&G)	Nostalgia, Enjoyment, Physical activity, Flow, Socializing, Image, Social norms, Physical and data privacy risks	Enjoyment, physical activity, and nostalgia drive Pokémon Go play. Players are aware of associated privacy and physical risks.
Wagner-Greene et al. (2017)	Survey. $N = 662$ players in USA	Exploratory research	Positive and negative health behaviors	Risky behaviors include driving, biking, and walking without paying attention while playing the game. Although the players reported gains in physical activity, over a third of them sacrificed their sleep.
Watanabe et al. (2017)	Online survey. $N = 2530$ (62.5% males, 37.5% females - Japanese workers)	Exploratory research	Psychological distress, Physical complaints, Work performance	Significant improvement of psychological distress among players of the game compared to non-players.
Yang and Liu (2017)	Online survey. $N = 262$ (45% females, 55% males in USA)	Exploratory research	Exercise, Fun, Escapism, Nostalgia, Friendship maintenance, Relationship maintenance, Achievement	Fun and friendship relates positively with well-being. Meanwhile escapism and nostalgia relates negatively with well-being.
Zsila et al. (2017)	Online survey. $N = 510$ (55.9% males, 44.1% females in Hungary)	Uses and Gratification (U&G) & Motives for Online Gaming	Social, Escape, Competition, Coping, Skill development, Fantasy, Recreation, Outdoor activity, Nostalgia, Boredom	Impulsivity was not related to the motives for online gaming. Competition and fantasy motivations predicted problematic gaming behavior.

some studies (e.g. Guo & Barnes, 2012; Mäntymäki & Salo, 2015) show a small positive association between enjoyment and purchase behavior, several others suggest that enjoying the freely available service might in fact reduce any future willingness to purchase premium content (Hamari, 2015). However, a meta-analysis (Hamari & Keronen, 2017a) of the field shows a general overall positive trend between game enjoyment and purchase behavior. Therefore, we hypothesize the following:

H1a: Enjoyment is positively associated with the reuse intention of Pokémon Go.

H1b: Enjoyment is positively associated with in-app purchase intentions (IPI) of Pokémon Go.

Beyond enjoyment gratifications that many games afford, challenge is also an important quality in games. In digital games research, challenge has been determined as one of the most reported motivations influencing the user's intention to play (Lucas & Sherry, 2004; Sherry et al., 2006). A study by Molen and Jongbloed (2007) on the use of free web-based games demonstrated challenge as being the leading motivation for playing this type of game. Similarly, challenge has also been identified as one of the key gratifications determining loyalty with online games (Huang & Hsieh, 2011). Games such as Pokémon Go have a relatively inclusive approach to challenge in that they reward skill, deep knowledge and high time investment, but for the most part require none of them in order for the players to progress. In particular, Pokémon Go doubles down on this, mirroring a mainstay design imperative of the Pokémon franchise where the games are easily approachable, and where more complicated mechanics are either hidden outright or available only after playing for a while, thus guaranteeing that the games remain accessible but challenging for a wide demographic. Accordingly, we hypothesize the following:

H2a: Challenge of the game is positively associated with the reuse intention of Pokémon Go.

H2b: Challenge of the game is positively associated with IPI of Pokémon Go.

One of the main aspects in games that create challenge is competition. Competition has also been established as one of the significant motivations in traditional sports, and more recently in online and mobile games (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2010; Lucas & Sherry, 2004; Molen & Jongbloed, 2007; Sherry et al., 2006). A number of studies with school-going children identified competition as a significant gratification for playing games (Funk, Chan, Brouwer, & Curtiss, 2006; Olson, 2010). Moreover, competition has also been determined as a critical factor influencing the subsequent use of digital games (Vorderer et al. 2003). As with other forms of games, ARGs and LBGs also tend to incorporate competitive elements into their designs (Hulsey & Reeves, 2014). In Pokémon Go, this can be observed, for example in the prominence of player factions, the

claim and control of Pokémon Gyms, as well as in the social component of encouraging players to collect as many different Pokémon as possible, so leading us to suggest the following:

H3a: Competition is positively associated with the reuse intentions of Pokémon Go.

H3b: Competition is positively associated with IPI of Pokémon Go.

Socializing has been identified as one of the key factors positively impacting user engagement and the continued usage of games (Chen et al., 2006; Hamari & Koivisto, 2015; Lucas & Sherry, 2004; Morschheuser, Riar, Hamari, & Maedche, 2017). A study on Happy Farm demonstrates that in comparison with non-social games, users play social games more frequently, spend more time playing them, and engage more due to the social interaction features they contain (Hou, 2011). In location-based ARGs, the combination of multiplayer gameplay and a focus on playing in public spaces often leads to socializing expectations and experiences between players (O'Hara, 2008; Richardson & Hjorth, 2014). Apart from players, these same aspects also give rise to a form of asymmetric sociality where bystanders can also become parts of the game (Montola et al., 2009). Given that mobile phones are primarily designed to facilitate social functions, many location-based mobile games include or solely rely on social elements and communication (Rashid, Mullins, Coulton, & Edwards, 2006). In the context of Pokémon Go, social matters are of special interest due to both their connection to the conventions of location-based ARGs, as well as the historical centrality of communality and cooperation in the Pokémon franchise. Thus, we hypothesize the following:

H4a: Socializing is positively associated with the reuse intention of Pokémon Go.

H4b: Socializing is positively associated with IPI of Pokémon Go.

With this spanning of physical and spatial boundaries in the field of play of LBGs, players are required to move their physical bodies to considerable distances to play the game. In fact, exercise is not only considered as a by-product of playing LBGs/ARGs, but for many, a chief reason to start playing. As noted by O'Hara (2008) in Geocaching, the primary motivation for playing was not necessarily achieving the objectives set by the activity, but rather participation in the activity itself. Pokémon Go uses game mechanics and achievements to incentivize walking outdoors and covering relatively long distances. Recent evidence indicate that novel gaming concepts such as Pokémon Go can lead to increased physical activity (Kaczmarek et al., 2017; Kogan et al., 2017; Serino, Cordrey, McLaughlin, & Milanaik, 2016). In the context of the current study, the concept of outdoor activity not only addresses physical activity but also includes other linked activities including meeting friends and engaging in social activities outdoors, as well as visiting and exploring new places. Therefore, we propose the following:

H5a: Outdoor activity is positively associated with the reuse intention of Pokémon Go.

H5b: Outdoor activity is positively associated with IPI of Pokémon Go.

Trendiness is one of the important aspects of many new-media applications and systems (Sundar & Limperos, 2013) including social media (Quan-Haase & Young, 2010), tablet devices (Leung & Zhang, 2016), and fitness applications (Lee & Cho, 2017). In practice, how the new technology usage is perceived by acquaintances and others strongly influence one's decision to use and adopt new technological solutions. If the solution is novel and unique compared with other already existing solutions, the users will consider it to be trendy and fashionable and, therefore, opt to use it to maintain their social image (Lee & Cho, 2017). As ARGs and LBGs are currently on the top of a hype-cycle, therefore, for a game like Pokémon Go, notions of perceived trendiness and novelty are a useful metric. Thus, we hypothesize the following:

H6a: Trendiness is positively associated with the reuse intention of Pokémon Go.

H6b: Trendiness is positively associated with IPI of Pokémon Go.

The social and communal aspects of the Pokémon franchise mentioned above as well as its long lifespan and widespread cultural penetration during the peak years have entrenched a nostalgic discourse (Suominen 2008) around it. Particularly, it is seen as a contemporary product line yet it is also linked to a vibrant past of transmedial goods and their consumption. As noted by Carter (2014), this is likely reflected in Pokémon's fan base, in that the Pokémon boom at the turn of the millennium affected a large segment of consumers, many of whom remained fans with varying degrees of activity even after the boom ended. While nostalgia-related gratifications might not be relevant for all ARGs/LBGs, timing seems to be a prominent aspect in the rise of Pokémon Go. The timing of Pokémon Go's release to coincide with Pokémon's 20th anniversary pushed the sales of Pokémon products spiking after Pokémon Go's launch (Nakamura & Amano, 2016), and the overall undercurrent of nostalgia in the contemporary Pokémon franchise all suggest the operationalization of nostalgic sentiment and ties to the wider transmedia system as relevant factors in the experience of playing Pokémon Go. Therefore, we propose that:

H7a: Nostalgia is positively associated with the reuse intention of Pokémon Go.

H7b: Nostalgia is positively associated with IPI of Pokémon Go.

LBGs/ARGs pose new kinds of potential issues in the usability of games as they are designed to be played in various locations and situations. Moreover, mobile games (location-based mobile games in particular) cannot take up considerable time or require significant effort to be playable. Their gameplay also relies on several simultaneously working systems such as GPS and the Internet. In addition, location-based mobile games drastically change the

potential times and locations of play, enabling a hybrid state in which the aim is not so much focused on play time but on a holistic integration of the game into a player's everyday (Richardson & Hjorth 2010). To paraphrase Juul (2010): these games are created to fit into the player's life, and regardless of how difficult they are, the act of playing them is not particularly arduous. Therefore, their ease of use can be either a major enabler or a hindrance for ARGs/LBGs.

H8a: Ease of use is positively associated with the reuse intention of Pokémon Go.

H8b: Ease of use is positively associated with IPI of Pokémon Go.

Information Systems scholars (IS scholars) have extensively investigated the consequences and antecedents of privacy concerns on various platforms (Malik, Dhir, & Nieminen, 2015; Malik, Hiekkanen, Dhir, & Nieminen, 2016a; Malik, Hiekkanen, & Nieminen, 2016b; Taddicken, 2014). Currently, many mobile and online games enforce players to disclose personal information before allowing access to the game (Wottrich, Verlegh, & Smit, 2017). Some of the games also gather meta-information such as the IP address and strategic moves of the players (Thurm & Kane, 2010). Furthermore, as they are fundamentally based on location data and tracking, location-based mobile games are particularly susceptible to claims and fears of privacy breaches. Framed as a voluntary dispensation of one's location to corporate entities, games such as Pokémon Go can be seen as forms of ambiguous surveillance (Hulsey & Reeves, 2014; Wilson, 2012). Accessing personal and meta-information of the players can potentially induce privacy concerns among them (Oulasvirta, Suomalainen, Hamari, Lampinen, & Karvonen, 2014; Wottrich et al., 2017) that in turn can negatively influence the entertainment value of games as well as brand attitude (Martí-Parreño, Aldás-Manzano, Currás-Pérez, & Sánchez-García, 2013; Wottrich et al., 2017). Thus, we hypothesize:

H9a: Privacy concerns are negatively associated with the reuse intention of Pokémon Go.

H9b: Privacy concerns are negatively associated with IPI of Pokémon Go.

Continuous use (see e.g. Bhattacharjee, 2001) of the freemium service has been considered as a fundamentally important necessity of profitability of freemium/free-to-play services as the sold augmenting in-app purchases are only available for existing users. In-app purchases can be regarded as a further step in the development of customer relationship (Mäntymäki & Salo, 2011). However, it can also be conceived that the gratifications player derive from the game experience can also directly affect in-app purchases. Therefore, in light of the current literature, continued play intentions may have a partial mediating role between user gratifications and IPI (Hamari, 2015; Hamari & Keronen 2017a; Hamari, Alha, et al., 2017; Mäntymäki & Salo, 2011). Therefore, we hypothesize the following:

H10: Intention to reuse Pokémon Go is positively associated with IPI of Pokémon Go (Figure 1)

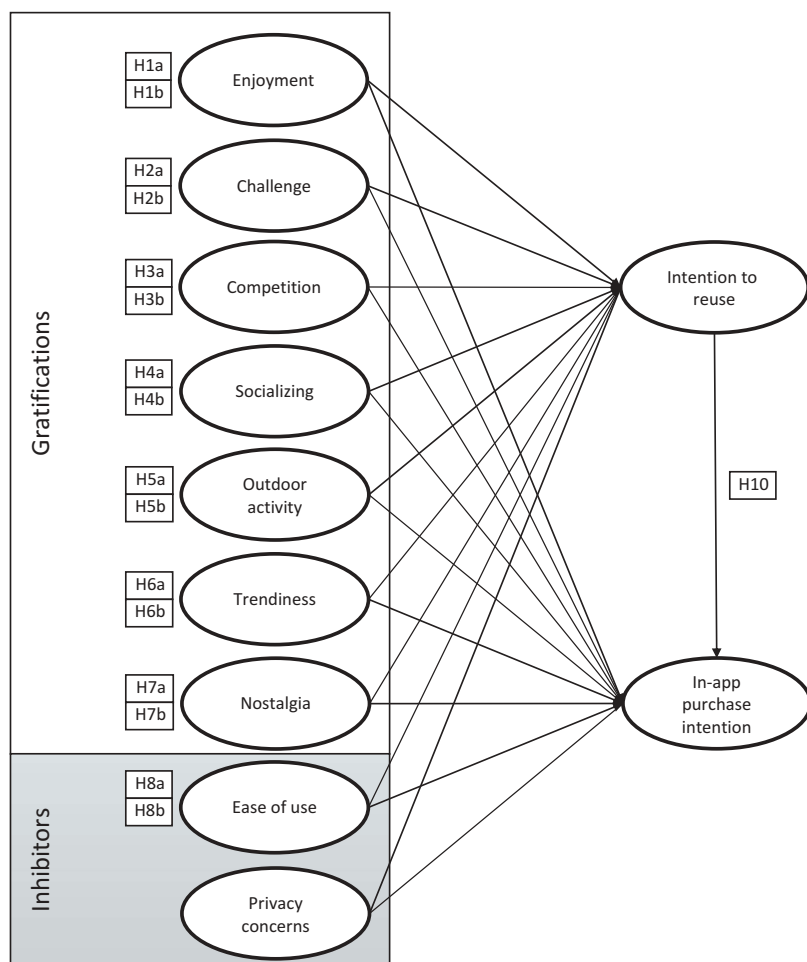


Figure 1. Research model.

3. Methods and data

3.1. Data and participants

The data were collected via a global web-based survey open for people who currently played or had recently played Pokémon Go. Link to the survey was initially posted on a number of gaming research mailing lists, as well as on the Twitter profiles of the main authors. In the brief description of the promotional text, we requested the readers to post links to the survey on relevant forums. During the course of one month, the survey was tweeted by a number of gaming professionals, academics, and research groups. Furthermore, the survey was posted on a number of Pokémon Go Facebook fan pages and by groups notably in the Philippines, Finland, USA, Canada, and Australia. The study procedures were consistent with the ethical principles defined by The Finnish Advisory Board on Research Integrity.

During the one-month period (14 September–13th October 2016), 1315 respondents completed the survey. Out of these responses, 43 respondents who stated that they did not play Pokémon Go were removed from the usable data set. Based on the guidelines proposed for maintaining data quality

(Meade & Craig, 2012), in total, 82 responses were excluded due to the following reasons. Participants providing careless responses with no variance among individual answers (e.g. all 1's or all 7's etc.), inconsistent responses to two control questions, and obvious outliers (using boxplots and histograms) were excluded from the data analysis. After the data-cleaning process, the final data set for statistical analysis is composed of 1190 valid responses. Table 2 lists the demographic and behavioral characteristics of the respondents.

3.2. Measurement

The survey instrument including construct definitions, items, and sources is appended in Appendix A. All the constructs used in the instrument were adapted from prior literature related to either uses and gratification or technology acceptance-related research as well as further adapted to fit the context of the study except for the *outdoor activity* construct which was developed by the authors due to a lack of related prior measurement in literature. Furthermore, constructs on continuous use intentions as well as purchase intentions were employed as the dependent variables. All items were measured on a seven-point Likert scale (strongly

Table 2. Sample demographic and playing-related factors.

Measure		N	%	Measure		N	%	
Demographic factors								
Gender	Male	698	58.7	Occupation	Full-time homemaker	33	2.8	
	Female	492	41.3		Retired/Pensioner	6	.5	
Age	Under 15 years	36	3.0		Student	401	33.7	
	16–20 years	179	15.0		Unemployed	98	8.2	
	21–25 years	388	32.6		Working full-time	550	46.2	
	26–30 years	302	25.4		Working part-time	102	8.6	
	31–35 years	132	11.1		Australia	36	3.0	
	36–40 years	74	6.2		Canada	38	3.2	
	41–45 years	36	3.0		Finland	375	31.5	
	46–50 years	25	2.1		Malta	21	1.8	
Over 51 years	18	1.5	Philippines	402	33.8			
Playing -related factors	Average mobile game play hours/typical day	< 15 minutes	83	7.0	Country of residence	Singapore	41	3.4
		16–30 minutes	107	9.0		Sweden	42	3.5
		31–45 minutes	96	8.1		United Kingdom	42	3.5
		46–60 minutes	150	12.6		United States	93	7.8
		1–2 hours	295	24.8		Others	100	8.5
		2–3 hours	159	13.4		High school	240	20.2
		3–4 hours	115	9.7		Vocational degree	116	9.7
		4–5 hours	60	5.0		College degree	421	35.4
		5–6 hours	39	3.3		University degree	413	34.7
		> 6 hours	86	7.2		Education	Average Pokémon Go play hours/typical day	< 15 minutes
Number of mobile games installed	5 or less	746	62.7	16–30 minutes	149		12.5	
	6–10	328	27.6	31–45 minutes	125		10.5	
	11–15	61	5.1	46–60 minutes	157		13.2	
	16–20	30	2.5	1–2 hours	279		23.4	
	21 or more	25	2.1	2–3 hours	140		11.8	
Number of regularly played mobile games	5 or less	1119	94.1	3–4 hours	101		8.5	
	6–10	65	5.5	4–5 hours	45		3.8	
	11–15	5	0.4	5–6 hours	41		3.4	
	16–20	0	0	> 6 hours	65		5.5	
	21 or more	1	0.1	5 or less	1119	94.1		

Table 3. Validity and Reliability.

	AVE	CR	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Enjoyment	0.689	0.929	0.830													
2 Challenge	0.683	0.915	0.604	0.827												
3 Competition	0.714	0.909	0.284	0.526	0.845											
4 Socializing	0.715	0.937	0.612	0.506	0.374	0.845										
5 Outdoor	0.694	0.940	0.704	0.564	0.298	0.707	0.833									
6 Trendiness	0.943	0.980	0.391	0.325	0.450	0.543	0.400	0.971								
7 Nostalgia	1.000	1.000	0.071	0.141	0.211	0.195	0.092	0.142	na							
8 Ease of use	0.772	0.910	0.444	0.594	0.320	0.362	0.415	0.178	0.104	0.879						
9 Privacy	0.829	0.935	0.191	0.176	0.163	0.191	0.199	0.190	−0.018	0.077	0.910					
10 Gender	1.000	1.000	−0.091	−0.033	0.232	0.111	0.000	0.137	0.227	−0.062	0.069	na				
11 Age	1.000	1.000	−0.033	−0.053	−0.170	−0.111	−0.016	−0.093	−0.405	−0.009	0.045	−0.133	na			
12 Education	1.000	1.000	−0.099	−0.093	−0.079	−0.095	−0.085	−0.078	−0.137	−0.047	0.110	−0.044	0.317	na		
13 Reuse	0.789	0.918	0.533	0.538	0.252	0.394	0.529	0.230	0.127	0.446	0.083	−0.062	0.022	−0.105	0.889	
14 Purchase	0.742	0.920	0.304	0.383	0.426	0.377	0.369	0.324	0.158	0.255	0.138	0.136	0.004	−0.107	0.451	0.862

disagree–strongly agree) except for the Nostalgia measurement which gauged concrete past experiences with Pokémon Franchise and, therefore, had answers “yes” and “no.”

3.3. Validity and reliability of the measurement instrument

The model-testing was conducted using the component-based PLS-SEM in SmartPLS 3 (Ringle, Wende, & Will, 2005). Convergent validity (refer Table 3) was assessed with two metrics: average variance extracted (AVE) and composite reliability (CR). Convergent validity was met (the AVE of

each construct should be > 0.5, and the CR of each construct should be > 0.7: Fornell & Larcker, 1981). Discriminant validity was assessed first through the comparison of the square root of the AVE of each construct to all of the correlations between it and other constructs (refer Fornell & Larcker, 1981), where all of the square roots of the AVEs should be greater than any of the correlations between the corresponding construct and another construct (Jöreskog & Sörbom, 1996) (Table 3). Second, we assessed discriminant validity using the HTMT criterion: no value between two constructs exceeded 0.85 (Henseler, Ringle, & Sarstedt, 2015). Third, we assessed the discriminant validity by confirming that each

item had the highest loading with its corresponding construct. From these tests, we can conclude that the discriminant validity and reliability was acceptable. The sample size ($N = 1190$) also satisfies several different criteria for the lower bounds of sample size for PLS-SEM analysis (Anderson & Gerbing, 1988). Moreover, to investigate the extent of common method bias in the data, we first conducted Harman's one-factor test where one common factor of all items in the model should explain less than 50% of the variance (Podsakoff et al., 2003). In our data, the variance explained by the single factors was 35.195%. Second, we investigated the Variance Inflation Factors (VIF) of the model where all inner-model VIF values should be below 3.3 (Kock, 2015). In our data, all VIF values were between 1.073 and 2.892. Third, as part of discriminant validity testing, the correlation matrix (Table 3) does not include extremely high correlations (> 0.9) (Bagozzi, Yi, & Phillips, 1991). Therefore, it can be concluded that CMB is unlikely to be an issue. Moreover, we investigated model fit although it is not commonly analyzed in PLS-SEM. The Standardized Root Mean Square Residual (SRMR) of the model was clearly within recommended bounds: 0.059 (recommended threshold < 0.08 (Hu & Bentler, 1999)) and Normed Fit Index (NFI) was close to the recommended threshold: 0.825 (recommended threshold > 0.9 (Löhmöller 1989)). We also ran the model using covariance-based SEM in AMOS to test whether there would be discrepancies in the results between the SEM modeling techniques. The results between component-based SEM

and covariance-based SEM differed so little that no change in interpretation would have to be made.

4. Results

All the results can be seen in Figure 2 and Table 4, the research model accounted for 41% of the variance of intentions to reuse (ITR) and 34.6% of in-app items purchase intentions.

Related to the hypotheses and the relationships between gratifications and ITR, the following hypotheses were supported: H1a - Enjoyment \rightarrow ITR (0.198**), H2a - Challenge \rightarrow ITR (0.231**), H5a - Outdoor activity \rightarrow ITR (0.251**), H7a - Nostalgia \rightarrow ITR (0.094**), and H8a - Ease of use \rightarrow ITR (0.136**). Please refer to Figure 2 and Table 4 for full details.

In the research model, the relationship between gratifications and IPI is modeled both as direct and as mediated by ITR, and this enables the investigation of both direct and mediated effects. With respect to the results, the total effects can be regarded as being more relevant as they also include the effect that is being mediated through the ITR. Both, however, can be found in Table 4. Relating to the relationship between gratifications and purchase intentions for in-game items, the following hypotheses were supported: H2b - Challenge \rightarrow PI (0.089*), H3b - Competition \rightarrow PI (0.259**), H4b - Socializing \rightarrow PI (0.083*), H5b - Outdoor activity \rightarrow PI (0.147**), H7b - Nostalgia \rightarrow PI (0.085*), and H10 - ITR \rightarrow PI (0.331**).

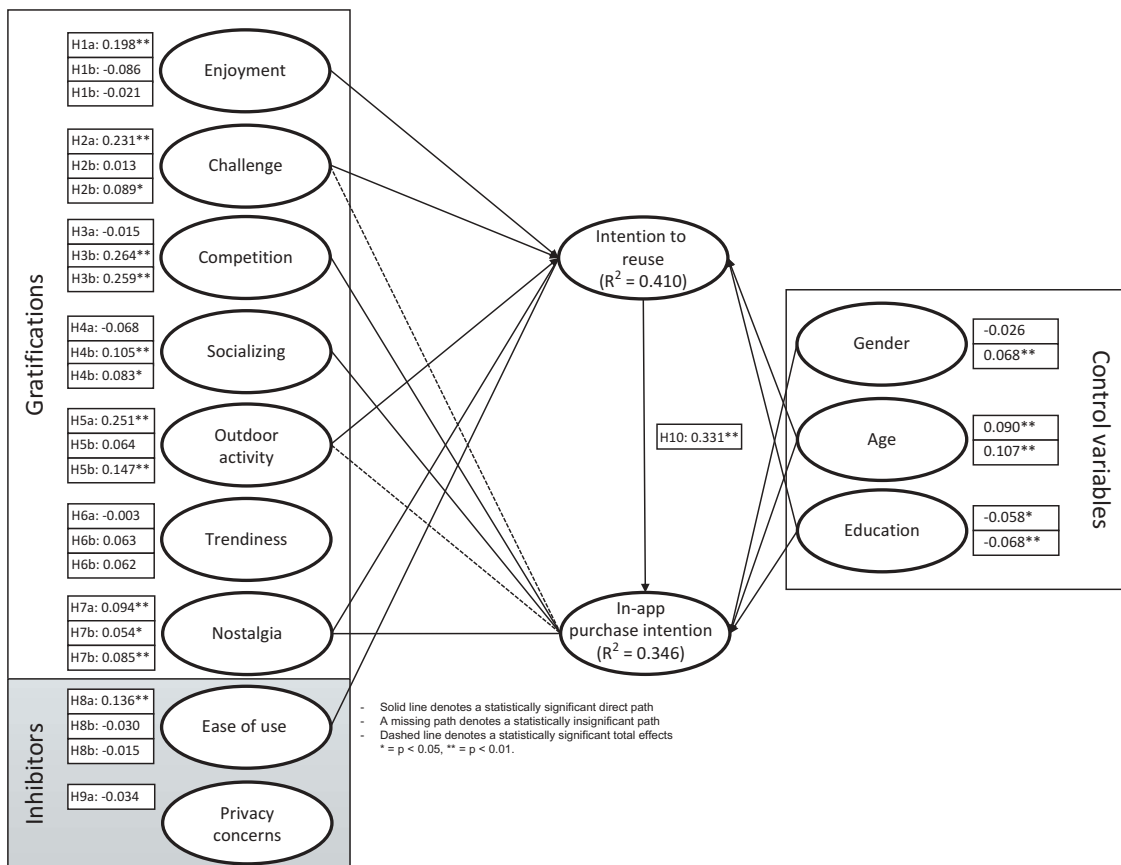


Figure 2. Structural Model.

Table 4. Summarized Results.

H#	Supported?		Beta	p	CI95 LOW	CI95 HI
		DV: intentions to reuse (R2 = 0.410)				
H1a	Yes	Enjoyment	0.198**	0.000	0.116	0.284
H2a	Yes	Challenge	0.231**	0.000	0.144	0.315
H3a	No	Competition	-0.015	0.615	-0.070	0.044
H4a	No	Socializing	-0.068	0.079	-0.143	0.009
H5a	Yes	Outdoor activity	0.251**	0.000	0.163	0.328
H6a	No	Trendiness	-0.003	0.921	-0.058	0.053
H7a	Yes	Nostalgia	0.094**	0.000	0.046	0.141
H8a	Yes	Ease of use	0.136**	0.000	0.071	0.201
H9a	No	Privacy concerns	-0.034	0.156	-0.077	0.014
		Gender	-0.026	0.268	-0.069	0.019
		Age	0.090**	0.000	0.043	0.141
		Education	-0.058*	0.015	-0.104	-0.014
		DV = in-app purchase intentions (R2 = 0.346)				
See total effects		Enjoyment	-0.086	0.056	-0.172	0.001
		Challenge	0.013	0.742	-0.065	0.086
		Competition	0.264**	0.000	0.202	0.327
		Socializing	0.105**	0.008	0.026	0.182
		Outdoor activity	0.064	0.138	-0.021	0.148
		Trendiness	0.063	0.050	0.000	0.124
		Nostalgia	0.054*	0.040	0.005	0.107
		Ease of use	-0.030	0.294	-0.088	0.026
		Privacy concerns	0.039	0.143	-0.013	0.095
		Intentions to reuse	0.331**	0.000	0.268	0.396
		Gender	0.063*	0.018	0.010	0.113
		Age	0.107**	0.000	0.054	0.160
		Education	-0.068**	0.008	-0.118	-0.021
		DV = in-app purchase intentions - Total effects (as mediated by intention to reuse) (R2 = 0.333)				
H1b	No	Enjoyment	-0.021	0.658	-0.109	0.067
H2b	Yes	Challenge	0.089*	0.037	0.003	0.167
H3b	Yes	Competition	0.259**	0.000	0.192	0.324
H4b	Yes	Socializing	0.083*	0.039	0.002	0.160
H5b	Yes	Outdoor activity	0.147**	0.000	0.067	0.227
H6b	No	Trendiness	0.062	0.060	-0.002	0.123
H7b	Yes	Nostalgia	0.085**	0.002	0.034	0.142
H8b	No	Ease of use	0.015	0.619	-0.048	0.073
H9b	No	Privacy concerns	0.028	0.311	-0.026	0.086
H10	Yes	Intentions to reuse	0.331**	0.000	0.268	0.396

* = $p < 0.05$, ** = $p < 0.01$

5. Discussion

In this study, we investigated why people play location-based ARGs by studying the relationship between gratifications people derive from Pokémon Go and their intentions to continue playing it and spend money on it. We employed data gathered from players of Pokémon Go across the globe ($N = 1190$). The key contributions and novelty pertinent to the present study are presented in Table 5.

Articulating the results of the present study on a broader level, the users who experience LBGs/ARGs as enjoyable, challenging, nostalgic association, and outdoor experiences with no usability problems are more likely to continue and increase their LBG/ARG interactions. Those users who, in addition to the aforementioned gratifications, derive more gratification related to competition and socializing are more likely to purchase in-game content in LBGs/ARGs. However, beyond these positive findings, two of the constructs that we also hypothesized to be positively associated with playing and paying in LBGs/ARGs (trendiness and privacy concerns) were not associated with the outcome variables.

Given that pervasive digital games in general and the Pokémon franchise in particular are relatively heavily invested in social aspects; as highlighted in relation to our hypotheses, it comes as a surprise that the social dimension was not positively associated with continued playing, although it was positively associated with spending money on the game. Although these findings are unexpected, it echoes strongly

with the prior study indicating no impact of socializing on driving users' attitudes toward playing the game (Rauschnabel et al., 2017). This finding also likely mirrors a demand through inconvenience, whereby players wishing to extend their social experience or to maintain their existing social gameplay might experience the free game as insufficient in that regard. Pokémon Go, like the whole Pokémon franchise, hinges on a commodified sociality where the product incorporates social elements, but allows unhindered access to them mostly through varying levels of consumption and commodification, whereupon sociality becomes a lucrative aspect to capitalize in the game design. In the case of Pokémon Go, players gain access to a variety of social features through the use of money, such as items like the Lure Modules, prolonged play-sessions, and an accumulation of social prestige through proficiency and in-game advancement.

Of particular note regarding the social features and basic user interactions in Pokémon Go is the respondent's positive reaction to outdoor activity as both a motivating factor for ITR and for spending money. With some caveats, given the overall popularity of Pokémon Go, it seems that the very manner of playing location-based ARGs as activities mapped onto physical locales holds strong motivational power. Furthermore, outdoor activity was connected not only to the charm of playing outside but also to the social potential afforded by the game's physical gameplay. The respondents seemed to be lukewarm to the thought of socializing interaction per se (refer above), but did react

Table 5. Results compared with prior studies on Pokémon Go.

Dimension	Studied previously in*	Novel contributions of the current study
Challenge	None	In gaming literature, gratification derived from the challenges that any game innate has been regarded as a highly significant element. However, past studies on Pokémon Go have yet to investigate its role in this context. The present study revealed a positive association between challenge and both the reuse and in-app purchase intentions.
Competition	Zsila et al., 2017	In the context of Pokémon Go, investigations around competition which is another critical feature-related dimension has only addressed its relationship with problematic gaming behaviors. The current investigation supplements the limited prior work by determining its relationship with reuse as well as in-app purchase intentions among the players.
Socializing	Ruiz-Ariza et al. (2018); Kaczmarek et al. (2017); Rauschnabel et al. (2017); Zsila et al. (2017)	Although the relationship between socializing and playing intentions has been examined, this study further determined its positive influence on users' in-app purchase intentions. Moreover, in accordance with prior work, the present study did not find a link between socializing and re-use intent.
Outdoor activity	Kaczmarek et al. (2017); Kogan et al. (2017); Rauschnabel et al. (2017); Yang and Liu (2017); Zsila et al. (2017)	Even though this component of the game has been examined assiduously by other scholars, the current study approached it through a wider perspective by including items not only related to health-related aspects of outdoor gratification. Our findings suggest that in addition to physical well-being and activity the potential of exploring new places and interacting with people summates appeal to the game. The results of the present study showed a positive association between outdoor activity gratification and reuse intention as well in-app purchase intentions (mediated by reuse intention).
Trendiness	None	Trendiness has been considered an important determinant of LBGs/ARGs in the popular discussion concerning them. However, prior studies on Pokémon Go have not taken this dimension into consideration. Even through trendiness may possibly have an effect on initial adoption of the game, the present study, however, found no significant effect between trendiness and intentions of reuse and in-app purchases.
Nostalgia	Rauschnabel et al. (2017); Yang and Liu (2017); Zsila et al. (2017)	Nostalgia especially in the context of Pokémon Go has been considered a relevant factor in past studies for its attractiveness since Pokémon commands a long standing franchise. As prior studies, the present study also established a positive association between nostalgia and continued use. However, in addition this study also revealed its importance with regards to in-app purchases.
Ease of use	None	Despite being acknowledged as a significant component influencing adoption in research concerning information technology and systems, ease of use has not thus far been addressed in the context of Pokémon Go. The present study showed a positive association between ease of use and intentions toward continued use. Beyond being a LBG/ARG, Pokémon Go is also a free-to-play game implying that the business model can have a relevant influence on the gameplay of the game. Therefore, investigating the in-app purchase behavior can be regarded essential.
In-app purchase intention	Rauschnabel et al. (2017)	Prior studies have not focused on in-app purchases to a large degree, and therefore, this study enforces our knowledge on this area: outdoor activity, challenge, competition, socializing, nostalgia and intentions to reuse were associated with in-app purchase intentions.

* In context of Pokémon Go

positively to sociality that happens “on the go,” when the game is actually played out and about. As such, spending time with friends and strangers outdoors as a designed and also incidental factor in Pokémon Go’s core gameplay likely contributed to its popularity among respondents. Overall, the confirmation of the outdoor activity hypothesis suggests that players found Pokémon Go’s mode of outdoor play, along with its potential for socializing interaction, motivationally rewarding. It also implies that the sociality embedded in the core gameplay was experienced as more motivating than the straightforward social aspects that games evoke. In this way, sociality has been intimately packaged into Pokémon Go’s monetization model, as both an enjoyable part of the free-core gameplay, and as a profitable item in its design of commodified sociality. With respect to trendiness, we believe that while this factor might play a strong role in the initial adoption of LBGs/ARGs, it does not seem to be associated with their continued use. This is an interesting finding that on one hand defies anecdotal explanations of Pokémon Go’s popularity, but on the other hand might explain why Pokémon Go has dramatically declined in popularity after its initial novelty wore off (Barrett, 2016). For the players

who remain active even after the trend or initial hype phases out, the game potentially offer multitude of other strong motivations beyond straightforward participation in a popular phenomenon.

Whereas the overall trendiness of Pokémon Go seemed to be of little consequence to players in terms of their continued use or purchase intentions for in-game content, nostalgic associations with the characters and brand display positive associations with both ITR and purchase decisions. Perhaps, overall, trendiness is less of a factor in an entertainment product that hinges on nostalgia and has a pre-existing brand history. This is a trend that is visible across a range of entertainment enterprises including movies and television where comic characters (e.g. Marvel or DC comics) are being revived and they already have an existing fan base. While the players of Pokémon Go might regard their participation in the game to be timely (and perhaps cool as a result), the perceived trendiness of any new development wears off. In Jenkins’s (2006) terms, this longstanding development focuses on forging and utilizing affective economics. Overall, it aims to maintain the Pokémon brand as an affective site where, ideally, consumers are emotionally engaged and socially

connected to a wider brand community, and where a key part of the brand's image is the existence of such interaction. In this sense, although hugely popular in its early days, Pokémon Go does not need to be viewed as cutting edge. Rather, not being cutting edge is somewhat the point of it, as framed through nostalgia and brand communities, Pokémon Go links to 20 years of accumulated Pokémon branding, fan culture, and potential personal experiences that draw from memories and established "world building"—of taking part in the brand and the story of Pokémon. It is, therefore, the players who enjoy these benefits that are more likely to remain as long-term players, and this has valuable implications for the development of any location-based ARG. Pokémon Go seems to benefit from the established fan-base of Pokémon: people who are or were at some point in their lives, used to spending money on the franchise likely found it easy to do so in the case of Pokémon Go. This nostalgic tie has probably been further fanned by Pokémon Go initially including only the iconic first 151 Pokémon available in the original Pokémon games and their tie-in products. Likewise, publishing Pokémon Go during the franchise's 20th anniversary, and concomitant pushes in marketing further seems to have intensified this nostalgic link.

Results from our study also suggest that concerns for privacy do not impact either the continued use intentions or the purchase intentions for in-game content of the players. One of the main reasons behind this finding could be linked to a limited or lack of awareness about the disposal and usage of their personal and game usage data, which according to prior literature is often the case (Oulasvirta et al., 2014). It is quite plausible that majority of the study respondents are not able to comprehend how their data are being handled or treated by Niantic as well as by various third parties including marketers and governmental agencies. The beliefs and attitudes of the respondents in our data most likely reflect the general mindset toward privacy, which tends to be one of the rational or irrational ignorances (e.g. Oulasvirta et al., 2014) where the effort of maintaining awareness of privacy threats as well as undertaking a systematic activity to mitigate them is too high in the modern IT reality. Another possible explanatory reason for the lack of association between privacy concerns and use-related variables could be that users of modern IT fall into apathy toward their privacy. If we consider the online services that consumers face today, no one can easily use them without succumbing to expending at least some privacy. This is especially so given the ever-growing number of online facets that threaten their personal and behavioral data, to maintain a participation and attachment to today's society. Furthermore, users might have high level of trust and confidence in Niantic and Nintendo, and as such the players believe that their data are in safe hands and will never be misused. Some prior literature also lends support for these notions—for example Wottrich et al. (2017) indicate that privacy concerns related to advergames do not impact brand attitude and information disclosure toward high trust brands. Moreover, this finding resonates with prior research that shows the concerns of users in the social web environment, although their concerns do not correspond to their online usage behavior (Malik et al., 2016; Taddicken, 2014). This

phenomenon is generally referred to as the "Privacy Paradox," and is assumed to occur due to a number of reasons including a lack of privacy awareness, limited privacy protection know-how, and an "won't happen to me" attitude (Malik et al., 2016; Taddicken, 2014).

Another surprising finding (although supported by prior literature) was that enjoyment of the game and purchase intentions for in-game content had a negative association (borderline significant), when not taking into account the mediating positive effect of a user's play intentions. This finding lends support for recent quantitative findings (Hamari, 2015) as well as confirming other qualitative observations on the relationship between game enjoyment and purchases of in-game content (e.g. Hamari & Lehdonvirta 2010; Hamari, Alha, et al., 2017; Lehdonvirta, 2009; Lin & Sun 2011). The prevailing explanation of why such an association is found is that game developers attempt to increase the desirability of in-game items by intentionally increasing the frustration experienced with the free-core game. In game environments, several studies (Alha, Koskinen, Paavilainen, Hamari, & Kinnunen, 2014; Hamari & Lehdonvirta, 2010; Hamari, 2015) have noted that the game design is indeed used for creating demand for in-game premium content (refer e.g. Hamari & Lehdonvirta, 2010; Lehdonvirta, 2009) via various artificial limitations such as the intentional degradation of virtual items, planned obsolescence, or a fear of losing content which has been gathered in the game. Therefore, players may need to spend money even to sustain playing the game (Hamari, Alha, et al., 2017; Wohn, 2014). Naturally, these strategies raise the question of how users perceive their enjoyment of the service when frustrating (negative enjoyment) elements are intentionally incorporated into it, to create a demand for premium products.

In Pokémon Go, this "demand through inconvenience" (Hamari, 2015) is illustrated, for example in how competition was experienced by respondents to be a motivating factor for spending money on the game (H3b), but not for spending more time in the game (H3a). It would seem that competitive gameplay is not, as such, a driving force for gameplay in Pokémon Go, but paying for a competitive edge is. Pokémon Go is designed in a way that buying items and perks considerably speeds the player's progress, granting an advantage over non-paying players which has also found to be a significant reason for in-game purchases in free-to-play games in general (e.g. Hamari, Alha, et al., 2017). As such, it seems that Pokémon Go's intentional elements of frustration (e.g. limited resources and inventory space) interfere with competitive players to a degree that they spend money to overcome them, even when overall competition accounts for a relatively small part of the users' continued use of the game.

5.1. Theoretical and practical implications

The current study lays out several theoretical and practical implications for scholars and practitioners in various domains as well as to policymakers to some extent. From the theoretical perspective, besides contributing to the prior scholarly work on ARG/LBG, the study findings contribute to research of new-media, augmented reality, and location-based

applications. Second, the current study contributes to the U&G literature as it goes beyond validating some of the well-established constructs by providing a thorough perspective of the attitudes and behaviors of Pokémon Go players. Finally, the current study expands the current scholarly work by investigating novel gratifications to new-media (i.e. outdoor activity) and Pokémon Go research (i.e. trendiness, challenge, and competition). This assessment supports the emphasis to identify and determine novel gratifications of new-media technologies (Sundar & Limperos, 2013).

With respect to practical implications, first the tested instrument can not only support researchers to investigate the usage and underlying motivations of other ARG/LBGs but also different tools and applications employing location and augmented reality features. Second, the proposed instrument could be applied by designers who would like to assess or incorporate location and augmented reality features in their products or applications (e.g. Smart glasses, AR Shopping, MapMyFitness, and Waze). Due to a rapid development and competition within the AR/LB domain, adapting the proposed gratifications can provide them a competitive edge. Third, the results from this study can be of relevance to the policymakers particularly within the health domain (e.g. state health agencies, health watchdogs, and NGOs). Results from the current study, which reiterates recent work (Althoff et al. 2016; Kogan et al., 2017; Rauschnabel et al., 2017), pointing to strong association of outdoor activity with players reuse intentions can be an insightful and upbeat finding. Based on the findings, strategies can be devised by the above-mentioned entities to promote similar applications to populations with poor-activity levels (e.g. obese, older adults).

In the wider context of ARGs and related LBGs, key takeaways from this study suggest that everyday spaces augmented with playful alterations and as a possible mode of traversal in these spaces indeed are important aspects of LBGs/ARGs. This is especially so if combined with the general design esthetics of casual games (i.e. combining ease of use with a balanced challenge) that enable this form of outdoor play to remain easily approachable but not trivial. The social aspects that are commonly theorized as being central to ARGs were also supported to a degree in this study. However, instead of unambiguously conforming to the hypotheses, the slight variability in the results in this area indicates that the function of social aspects (at least in Pokémon Go) is partly instrumental. Alongside being part of the basic LBG play, there appears to be a form of commodified sociality where players are willing to invest money in (and because of) the social aspects of the game. In this light, it is likely that such an instrumental value of sociality in forming, for example the gaming capital (Consalvo, 2009) of a player in a multiplayer setting might emerge in other games as well—particularly in free-to-play games in the vein of Pokémon Go. Furthermore, the effect of the groundwork established by the Pokémon franchise in terms of prior “world building” and establishing a firm consumer base was, according to our results, significant for the proliferation of Pokémon Go. As such, it might seem tempting to map the expectations of any future

success with ARGs on similar extensions of these established properties and to attribute the relatively modest current success of ARGs partially on the lack of such mobilizing tie-ins.

In any case, with location-based augmented reality gaming having now breached the mainstream, Pokémon Go’s successors will likely find it easier to attract players already invested in the modalities and conventions of the genre. Just as Pokémon Go was built on the lessons of prior games, so too will future LBGs be built on those of Pokémon Go. Time will tell whether Pokémon Go was the first in a line of mainstream big-audience ARGs, or just an idiosyncratic application of a nostalgic and popular franchise to a previously relatively niche corner of gaming. What remains probable, however, is that the lessons learned from the development, reception, and research of Pokémon Go will be identifiable in future ARGs as well.

5.2. Limitations and future research directions

As with any study, there are certain limitations that must be taken into account when considering our data and its representativeness. First, our study was conducted in the context of Pokémon Go. While Pokémon Go is the most popular ARG, results may slightly vary between ARGs. Second, as is usually the case with questionnaire-based studies, the data are cross-sectional, and therefore, we are not able to infer how players’ gratifications might have changed during their engagement with the product. Third, in our data set large portions of respondents were from Philippines and Finland (over 65% in total). The composition of the respondents is most likely connected to the distribution channels used by our study. However, we can be rather confident that these biases in our data have had little effect on the results, and an impressive sample has been reached when compared with similar studies. Fourth, the data collection was conducted via an online survey and the respondents were obviously self-selected. Even though these data collection methods are commonly used and the process followed standard procedures used in the field of social sciences, the effects of these methods need to be noted. As such, it is possible that the respondents who chose to participate in the study are more highly motivated gamers than the average population. While we do not consider these factors to have considerably affected the study, they should be, however, acknowledged when evaluating the results.

With respect to future research, comparing and analyzing data from several ARGs can be a potential path for future research. While in the present study, we investigated the gratifications that people derive from playing LBGs/ARGs, another prevailing avenue for research on games has investigated player typologies and how differently oriented players may experience games differently (e.g. Hamari & Tuunanen, 2014; Kallio et al., 2011; Lee & Wohn, 2012; Yee, 2006). Therefore, a potentially fruitful avenue in studying LBGs/ARGs could be to investigate how differently oriented players experience and play LBGs/ARGs, and thus increase the normative knowledge on how to design LBGs/ARGs for different audiences. In the current study, few novel variables were investigated in the context of new-media as well Pokémon

Go research. Scholars can further explore and apply these constructs in other ARG/VRG games and applications as well as relevant new-media applications. Moreover, one interesting possible avenue for research would be to investigate the stealth learning that can happen during the game when players explore historical locations and cultural landmarks (Prensky, 2007; Whitton, 2014). Finally, there is a strong need to explore and understand the long-term effects on the players. Based on the sensor/log data or through longitudinal studies, quantifying the behavioral change (change in players' BMI over time, impact of various weather conditions, or relationships/friendships through the game play) can be another interesting avenue. Moreover, the technological development around augmented reality and its dissemination into consumer culture are still in its infancy. Therefore, future research should anticipate and pursuit carrying out research involving technologies such as more developed display devices, the integration of Augmented reality (AR) and virtual reality (VR) (mixed reality) as well as the marriage between Internet-of-things and mixed reality to keep up with the rapid development between humans and perceived reality.

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Appendix A: Survey constructs and items

Construct	Definition	Items	Mean	SD	Adapted from
Challenge 1 = strongly disagree, 7 = strongly agree	A sense that an individual's capabilities are being stretched and tested.	CHAL_1: I feel proud when I master an aspect of the game CHAL_2: It feels rewarding to get to the next level CHAL_3*: I feel excited when I catch a new Pokémon CHAL_4*: I feel excited when I win a battle CHAL_5: I enjoy finding new and creative ways to work through the game	5.598	1.191	Sherry, Lucas, Greenberg, & Lachlan. (2006) * Constructed
Competition 1 = strongly disagree, 7 = strongly agree	The desire and need to perform better or beat other players/computer while playing a game.	COMP_1: I like to prove that I am one of the best players COMP_2: I get upset when others do better than me COMP_3: I get upset when I am unable to earn enough points COMP_4: It is important to me to be one of the skilled persons playing the game	3.807	1.662	Sherry et al. (2006); Kim and Ross (2006)
Enjoyment 1 = strongly disagree, 7 = strongly agree	The pleasure an individual gains while playing the game.	ENJ_1: I play Pokémon Go because it is exciting ENJ_2: I play Pokémon Go because it is entertaining ENJ_3: I play Pokémon Go because it is fun ENJ_4: I play Pokémon Go because it is a good pastime ENJ_5: I play Pokémon Go because it is a habit ENJ_6: I play Pokémon Go because it occupies my free time	5.136	1.320	Wu et al. (2010), Kim and Ross (2006), Wei and Lu (2014)
Trendiness 1 = strongly disagree, 7 = strongly agree	The extent to which an individual considers playing game for other's perceptions	TREN_1: Pokémon Go enables me to look trendy TREN_2: Pokémon Go enables me to look cool TREN_3: Pokémon Go enables me to look stylish	2.938	1.735	Lee and Cho (2017); Quan-Haase and Young (2010); Leung and Zhang (2016)
Socializing 1 = strongly disagree, 7 = strongly agree	Psychological sense of physically interacting with other humans.	SOC_1: Pokémon Go enables me to maintain friendships SOC_2: Pokémon Go enables me to improve relationships SOC_3: Pokémon Go enables me to make new friends SOC_4: I like to play Pokémon Go because my friends play the game SOC_5: Pokémon Go enables me to participate in relevant discussions SOC_6: Pokémon Go enables me to be part of a group	4.337	1.554	Sherry et al. (2006); Kim and Ross (2006); Wu et al. (2010)
Outdoor activity 1 = strongly disagree, 7 = strongly agree	The gratifications related playing outdoors	OUT_1: I play Pokémon Go because it motivates me to go out OUT_2: I play Pokémon Go because it motivates me to explore new places OUT_3: I play Pokémon Go because I can meet friends outdoors OUT_4: I play Pokémon Go because I can meet strangers outdoors	5.068	1.436	Constructed
Ease of use 1 = strongly disagree, 7 = strongly agree	Degree to which a person believes that playing the game would be free of effort.	EASE_1: Using the game interface doesn't require much effort EASE_2: The interaction with the game is clear and understandable EASE_3: Pokémon Go is easy to use	5.440	1.332	Davis (1989)
Privacy concerns 1 = strongly disagree, 7 = strongly agree	An individual's worries related to the access of her disclosed personal information.	PRIV_1: My data being transferred to Niantic PRIV_2: My data being used by Niantic PRIV_3: My data being shared with third parties	3.848	1.788	Taddicken (2014)
Nostalgia (yes (1)/no (0) questions summed into a single variable)	A yearning to relive or return to a past period.	NOST_1: I used to play games on "Nintendo Game boy" NOST_2: I used to play Pokémon PC/Console games NOST_3: I used to watch Pokémon cartoons/anime series/movies NOST_4: I used to collect Pokémon merchandise (e.g. toys, stickers, trading cards, books etc.) NOST_5: I have been a fan of Pokémon even before the launch of Pokémon Go	3.506	1.619	Constructed
Intentions to reuse 1 = strongly disagree, 7 = strongly agree	The degree of one's belief that she will continue playing the game.	ITRCONT_1: I will keep playing Pokémon Go in future as much as I have played it lately ITRCONT_2: I intend to play Pokémon Go at least as often within the next month as I have previously played it ITRCONT_3: I plan to play Pokémon Go during the next month	5.210	1.516	Davis (1989)
In-app purchase intentions 1 = strongly disagree, 7 = strongly agree	Likelihood of an individual making in-game purchases.	IPIPURCH_1: I am likely to buy extra PokéBalls in future IPIPURCH_2: I am likely to buy extra Poké lives in future IPIPURCH_3: I am likely to buy extra storage space in future IPIPURCH_4: I am likely to buy extra items in the future (e.g. lucky eggs, power ups etc.)	3.194	1.844	Dodds, Monroe, and Grewal (1991)