Personality and Individual Differences 124 (2018) 35–38

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Short Communication

Who's Gotta Catch 'Em All?: Individual differences in Pokèmon Go gameplay behaviors

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ARTICLE INFO

Keywords:
Personality
Video games
Augmented reality
Social competence
Social anxiety
Pokémon Go

ABSTRACT

Pokémon Go (PG), an augmented reality game integrating virtual and physical environments, presents a unique opportunity for examining individual characteristics that influence behavior in the digital context. Participants were 101 PG players from a university subject pool. They completed questionnaires on their personality, social competence, and social anxiety. PG gameplay behaviors were then observed in a 20-minute gameplay session. After statistical control of gender and baseline level in-game, participants with greater social competence, agreeableness and extraversion as well as lower social anxiety were observed to catch more Pokémon and gain more experience points during gameplay. Participants with greater social competence and conscientiousness were observed to visit more Pokéstops and cover greater physical distances. Personality and adjustment factors may influence behaviors in video games, much in the same way they do in face-to-face contexts.

Among people aged 13 and above, 64% describe themselves as gamers and report spending 12% of their leisure time playing video games (Nielsen Games, 2017). The popularity of video gaming underscores the relevance of understanding the behaviors players exhibit in these environments, as well as what individual characteristics drive differences in players' behavior.

Mobile augmented reality (AR) games, which integrate virtual and physical environments, have recently come to the forefront of popular culture with the release of Pokémon Go (PG) in July of 2016. At its release, 25 million people played PG daily, with 46% of players aged 18–29 (Mac, 2016). Unlike console-based video games, PG overlays virtual objects onto players' physical environments, and players must move around the physical world to capture and battle virtual creatures that appear on their screens as if they were in the player's real-world environment. The current study examines the impact of players' personality, social competence, and social anxiety on PG gameplay behavior. We aim to build upon the robust literature suggesting that these individual characteristics influence behavior in face-to-face contexts (see Kenrick & Funder, 1988), by extending such findings to the digital context.

There is reason to believe that individual characteristics may influence players' behaviors in video game environments much in the same way that they affect behaviors occurring face-to-face (Bayraktar & Amca, 2012; Funder & Colvin, 1991). Existing work suggests that players adopt gameplay behaviors that match their personality characteristics. For instance, adults who view themselves as more extraverted and agreeable are also more likely to self-report engaging in gameplay that emphasizes cooperation and social interaction, much as they do when face-to-face (Worth & Book, 2014). Conscientiousness, which is linked to achievement in face-to-face contexts (see John, Naumann, & Soto, 2008) has also been found to be correlated with self-reported completion of video game objectives (Worth & Book, 2014). Taken together, the available literature suggests that personality may relate to behaviors in the gameplay setting as it does in face-to-face contexts.

However, existing research has examined behavior in video games where players primarily interface with the game through a console. Likely because AR games are so new, we are only aware of one study examining associations between players' individual characteristics and gameplay behaviors in PG. Tabacchi, Caci, Cardaci, and Perticone (2017) found that PG players who self-reported higher extraversion and agreeableness also self-reported spending more time catching Pokémon during gameplay.

Crucially, we speculate that individuals' personality and social adjustment may be more strongly correlated with gameplay behaviors in PG as compared to in traditional video games. This is because the in-game goals of PG are achieved through players interacting with their physical and social environment. PG players must leave their homes and walk around to catch Pokémon and visit Pokéstops, for which they earn experience points (XP). Further, relative to traditional video games, face-to-face social interactions with others are more common in PG and aid in the achievement of game-related goals. Players in the

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https://doi.org/10.1016/j.paid.2017.11.049
Received 31 July 2017; Received in revised form 26 November 2017; Accepted 27 November 2017

same area may assist each other by pointing out a Pokémon nearby, and are often needed to collaborate on a battle. Therefore, individuals who are more extraverted, agreeable, and socially competent may engage in more of these PG-related social interactions which further game objectives.

In contrast, the physical and social nature of PG may be a barrier for players with social anxiety. Research suggests that individuals endorsing social anxiety prefer communicating in digital environments (e.g., online games) rather than face-to-face because of the anonymity online and the reduced need to attend to social cues (Caplan, 2003). However, as the majority of PG gameplay occurs around other people, players who are socially anxious may be self-conscious and less likely to engage in gameplay due to fear of negative evaluation (Leary, 2010). These individuals may hesitate to play when others may be watching, or may be reluctant to engage in the social activities with other players that would facilitate in-game goals.

Another limitation of existing research is that it has largely relied on self-reports of gameplay style. Individuals' self-reported perceptions of their gameplay may be subject to biases, and may not match their actual behavior. In particular, any associations found between individual characteristics and gameplay behavior may be artificially elevated by shared method variance.

The current study investigates individual characteristics (personality, social anxiety, and social competence) as predictors of observed PG gameplay behavior. We build upon existing literature regarding gameplay behaviors in traditional console-based environments to examine these factors in the mobile AR video game PG, using observational measures of behavior during a gameplay session. We hypothesized that players who were more extraverted, agreeable, and conscientious, as well as who perceived themselves to have higher social competence and less social anxiety, would engage in more gameplay behaviors that achieve in-game goals.

1. Method

1.1. Participants

We recruited 101 participants (30% male) from an undergraduate psychology research subject pool at a public Canadian university in the 2016–2017 academic year. The average participant was 20 years old (range = 18 to 28). We note that this represents the demographics of PG players (majority female, emerging adults; Mac, 2016). To be included in the study, all participants were required to be current players of PG, although there was no frequency with which participants had to be playing.

1.2. Procedure

In each study timeslot, two previously unacquainted participants completed questionnaires in the lab regarding their personality, social anxiety, and social competence. Participants' baseline PG performance was recorded by observing this data on their phones. The participants were then asked to leave the lab and play PG for 20 min. No instructions were given for the gameplay session, except that all participants received a small incentive (a candy bar) for either: (a) catching at least 15 Pokémon; or (b) visiting at least 10 Pokéstops during the session. We set these goals to incentivize participants to play, but wanted anyone who played for 20 min to be able to achieve either goal easily (such that the effect of individual factors on gameplay behaviors could be seen). At the end of the session, post-gameplay performance data on participants' phones was observed and recorded.

1.3. Measures

1.3.1. Personality

Participants completed the Big Five Inventory (BFI; John et al., 2008), a widely-used self-report inventory that assesses five domains of personality: openness to experience (10 items; $\alpha = 0.72$), conscientiousness (9 items; $\alpha = 0.74$), extraversion (8 items; $\alpha = 0.82$), agreeableness (9 items; α in our sample = 0.77), and neuroticism (8 items; $\alpha = 0.87$). Each item is rated on a five-point Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*.

1.3.2. Social anxiety

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) is a 20-item self-report measure that assesses anxiety in social interactions. Items are rated on a four-point Likert scale (0 = *Not at all characteristic or true of me;* 5 = *Extremely characteristic or true of me*). The sum of all items was calculated, with appropriate items reverse-scored. Alpha in our sample was 0.90.

1.3.3. Social competence

The Interpersonal Competence Questionnaire (ICQ; Buhrmester, Furman, Wittenberg, & Reis, 1988) assesses self-perceptions of competence in social relationships. Each of the 40 items is rated on a five-point Likert scale (1 = *I'm poor at this; I'd feel so uncomfortable and unable to handle this situation, I'd avoid it if possible*; 5 = *I'm extremely good at this, I'd feel very comfortable and could handle this situation very well*). A composite score, composed of the average of all items, was used. Alpha in our sample was 0.87.

1.3.4. PG gameplay behavior

In-game behavior was recorded from participants' PG app on their phones at baseline and again after the 20-minute gameplay session. The indicators recorded were: (a) physical distance travelled; (b) number of Pokémon caught; (c) number of Pokéstops visited; and (d) amount of XP gained. Baseline PG level was recorded as an index of participants' familiarity with the game. Participants' gameplay behavior during the 20-minute period was calculated by subtracting baseline performance from post-gameplay performance.

1.4. Data analysis

As a means of dimension reduction, we conducted a principal component analysis with varimax rotation on the four observed PG gameplay behaviors. Two factors with eigenvalues above 1 were extracted, and together accounted for 76% of total variance in the model; both these factors were retained. The first factor, Catching Behavior, was comprised of Pokémon caught and XP gained (likely because catching a Pokémon results in more XP than visiting a Pokéstop), and reflected behaviors centred around catching Pokémon. The second factor, Exploration Behavior, contained Pokéstops visited and physical distance travelled. As players must walk around to visit Pokéstops, this factor reflects behaviors that involve exploring the physical world.

We used multiple hierarchical linear regression to predict the criterion variables of Catching Behavior and Exploration Behavior, entering participants' baseline PG level and gender as covariates at Step 1. In separate models, social anxiety, social competence, and personality were entered at Step 2. For the personality model, agreeableness, conscientiousness, openness, neuroticism, and extraversion were entered simultaneously at Step 2.

2. Results

Zero-order correlations between variables are reported in Table 1. Table 2 displays the results from the regression models predicting PG gameplay behaviors. Participants' PG level was not associated with Catching Behavior, but predicted increased Exploration Behavior. Crucially, after controlling for baseline PG level and gender, participants with greater social competence, agreeableness and extraversion displayed more Catching Behavior during the gameplay session. Higher social anxiety was also associated with less Catching Behavior at