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Catch them all and increase your place attachment! The role of location-based augmented reality games in changing people - place relations

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ABSTRACT

We examined how playing a game employing augmented reality (AR) technology increases attachment to the place of playing. Place attachment refers to the relationship between people and places, which has numerous benefits for individual well-being. Popular location-based AR games often include elements that are known to predict place attachment: exploration, social relations or the experience of enjoyment in a place. We argue that positive emotions triggered by playing can influence players' place attachment via the process of gamification. We tested this hypothesis in a correlational study conducted among Pokémon Go players. Our analyses showed that satisfaction from playing and the social relations made during play positively predict place attachment, but the amount of time spent on playing does not. A series of mediation analyses showed that relations among game satisfaction, social relations, and place attachment were mediated by the appraisal of the place as exciting. This study demonstrated a mechanism of emotional transfer between positive experiences from playing and place attachment, which may prove useful in other domains, such as education, land conservation, or marketing.

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1. Introduction

The meaning one attributes to a place varies according to individual experience, personal emotional connection, and historical or cultural significance. People tend to create specific bonds with places based on the roles these locations play in their lives. A specific, deep bond with a location is called 'place attachment'. As research shows, place attachment has various benefits, including providing a sense of wellbeing, fostering feelings of belonging, and encouraging pro-environment activity (e.g. Brown, Perkins, & Brown, 2003; Jack, 2010; Lee, 2011; Manzo & Perkins, 2006; Scannell & Gifford, 2010).

This research aims to examine the possibility of increasing place attachment by interacting with real environments through location-based augmented reality (AR) games. Popular location-based AR games often include elements that can foster place attachment; namely, active contact with a place, place exploration, social relations in a place, and the experience of enjoyment related to that place. The most statistically popular mobile game of this kind, Pokémon Go, will be examined in this study to determine how the various aspects of playing location-based AR games can affect place attachment towards the game site.

2. Location-based AR games and attitudes towards places

The rapid development of mobile technology (e.g. smartphones and tablets) has enabled games to be played almost everywhere. Several games have begun to exploit advanced positioning technology, allowing players to interact with their environments at real locations in real time (Hinske, Lampe, Magerkurth, & Röcker, 2007). In these location-based AR games, movement is the crucial component of the player's experience because the player's activities in different locations influence the game's progress. Location-based AR games are situated in a mixed reality continuum, which has been described by Milgram and Kishino (1994) as a dimension between real and virtual environments. The space between these two environments, the 'mixed reality', consists of two parts:1) augmented reality (AR), where the real world is enhanced by virtual objects displayed in real time; and 2) augmented virtuality, where a virtual space is enhanced with real objects. Although

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location-based AR games may differ in the extent to which they use AR, they all aim to offer players a coherent experience of a blended reality by joining activities in real and virtual worlds.

In addition to providing entertainment, location-based AR games are also used to influence players' attitudes and behaviours via the mechanism of 'gamification': the contextualisation of game design outside its original domain (Deterding, Dixon, Khaled, & Nacke, 2011). Gamification works by engaging players in an interesting and novel experience that supports change towards a desired direction. Via game-specific phenomena such as the hedonistic value of playing or competition with other players, location-based AR games can increase the intrinsic motivation of players to take action or modify their beliefs. For example, research has shown gamification in mobile games to be effective in the areas of healthcare and education (Ardito et al., 2010; Chittaro & Sioni, 2012; Klasnja & Pratt, 2012). Location-based AR games have also been used to change attitudes towards real locations, such as in the education and tourism industries. According to Ardito et al. (2010), the playful learning offered by these games in educational settings increases students' motivation to interact with cultural spaces. In tourism, games and applications using gamification can increase tourists' willingness to explore a given place by modifying the path of their walk through a destination (e.g. Ballagas, Kuntze, & Walz, 2008; Egger & Bulencea, 2015; Negruşa, Toader, Sofică, Tutunea, & Rus, 2015).

Previous studies on the use of gamification to modify attitudes towards places have focused on games that utilise this method deliberately to shape specific behaviours or attitudes towards a given place. Our research examines the more implicit outcomes of gamification mechanisms on the people–place relationship in situations where players interact with a game designed for player amusement rather than one limited to a specific location (i.e. without explicit intention to change player attitudes). We propose that the crucial aspect of such location-based AR games is their ability to turn almost any place into playground. The impressions and emotions evoked by playing can change users' perceptions of the place in question; it changes from an ordinary site to one associated with fun, satisfaction, and memories analogically, just as gamification changes ordinary activities into interesting experiences. This translation can develop or enhance place attachment.

3. Predictors of place attachment

Place attachment is defined as a bond between people and places (Hidalgo & Hernandez, 2001; Low & Altman, 1992; Manzo, 2003; Pretty, Chipuer, & Bramston, 2003; Lewicka, 2011). It develops when a physical place is linked to individual experience and emotional meaning, thus establishing a close connection to the specific location (Lewicka, 2012). Environmental psychologists acknowledge place attachment as a multidimensional concept that consists of several aspects of the people–place relationship; namely, affects, knowledge, beliefs, and behaviours connected with the place (Chow & Healey, 2008; Gustafson, 2001; Scannell & Gifford, 2010). The important aspects of place attachment include place dependence (Stokols & Shumaker, 1982) and place identity (Proshansky, 1978). Place dependence, or 'place satisfaction', entails perceiving a place as a means to satisfy individual needs and conduct desired activities (Schreyer, Jacobs, & White, 1981). This factor considers to what extent a place provides people with opportunities to realise their goals or experience enjoyment (Lee, Kyle, & Scott, 2012; López-Mosquera & Sánchez, 2011; Moore & Graefe, 1994). Place identity refers to the cognitive and symbolic relationship between place and self and considers how a place serves as a carrier of personal or group values and meaning (Halpenny, 2006; Stokols & Shumaker, 1982; Vaske & Kobrin, 2001).

Lewicka's research (2011) identified three different ways in which people relate to their places of residence: traditional place attachment, active place attachment, and lack of place attachment. Traditional place attachment is characterised by rootedness and is generally taken for granted. In traditional place attachment, the relationship between place and people is natural, simple, and unintentional. This form of attachment is due chiefly to biographical events, rootedness, and length of residency. In contrast, active place attachment entails conscious identification with a place based on interest in its history or present opportunities. Active place attachment often involves increased exploration of and activity in the place.

Much research has shown that people develop strong attachments to places in which they have had experiences of activity, relaxation, recreation, or leisure (Brown & Raymond, 2007; Halpenny, 2006; Kyle, Graefe, Manning, & Bacon, 2004; Prayag & Ryan, 2011; Williams & Vaske, 2003). Repeated interactions in a place and frequent visitations enhance the emotional, cognitive, and instrumental aspects of attachment (Hammitt, Kyle, & Oh, 2009). Increased place attachment resulting from activity has been observed among visitors to national parks (Kyle, Graefe, & Manning, 2005), dog owners walking their pets in parks (Lee & Shen, 2013), people using sporting places (Madgin, Bradley, & Hastings, 2016), and in various informal meeting places such as cafes or pubs (Oldenburg, 1989). All these locations are fairly typical places of activity, i.e. places devoted to recreational activity. Location-based AR games have now made it possible to turn almost any place into such a playground, regardless of its normal usage.

Place attachment is also influenced by social factors. According to Hidalgo and Hernandez (2001) and Lewicka (2010), a consistent predictor of place attachment is the existence of strong social ties among people sharing a place. In both mentioned studies the authors showed that neighbourhood ties are stronger predictor of place attachment than physical aspects of place.

4. Location-based AR games as enablers of place attachment

The present research uses Pokémon Go as an example of the location-based AR game for study for three reasons: 1) the popularity of application; 2) its extensive media coverage, which provides information about the game to people who were not a target audience of mobile games before; and 3) the characteristics of the game described below) that seem prototypical of AR games (i.e. elements of the game's design that could influence the development of place attachment).

Pokémon is a Japanese media franchise founded in 1995 and managed by The Pokémon Company. The franchise is centred on fictional creatures known as 'Pocket Monsters' or 'Pokémon', which humans (Pokémon trainers) catch and train to battle each other. Pokémon Go is a gaming application designed for smartphones using iOS and Android systems. In the game, players explore their environments in search of virtual Pokémon characters, which are displayed in real places via AR technology. To facilitate the search for virtual Pokémon monsters, the Pokémon Go application uses the smartphone's global positioning system (GPS) and built-in Google Maps service. Pokémon Go has been extremely successful; within one week of its release, the game attracted over 65 million users (Serino, Cordrey, McLaughlin, & Milanaik, 2016). Many users were very active, spending more time using the Pokémon Go application (according to iOS usage data) than average users spent on popular applications such as Facebook and Snapchat (Perez, 2016). As a cultural phenomenon, Pokémon Go attracted worldwide attention from the media and became one of the most discussed and analysed games in history.

Pokémon Go requires that players go out and explore real environments to find new or rare species of Pokémon. Successful players must visit new areas and cover a lot of distance. The game rewards walking and bicycling, as the Pokémon 'eggs' collected by players 'hatch' only after a player has travelled a target distance (typically 5–10 km) at speeds under 10 km/h (so as to rule out distance covered in motor vehicles). The game also brings a significant social quality, as players often exchange information about the locations of rare Pokémon or special places such as PokéStops (places where players acquire items useful for hunting Pokémon). While it is possible to collect Pokémon alone, the game encourages people to interact with others if they want to progress quickly. This social aspect is enhanced by the application's feature that allows players to share scores and organise into communities or teams that jointly catch Pokémon. Through these game components, Pokémon Go has been shown to change the habits and attitudes of players, which could be understood as implicit gamification.

The application has been identified as potentially useful for promoting healthy behaviours and reducing obesity (McCartney, 2016), increasing physical activity (Howe et al., 2016), and influencing moods (Serino et al., 2016). Further, Pokémon Go provides the possibility of enhancing awareness of sites of cultural interest—such as monuments, historical sites, and murals—by locating Pokémon characters, gyms (i.e. places where Pokémon duel), and PokéStops (where players acquire items useful in hunting for Pokémon) in these areas. Users playing near cultural sites could obtain information about the sites through dialogue boxes displayed on their smartphones. In this way, Pokémon Go could facilitate active learning about important cultural sites or other areas of educational interest.

Based on the above discussion and our review of predictors of place attachment, we concluded that playing location-based AR games like Pokémon Go is an activity that includes three well-known predictors of place attachment. First, the game provides opportunities to explore places and obtain information about them, as well as facilitates active contact with a place (all of which are prerequisites to developing place attachment) (Kyle et al., 2004; Williams & Roggenbuck, 1989). Therefore, we expect that *engagement in playing the game*, measured by a distance covered and duration of play per day, will provide players with opportunities for increased contact with a place of playing, possibly increasing their place attachment.

Second, Pokémon Go converts a variety of types of places into recreational areas and sources of enjoyment, fostering positive attitudes towards these locations. According to place attachment theory, the development of place attachment depends on the ability to fulfil one's goals or emotional needs in a given place (López-Mosquera & Sánchez, 2011). We propose that place attachment is positively related to *satisfaction from playing*, which Pokémon Go reinforces through advancement in the game (experienced most strongly by successful players). This assumption is in line with gamification theory, which emphasises that the efficacy of a method depends on positive reinforcement from a given activity via success in the game (Landers, Bauer, Callan, & Armstrong, 2015).

Third, Pokémon Go involves social elements that transform environments into meeting places with other players. As creating opportunities for social contact is a well-known predictor of place attachment (Hidalgo & Hernandez, 2001), we expect that *social relations* in a place of playing will correlate positively with place attachment.

In addition, we expect that the positive emotions related to game satisfaction and social relations made while playing Pokémon Go will predict positive emotional appraisals of the environment of playing. This assumption is based on the concept of misattribution (Schwarz & Clore, 1983), which is the idea that people are prone to misidentify one source of emotional experience with another. The concept of misattribution is in line with Zillmann's theory of excitation transfer (Zillmann, Katcher, & Milavsky, 1972), which explains how the slow dissipation of an emotional state ascribed to one source can transfer to independent emotional experiences.

Recent research by Toruńczyk-Ruiz and Lewicka (2016) and Lewicka (2012) reveals that place attachment depends on the affective appraisal of the place; in Toruńczyk-Ruiz and Lewicka's study, the evaluation of a neighbourhood as exciting and relaxing predicts neighbourhood attachment. Based on these findings, we expect that affective appraisal of an environment will mediate the correlations among game satisfaction, social relations, and place attachment. In line with gamification theory, we hypothesise that players of Pokémon Go will associate their excitement from progressing in the game and making social contact with other players with their place of playing. This newly acquired positive appraisal of the place will then lead to enhanced place attachment.

5. Research hypotheses

Based on the above research review we test the hypotheses that 1) engagement in playing the game, satisfaction derived from playing and social relations made during playing predict active place attachment in the place of playing and that 2) the relation between as well as game satisfaction as social relations and place attachment will be mediated by the evaluation of a place as exciting.

6. Method

6.1. Participants

Participants were 279 persons (167 men and 112 women) of different age ($M = 24.7$; $SD = 5.09$) and education level, 58% had at least a high school education, 15% had completed university degree. Participants were inhabitants of different cities in Poland (5 different locations). They were recruited via Pokémon Go fan groups on Facebook. These Facebook groups were chosen because they were central and popular platforms for contact between players of Pokémon Go (mainly to exchange information about the locations of Pokémon). The study was conducted online. Participants were invited to take part in a prize drawing in return for participating.

6.2. Measures

6.2.1. Dependent variables

Active place attachment was measured by the subscale of place attachment scale developed by Maria Lewicka (2012), e.g. 'I would like to show my guests this place', 'I would like to take some photos of this place', or 'I would like to know more about this place' ($\alpha = .79$). In the present study, statements were related to the places where participants played Pokémon Go most often. Participants were asked to answer using a scale from 1 (*definitely disagree*) to 5 (*definitely agree*).

6.2.2. Independent variables

Engagement in playing the game was measured using two questions about players' average distance covered and time spent during the day while playing.

Game satisfaction was measured with three questions: How would you rate your success in the Pokémon Go game? How satisfied are you with the Pokémon Go game? How willing are you to continue playing Pokémon Go? ($\alpha = .70$) Participants were asked to answer using a scale from 1 (none/not at all) to 5 (great/very

much).

Affective appraisals of the environment were measured on a scale based on Russell's model (1988). This model of affective appraisals assumes that people react affectively to environments, and these affective reactions may be described by two main dimensions: arousal (arousing versus non-arousing) and pleasure (pleasant versus unpleasant). This gives four possible emotions: arousing and pleasant (exciting); non-arousing and pleasant (relaxing); arousing and unpleasant (irritating); and non-arousing and unpleasant (boring). Our measure included seven pairs of items on a bipolar scale, where the end points were opposite adjectives (e.g. drowsy–exciting, boring–interesting, unsafe–safe, irritating–relaxing). The principal component analysis (PCA) with orthogonal rotation (Varimax) yielded two factors corresponding to an evaluation of place as boring versus exciting ($\alpha = .85$) and an evaluation of place as irritating versus relaxing ($\alpha = .70$). Mean values were used for the analysis, with higher values indicating higher excitement and relaxation.

Social relations in a place of play were measured with one question: How often do you arrange playing Pokémon Go with other players? Participants were asked to answer using a 5-point scale from 1 (never) to 5 (very often).

7. Results

The zero-order correlations found between the described variables are presented in Table 1. Engagement in playing Pokémon Go was not related to active place attachment or perception of the place as exciting. However, there were significant positive relationships among game satisfaction and social contact with other players and both place-related variables.

The hypothesis that engagement in play is a positive predictor of place attachment was checked. Results of the regression analysis showed that game satisfaction and social contact during playing predicted active place attachment when engagement in playing did not (see Table 2). The full model accounted for 6.4% of the variance, and the change of R^2 was approximately 5% after including game satisfaction and 1.4% after including social contact (the first model was insignificant).

The relationships between game satisfaction, social contact, and active place attachment were examined to determine whether it was mediated by perception of a place of playing as exciting. The lack of significant correlations between game satisfaction and social contact and perceiving places as relaxing suggests that the latter was not a mediator in the relationship between these two variables and active place attachment. Two analyses of mediation were conducted using PROCESS macro (v.2.16) for SPSS, model 4 (Hayes, 2013). The first analysis indicated that the indirect effect of game satisfaction on place attachment via perceiving a place as exciting was statistically significant, with the 95% bootstrap confidence interval ranging from 0.06 to 0.22. However, the direct effect also remained significant, with the 95% bootstrap confidence interval ranging from 0.04 to 0.37. The second analysis showed that the indirect effect of social contact with other players on place attachment was also significant, with a 95% confidence interval ranging between 0.04 and 0.13. The direct effect was null at 95% CI = [-0.02, 0.16]. The coefficients of the model are presented in Figs. 1 and 2.

Table 1
Zero-order correlations.

Variable	*M*	*SD*	1	2	3	4	5
1. Engagement in playing	2.57	0.77					
2. Game satisfaction	3.56	0.68	0.37**				
3. Social contact	3.16	1.24	0.24**	0.27**			
4. Active place attachment	2.94	0.99	0.03	0.23**	0.18**		
5. Excitement	4.66	1.26	0.08	0.25**	0.24**	0.38**	
6. Relaxation	5.32	1.10	0.06	0.08	0.09	0.25**	0.47**

Notes: $^{*}p < .05$, $^{**}p < .01$.

Table 2
Results of regression analysis of active place attachment (β values).

Active place attachment	Model 1	Model 2	Model 3
Engagement in playing	0.03	−0.05	−0.07
Game satisfaction	–	0.24**	0.21**
Social contact	–	–	0.13*
R^2	0.001	0.05	0.06

Notes: $^{*}p < .05$, $^{**}p < .001$.

8. Discussion

The main aim of this research was to test the potential for enhancing place attachment by interacting with places using location-based AR games like Pokémon Go. To our knowledge, this is the first study to investigate the possibility of changing attitudes towards places via mobile games that are not linked to specific locations. Previous research (Oleksy & Wnuk, 2016) showed that attitudes towards places could be modified efficiently by AR applications that refer to a place's multicultural past. In addition, recent research has revealed the usefulness of location-based AR games and applications in educating players about places and tourism, such as by increasing visitors' explorations of a given place (Ardito et al., 2010; Ballagas et al., 2008). However, our study is the first to show a relationship between playing an location-based AR game not strictly bound to a given place and place attachment.

The present study focused on enhancing place attachment via location-based AR games that may be used in similar ways across different places in the world. Our results show that quantitative parameters, such as time spent playing the game and distance covered during the game, do not predict place attachment. However, place attachment was found to relate to satisfaction gained from playing and the social contacts made during the game. These results are consistent with research on place attachment that has demonstrated the importance of social relations (Lewicka, 2010; Hidalgo & Hernandez, 2001) and the fulfilment of individual needs via interactions with a place (Williams & Vaske, 2003).

Moreover, this study demonstrates that positive emotions (e.g. satisfaction, feeling successful) connected with game activity in a given place lead to positive appraisal of that place and eventually foster place attachment. Specifically, it was revealed that the correlation between game satisfaction and social contact with active place attachment was mediated by the excitement of being in that place. Drawing from the theory of excitement transfer (Zillmann et al., 1972) and the concept of misattribution (Schwarz & Clore, 1983), we speculate that positive experiences with the game and other players result in the perception of a place of play as more exciting. Because place attachment is connected with positive emotional memories of the place, attributing feelings of excitement to the place of play mediates the effects of social interactions and game satisfaction on place attachment. This effect could be explained in line with gamification theory. Research has already shown that gamification via associating pleasant experiences of playing with other contexts supports behavioural and attitudinal changes (Munoz, Cowling, & Birt, 2016; Wu, Lee, Chang, & Liang, 2013). In our study, we showed a possible implicit effect of gamification when positive experiences from playing could be translated into more positive attitudes towards ordinary places of playing.

As demonstrated in previous research, place attachment is a

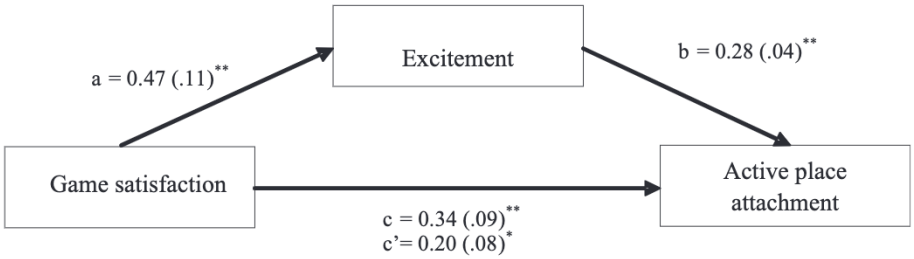

Fig. 1. Influence of game satisfaction on active place attachment via perceiving a place as exciting.

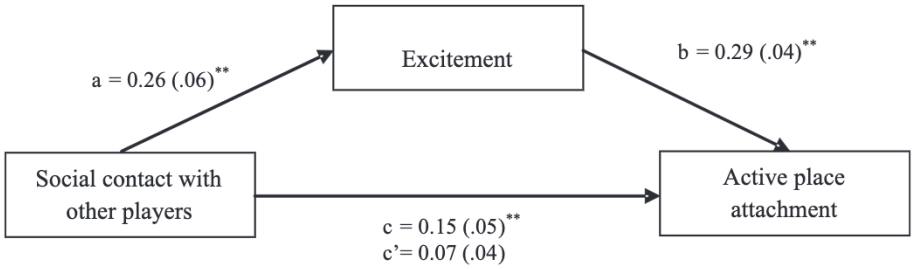

Fig. 2. Influence of social contact with other players on active place attachment via perceiving a place as exciting.

feeling related to many positive emotional and behavioural factors. Research shows it increases wellbeing, social trust, and pro-community tendencies (Lewicka, 2012). Considering the positive consequences of place attachment, the possibility of creating place attachment via increasingly popular technology is of great interest for people–place relationship research. From the perspective of place attachment theory, this study has shown which aspects of location-based games are important for influencing players' place attachment.

However, our study was not free of limitations. First, because the study was correlational, it did not allow us to establish causal relationships between variables. Our study revealed only minimal effects of playing Pokémon Go on place attachment; however, this could be due to the very nature of the place attachment phenomenon. Most research studies report that place attachment develops through intensive and repetitive contact with a given place, and our study measured only occasional activity in the place of attachment. Further, we did not collect data to determine whether participants were playing Pokémon Go using the AR mode or without it (this game offers both modes). In the AR mode, Pokémon creatures are overlaid on real environment settings, and players 'catch' Pokémon by pointing their smartphone's camera at the virtual creature. In the non-AR-mode, players still need to explore real environments to catch Pokémon, but the creatures are displayed on a generic background on the smartphone's screen. As our main hypotheses involved the role of game satisfaction and social contact, however, the use or disuse of AR mode in Pokémon Go should not change the results. As mentioned previously, location-based AR games can differ in the extent to which they incorporate AR in the game design, but the opportunity to participate in a mixed reality is maintained even if the AR mode is turned off.

Because this research focused on how different aspects of playing can influence place attachment, we deliberately did not include populations of non-players. However, one could argue that examining only members of Pokémon Go Facebook groups might not be representative of all Pokémon Go players. It should be noted that the selected Pokémon Go fan groups from Facebook were not narrow communities of fans, but rather included large numbers of users. As we conducted our research at the peak of Pokémon Go's popularity, these Facebook groups included people generally interested in the game in addition to devoted fans. Nevertheless, it would be worthwhile in future research, in an experimental study to compare participants playing the location-based AR game not related to a specific place for the first time against a control group in the context of place attachment.

This study demonstrated that a transfer of emotion from the game to the real location of playing is crucial for facilitating place attachment. The possibility of emotional transfer as a result of the game experience could potentially be useful in other domains, such as education, land conservation, or marketing. Our research shows that AR applications have the potential to 'gamify' the reality around us, which can alter attitudes towards places of playing. Simply put, it is not important *where* you play; rather, the place of playing *becomes* important to you.

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