To Catch Them All – The (Un)intended Consequences of Pokémon GO on Mobility, Consumption, and Wellbeing[*]

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Abstract

In order to better understand the effectiveness of location-based mobile games in shaping user behaviour, this study investigates the behavioural impacts of playing Pokémon GO on mobility (i.e., travel) and consumption (i.e., spending) and its effects on users' wellbeing. Based on a survey with 405 players in the United States (US), three types of impacts were identified: sense of community (social), mobility (visitation to places), and physical activities. Two dimensions of players' wellbeing were also identified: improved daily functions and psychosocial functions. Enjoyment of the game as well as motivation to win battle were consistently found to affect these behavioural impacts. Additionally, these factors also increase the probability of players spending money on induced consumption, such as for retail, restaurants, and travel.

Keywords: mobile gaming; location-based game; mobility; travel; consumption; wellbeing.

1 Introduction

Pokémon GO, at 500 million downloads by September 2016, brought the combination of mobile gaming and augmented reality to the masses. The game relies on smartphone's geolocation to enable gameplay, in that in-game mobility is triggered by physical travel. To succeed in the game, users have to be in the vicinity of real world locations to find and catch Pokémon characters and to interact with Gyms to battle or with PokéStops to collect necessary game items. While some of these items can be bought through in-app purchases, others can only be found when users are in the vicinity of a PokéStop.

Mobile games are changing the game industry significantly. At the expense of console games, smartphone games today account for 27% or $36.9 billion of the market share, up from 24% in 2015 (Newzoo, 2016). Mobile games typically generate revenue through app download and in-app purchases and can be played on a smartphone regardless of the physical location of the player. However, Pokémon GO, and the less

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successful predecessor Ingress, augmented the game by requiring users to be at specific geographical locations to have access to relevant game features. In Pokémon GO, PokéStops are placed at landmarks, such as statues, commemorative signs, churches, and other public places. As such, it is expected that gameplay affects users' surroundings. Furthermore, different types of Pokémon are spawned in different geographic areas, forcing players to walk and visit different areas to catch them all.

The large scale success of Pokémon GO warrants a closer look at the benefits derived for users and potential effects for businesses located near Pokéstops. Indeed, the media have speculated the impacts of the game for its users (e.g., health benefits, meeting other players at PokéStops or collaborating with players from the same team to battle at a Gym), for local businesses (e.g., increased foot traffic, induced consumption), and for cities (e.g., improved civic engagement) (e.g., Dicker, 2016; Hahn & Judkis, 2016; Walker, 2016). Importantly, the nature of gameplay in Pokémon GO also leads to consequences of mobility, leading to speculations of its benefit to travel and tourism (Abbey-Lambertz, 2016; McIntosh, 2016). Therefore, the aim if this study is to investigate the behavioural consequences of playing Pokémon GO with regards to consumption and mobility as well as its effects on players' wellbeing.

2 Behavioural Consequences of Games

The use of mobile devices affects experiences as users take advantage of new opportunities presented by various mobile applications to manage and complete their days differently (Schwanen & Kwan, 2008). For example, mobile applications that rely on geolocation data (i.e., using Geographical Positioning Systems/GPS) improve experiences in space by providing users with prompts for wayfinding and other task fulfilment (Hahn, 2012; Tussyadiah & Zach, 2012). As such, these applications can guide users to certain locations (e.g., points of interest, tourism attractions, restaurants) to enable specific behaviour (e.g., sightseeing, dining) (Tussyadiah, 2012). Furthermore, mobile game applications influence experiences by offering users the hedonic benefit of enjoyment (Nysveen, Pedersen, & Thorbjørnsen, 2005). Indeed, Okazaki, Skapa, and Grande (2008) found that intention to play mobile games can be explained by such factors as escapism and visual appeal. Game applications on smartphones exploit these drivers by offering more

playful and fun activities. Location-based mobile games combine geolocation and enjoyment to allow users to immerse in real or mixed environments by relying on their physical position and mobility to enable completion of local tasks (Klopfer & Squire, 2008). Comparably, Pokémon GO relies on enjoyment of mobile gaming and requires players to move about the physical space to advance in the game.

Importantly, due to the hedonic characteristics of play, mobile games have been suggested as an effective behavioural intervention tool in different areas, such as healthcare (e.g., Chittaro & Sioni, 2012; Klasnja & Pratt, 2012) and education (e.g., Klopfer & Squire, 2008; Sintoris et al., 2010). By adding a factor of enjoyment to certain activities, mobile games are designed to target attitude change and, in turn, shape players' behaviour. For example, it is generally acknowledged that physical activity has a beneficial effect on health (Penedo & Dahn, 2005). To that end, various mobile games were designed to support physical activities such as walking and running in order to promote a healthier lifestyle (e.g., Chittaro & Sioni, 2012). Studies also found that electronic games that respond to players' movements (e.g., Nintendo Wii) can be used for rehabilitation purposes. In education, location-based mobile games provide playful learning activities to instil motivation among students to interact more meaningfully with cultural spaces, using the games to link physical artefacts with abstract cultural concepts (Sintoris et al., 2010). Similarly, the integration of games (and gamified applications) into tourism experience has been suggested as effective in shaping tourists' motivation and behaviour (e.g., Ballagas, Kuntze, Walz, 2008; Bulencea & Egger, 2015; Negruşa et al., 2015; Xu, et al., 2015). Indeed, mobile games have been developed to increase tourists' motivation to explore tourism destinations, influence tourists' paths throughout a destination, and encourage a higher level of engagement with tourism destinations (Ballagas, Kuntze, Walz, 2008; Xu, et al., 2015).

Behaviour change through games stems from players' enhanced skills by receiving feedback from the game and efficacy in engaging in the new game-driven behaviour (Baranowski et al., 2008). As consumer behaviour is typically goal directed (Bagozzi & Dholakia, 1999), setting goals focuses players on following the new behaviour to be successful (Ryan, Rigby & Przybylsk 2006). To advance in Pokémon GO (i.e., to collect experience points), players need to walk to reach a PokéStop or a Gym to collect items, catch Pokémon, or battle. As such, with the goal

of catching Pokémon and winning Gym battles, the game induces players to travel to places with a high concentration of PokéStops and Gyms. While it is less about building skills (as in sports), it is expected that players continue to engage in the game-driven behaviour (i.e., walking, exploring), which will lead to physical and mental fitness (Morin, 2016; Villeneuve, 2016). As such, tourism destinations can utilize the game feedback (e.g., spawning of rare Pokémon) to induce targeted behavioural outcomes: visitation and consumption of places.

Furthermore, to add an element of fun, mobile games typically build the targeted behaviour around (fantasy) storylines and interactive features (Baranowski et al., 2008). In tourism, previous studies suggested that storytelling creates extraordinary experiences that visitors recall (Mossberg, 2008; Tung & Ritchie, 2011). Taking advantage of mobile games, tourism destinations can offer tourists with a storyline that matches the destination image to create memorable tourism experiences. Finally, location-based mobile games are expected to cast an impact on the immediate surroundings. Indeed, Pokémon GO affects businesses and individuals around PokéStops and Gyms by generating an influx of visitations to public places and patrons to local businesses. For example, upon release of the game in Japan, the game maker collaborated with McDonalds to place PokéStops near its restaurants. Therefore, this study proposes that mobile games requiring physical movements between geolocations affect player behaviour and business patronage.

3 Method

A questionnaire was developed to gauge information with regards to patterns and behavioural consequences of playing Pokémon GO. To measure behavioural consequences, statements relevant to suggested impacts of Pokémon GO found on various news outlets (via Google's news search) up to July 20th, 2016 were presented in the questionnaire. In order to measure enjoyment of the game, respondents were asked to evaluate the game using 18 bipolar statements from the Physical Activity Enjoyment Scale (PACES, Kendzierski & DeCarlo, 1991). The questionnaire also includes questions regarding spending while playing the game.

The questionnaire was distributed to US-based Amazon Mechanical Turk users with a 99% approval rating on August 1st, 2016 when the game was available for download for about four weeks. This effort

resulted in 405 responses. Respondents are 50% female, mostly younger (53% between 25 and 34 years of age), mostly college-educated (50% have at least a Bachelor Degree), and with household income less than US$ 60,000 (about 65%). The top five states of residence are California (12.4%), Florida (8.7%), Texas (8.4%), Pennsylvania (7.2%), and New York (6.9%). About half of respondents were below Level 10 trainers on Pokémon GO at the time of taking the survey, with 17% below Level 5 (i.e., beginners). About 5% were at Level 20 or higher.

4 Findings

Motivation. Respondents were asked to rate the importance of various achievements as designed in the gameplay, including to level up (moving up to a higher level), catching as many Pokémon as possible, finding rare Pokémon, winning Gym battles, taking over Gyms from other teams, etc. Two main motivations were identified from the dataset: (1) catching Pokémon (consisting of catching as many Pokémon and catching rare Pokémon) (*Mean* = 2.32, *s.d.* = 1.13) and (2) winning battles (consisting of supporting own team Gyms and taking over other teams' Gyms) (*Mean* = 3.34, *s.d.* = 1.10).

Play. The majority of respondents (38%) reported playing the game every day, followed by 2 – 3 times a week (27%) and 4 – 6 times a week (19%). About 20% of respondents reported playing for at least two hours on any given day, while about 39% reported playing for less than 30 minutes. When asked to indicate their perceived intensity of play (from 1 – "far too little" to 5 – "far too much"); responses were relatively neutral (*Mean* = 3.28, *s.d.* = .884). As of now, for the sole purpose of playing the game, 47% of respondents reported walking and 47% driving beyond their neighbourhood. Only about 10% reported taking a daytrip to other cities and 4% traveling to and staying overnight in other cities to play Pokémon GO. When asked about future plans, 44% of them stated that they plan to take a daytrip and 46% plan to travel to and stay overnight in other regions for the sole purpose of playing the game, indicating the significant potential of gaming impacts for the travel and tourism industry.

Enjoyment. Reponses to all items in the PACES scale are consistently positive, with mean values ranging from 3.34 (for "*I felt as though I would rather be doing something else.*" – "*I felt as though there is nothing else I would rather be doing.*") to 4.33 (for "*I dislike it.*" – "*I like*

it."). The overall mean for enjoyment of Pokémon GO is 4.00 (*s.d.* = .71). The construct explains 61% of variance in the dataset with Cronbach's Alpha value of .959, indicating internal consistency.

Money Spent. A low number of respondents reported spending money for in-app purchases (18%). However, as consequences of playing the game, they reported spending money for unplanned consumption while catching Pokémon, typically at local businesses located next to PokéStops, such as for goods at retail outlets (11%), food and beverage at restaurants (29%), services (13%), and traveling (17%). These are the local businesses, retail outlets and restaurants that the respondents would not have visited otherwise.

Behavioural Consequences. Factor analysis on perceived behavioural consequences of playing Pokémon Go yielded three factors, accounting for 77% of variance in the dataset (see Table 1). The first factor (*Community/Social*) represents social interactions and sense of belonging to a community or a generation. The second factor (*Travel/Visitation*) reflects patterns of visitation to different places in the neighbourhood. The third factor includes intensity of physical activities (*Physical Activities*). Seven items were eliminated from the pool due to low factor loadings (less than .4) or significant cross-loadings to more than one factor. The values of Cronbach's Alpha for the three factors support the internal consistency.

Table 1. Perceived Behavioural Consequences of Play

Perceived Behavioural Consequences	**Factor Loading**	**Eigen-value**	**Cum. %**	**Cronbach's Alpha**
Community/Social		5.279	52.789	.828
... I feel a strong sense of belonging to a community.	.854			
... I interact more with strangers.	.777			
... I feel a strong sense of belonging to a generation.	.750			
... I spend more time with my friends/family.	.666			
Travel/Visitation		1.235	65.143	.905
... I visit places in my area/neighbourhood that I have never visited before.	.894			

Perceived Behavioural Consequences	Factor Loading	Eigen-value	Cum. %	Cronbach's Alpha
... I visit places in my area/neighbourhood that I would not visit otherwise.	.859			
... I visit places in my area/neighbourhood that I rarely visit.	.811			
Physical Activity		1.183	76.972	.897
... I walk much more.	.876			
... I spend more time outdoors.	.869			
... I am more physically active.	.797			

Impacts on Wellbeing. Factor analysis with perceived impacts of playing Pokémon GO on personal wellbeing yielded two factors, accounting for 81% of variance in the dataset (see Table 2): (1) *Daily functions* reflects improvement in day-to-day functions (eat, sleep, work, etc.) and (2) *Psychosocial functions* reflects improvement in cognition, emotion, and communication. Cronbach's Alpha values of the two constructs are higher than .70, indicating internal consistency.

Table 2. Perceived Impacts of Play on Personal Wellbeing

Perceived Impacts on Well-Being	Factor Loading	Eigen-value	Cum. %	Cronbach's Alpha
Daily functions		5.017	62.718	.951
... I perform better at work.	.908			
... I eat better.	.898			
... I manage my home better.	.897			
... I sleep (rest) better.	.887			
Psychosocial functions		1.484	81.271	.886
... improves my communication.	.875			
... improves my social interactions.	.875			
... increases my alertness (active attention).	.799			
... improves my emotions.	.747			

Table 3 presents the correlations among the perceived behavioural consequences of playing Pokémon GO and perceived impacts on personal wellbeing. Strong positive correlations were found between the variables, notably between community/social impacts and perceived improvements of performance (r = .744, p = .000).

Table 3. Correlation Matrix: Perceived Impacts of Pokémon GO

Variables	Mean (s.d.)	Correlation			
		(1)	(2)	(3)	(4)
(1) Community/Social	3.18 (1.00)	1			
(2) Travel/Visitation	3.38 (1.11)	.527***	1		
(3) Physical Activity	3.90 (0.93)	.533***	.530***	1	
(4) Daily functions	3.22 (1.01)	.744***	.492***	.505***	1
(5) Psychosocial functions	2.56 (1.00)	.524***	.330***	.396***	.543***

Note: *** significant at $p < .001$

Determinants of Perceived Impacts. Regression analyses were conducted to assess the influence of game motivation and enjoyment on perceived impacts of playing the game, including behavioural consequences and impacts on wellbeing. In order to assess the influence of play, dummy variables representing frequency and intensity of play were also included in the analyses. The correlation matrix between motivation, enjoyment, and impacts is presented in Table 4.

Table 4. Correlation Matrix: Motivation, Enjoyment, and Impacts

Variables	Correlation		
	(1)	(2)	(3)
(1) Motive: Catching Pokémon	1		
(2) Motive: Winning Battle	.441***	1	
(3) Enjoyment	.528***	.401***	1
(4) Community/Social	.351***	.391***	.477***
(5) Travel/Visitation	.280***	.295***	.359***
(6) Physical Activity	.411***	.285***	.499***
(7) Daily functions	.334***	.458***	.544***
(8) Psychosocial functions	.208***	.290***	.380***

Note: *** significant at $p < .001$

The results of regression analyses with the three perceived behavioural consequences of playing Pokémon GO are presented in Table 5. All models are statistically significant, independent variables explaining 28% of the variability in Community/Social, 17% in Travel/Visitation, and 18% in Physical Activity (based on R^2 values). The analysis revealed consistent significant effects of Enjoyment on all perceived behavioural consequences of playing the game. Significant effects of Winning Battle were found on Community/Social and Travel/Visitation. Catching Pokémon significantly influences Physical Activity. In terms of dummy

variable, the analyses only reveal a statistically significant effect of higher duration of play on Travel/Visitation.

Table 5. Regression Analyses on Perceived Behavioural Consequences

	Community/ Social	**Travel/ Visitation**	**Physical Activity**
R^2	.281	.169	.282
F	31.070 (.000)	16.202 (.000)	31.315 (.000)
Independent Variables			
Motive: Catching Pokémon	.062 (.246)	.057 (.317)	.180 (.001)
Motive: Winning Battle	.213 (.000)	.150 (.005)	.045 (.359)
Enjoyment	.346 (.000)	.234 (.000)	.367 (.000)
Play Daily (Dummy)	-.019 (.697)	.007 (.888)	.021 (.661)
Play 1 Hour or More (Dummy)	.063 (.179)	.102 (.042)	.032 (.486)

The results from regression analyses on perceived impacts on wellbeing are presented in Table 6. The models are statistically significant; R^2 values indicate that the independent variables explain 37% variability in Daily Functions and 16% in Psychosocial Functions. The analyses show consistent significant effects of Winning Battle and Enjoyment on both dependent variables: increasing motivation to win battles at the Gyms and increasing enjoyment are associated with increase in perception that playing the game has improved players' Daily and Psychosocial Functions.

Table 6. Regression Analyses on Perceived Impacts on Wellbeing

	Impact 1: Daily Functions	**Impact 2: Psychosocial Functions**
R^2	.367	.159
F	46.069 (.000)	16.207 (.000)
Independent Variables – Beta (p)		
Motive: Catching Pokémon	-.033 (.514)	-.045 (.437)
Motive: Winning Battle	.286 (.000)	.172 (.001)
Enjoyment	.437 (.000)	.336 (.000)
Play Daily (Dummy)	-.023 (.604)	-.032 (.528)
Play 1 Hour or More (Dummy)	.057 (.190)	.034 (.496)

Determinants of Spending Money. Logistic regression analyses were performed to ascertain the effects of game motivation, enjoyment, frequency and intensity of play on the likelihood that respondents spent

money on goods, food and beverage, and travel, as consequences of playing Pokémon GO. The results are as follow:

- *Spending money on goods at retail outlets*. The logistic regression model was significant with χ^2 (5) = 23.038 (.000). The model explained 10% (Nagelkerke R^2) of the variance in dependent variable and correctly classified 86.5% of cases. Significant effects of winning battle and enjoyment were found.
- *Spending money on food and beverage at restaurants*. The logistic regression model was significant with χ^2 (5) = 37.765 (.000). The model explained 29% (Nagelkerke R^2) of the variance in dependent variable and correctly classified 67% of cases. Significant effects of winning battle and enjoyment were found.
- *Spending money on travelling*. The logistic regression model was significant with χ^2 (5) = 31.103 (.000). The model explained 10% (Nagelkerke R^2) of the variance in dependent variable and correctly classified 79% of cases. Significant effects of enjoyment and playing one hour or more were found. Respondents who play one hour or more are less likely to spend money on traveling for the game (odd ratio = .486).

5 Conclusion and Recommendation

This study contributes to our understanding of the effects of playing mobile games that require the player to interact with their environment. The majority of respondents indicated that they move beyond their neighbourhoods to play the game and nearly half of them indicated that they are planning to take a daytrip to or stay overnight in other areas for the sole purpose of playing the game. This demonstrates the impacts the game has in shaping travel motivations among its players. Three behavioural consequences of playing the game are feeling of community (e.g., feeling the connection with other players), travel and visitation (mobility), and physical activity. Based on a series of regression analyses, it was found that enjoyment of the game significantly results in the feeling of community, increases travel and visitation to other geographic areas, and increases physical activities outdoors. Additionally, the motivation to win Gym battles (i.e., letting own Pokémon to battle other's) also positively influences the sense of community and encourages travel. In terms of wellbeing, two dimensions of players' wellbeing were identified: daily and psychosocial

functions. Enjoyment of the game was found to positively influence daily and psychosocial functions of its users. Similar effects were also found from motivation to win battles. In terms of spending, it was found that increasing motivation to win battle and enjoyment are associated with increasing probability of spending money on goods (at retail shops), on food and beverages (at restaurants), and on travel.

Previously, playing electronic games were identified to be useful to pass time and to compete with friends in the case of mobile games or to advance physical rehabilitation in the case of console games with motion-based controllers. This study provides empirical support that playing mobile games that require interaction with geographical locations can have positive consequences to funnel consumer behaviour into certain activities (e.g., staying physically active, visiting places beyond own neighbourhoods) and induce spending that, in turn, affect the immediate environment. From a theoretical point of view, the study provides a better understanding of the relationships between enjoyment of a game and the behavioural consequences of playing the game, supporting the effectiveness of gaming as a behavioural intervention tool. From a managerial point of view, it can be suggested that marketers and decision makers can capitalize on this success by designing game feedback to induce targeted behaviour. Tourism decision makers can use the underlying concept to create destination specific games that move visitors through a destination. Visitors can be guided to locations within the destination, thus allowing control of visitor flow, providing educational information, and creating memorable experiences. For example, the REXplorer engaged visitors through a game to interact with "spirits" to explore the city of Regensburg. Similar to Pokémon GO, players had to walk and could interact with the game at certain locations (Ballagas, Kuntze & Walz, 2008).

While the results are useful to better understand the consequences of games on mobility and consumption, it is noteworthy that the study was conducted shortly after the introduction of the game. The novelty of the game might cause bias in the results due to: (1) respondents were highly motivated to play the game causing inflation in perceived enjoyment or (2) respondents were in a learning process and unaware of the full potential of the game. Future research should address these issues.

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