CYBERPSYCHOLOGY, BEHAVIOR, AND SOCIAL NETWORKING
Volume 18, Number 8, 2015

DOI: 10.1089/cyber.2015.0073

Interdependent Self-Construal, Self-Efficacy, and Community Involvement as Predictors of Perceived Knowledge Gain Among MMORPG Players

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Abstract

This study explored the relationship between interdependent self-construal, video game self-efficacy, massively multiplayer online role-playing game (MMORPG) community involvement, and self-reported learning outcomes. The results suggested that self-efficacy and interdependent self-construal were positive and significant predictors of MMORPG community involvement. For its part, MMORPG community involvement was a positive predictor of self-reported learning in both focused and incidental forms. Supplementary analyses suggested that self-efficacy was a comparatively more robust predictor of MMORPG community involvement when compared to self-construal. Moreover, the present data suggest that community involvement significantly facilitated indirect relationships between self-construal, game-relevant self-efficacy, and both focused and incidental learning.

Introduction

MASSIVELY MULTIPLAYER online role-playing games (MMORPGs) are persistent, online gaming worlds that feature dynamic opportunities for virtual social interaction.[1,2] As immersive worlds that sustain substantial and continued involvement from players, it stands to reason that MMORPGs offer players a rich opportunity for acquisition of community support. Unsurprisingly, previous research on MMORPG involvement has substantively focused on topics related to the acquisition of social and emotional support.[3,4] However, this research has not broadly explored the degree to which MMORPG community engagement is associated with the acquisition of substantial support in the form of player knowledge acquisition. Learning more about the degree to which MMORPG communities offer meaningful learning opportunities is important as researchers continue to explore both the costs and benefits that accompany MMORPG gameplay. Moreover, outside of exploring functionalistic (i.e., motivational) antecedents to involvement in MMORPG communities, relatively little attention has been paid to understanding individual-level factors that facilitate user involvement with MMORPG communities. Drawing upon the notion that MMORPG communities exist as communities of practice (CoP),[5,6] the present study focused on the degree to which player involvement with MMORPG-based communities was associated with both incidental and focused learning outcomes. In so doing, the specified model also suggested that involvement with MMORPG-based communities was related to individual-level characteristics in the form of game-relevant self-efficacy beliefs and interdependent self-construal orientations.

Literature Review

MMORPG community involvement

The persistent nature of MMORPG worlds encourages ongoing collaboration between players.[5] As a result, users can develop shared feelings of trust, experience, and, ultimately, community.[7] In contrast to many other types of online relationships, the temporal and structural factors underlying involvement with MMORPG worlds may result in users who are comparatively more likely to exchange emotional or substantial support.[8] As such, researchers have previously understood MMORPGs within the CoP framework.[5,6] Practice-based communities are informal learning organizations[9] that are structured around sets of relations among persons, activity, and world.[10,11] Stated differently, the essence of a CoP lies in the common activities and procedures that frame participation.[5]

Like all communities, MMORPG-based social groups are not without barriers to entry. Beyond access-related factors, the inherently social nature of MMORPG gameplay requires users to possess construal orientations suited for collaborative

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interaction.[12] Moreover, as practice-based endeavors, regulatory perceptions relative to game-relevant competencies also influence community participation.[13] Building upon these twin notions, the current theoretical framework suggests that MMORPG community involvement is highest among (a) players with high levels of game-relevant self-efficacy, and (b) players whose self-construal is interdependently oriented.

Game-relevant self-efficacy beliefs

Self-efficacy refers to beliefs in one's internal capabilities to organize and execute courses of action relevant to the accomplishment of desirable outcomes.[14] Self-efficacy is a core component of social cognitive theory that explicitly refers to internal, domain-specific competency perceptions and is thus discriminable from constructs such as locus of control, self-esteem, and outcome expectancies.[15–17] Self-efficacy beliefs exert a regulatory influence over the activities in which people choose to engage, the amount of effort spent on selected activities, and the degree of persistence shown in the face of obstacles.[18,19] Research also shows that self-efficacy is positively related to group cohesion, group commitment, and collective efficacy.[20–22.]

Specifically pertaining to playing video games, video game self-efficacy perceptions can be understood in terms of both the game's interface and the tasks required for completion/success.[23] The literature suggests that self-efficacy plays an important role in user interaction with gaming environments. Researchers have, for instance, shown that efficacy perceptions are related to gameplay motivations[24] and game enjoyment.[19,25] To the best of the authors' knowledge, researchers have not previously explored the link between game-relevant self-efficacy and involvement with MMORPG worlds. However, drawing upon the notions that self-efficacy governs activity selection and involvement, goal commitment, task resiliency, and group commitment, the current work proposed the following:

H1: Game-relevant self-efficacy will be a positive predictor of MMORPG community involvement.

Interdependent self-construal

Markus and Kitayama[26] used the terms ''independent'' and ''interdependent'' to describe people who endorse (respectively) individualist or collectivist cultural values. Individuals who espouse independent self-construal stress their own autonomy and independence, while those who report interdependent self-construal tend to emphasize relationships with others and their surroundings. While much research on self-construal has occurred at the cultural level, individuals in all cultures are thought to possess independent and interdependent self-construals in varying levels.[27]

The interdependent self depends on relationships with others to regulate behavior.[28] In other words, individuals with high interdependent self-construals are motivated to find ways to fit in with relevant others, to create and fulfill obligation, and to become part of various interpersonal relationships.[26] Furthermore, research on the relationship between self-construals and group climate suggests that groups with high average levels of interdependent self-construals tend to have minimal conflict, effective communication processes, and high levels of cooperation.[26,29,30] Thus, in the current study, it was predicted that MMORPG community involvement would be highest among players with high levels of interdependent self-construal:

H2: Interdependent self-construal will be a positive predictor of MMORPG community involvement.

Perceived knowledge gain

As practice-based communities, MMORPG-based groups feature numerous opportunities for knowledge acquisition. Wegner[31] posited that three specific characteristics of CoP allow for member learning. First, CoP integration encourages mutual engagement, or concentrated interaction between individuals that leads to the creation of shared meaning. Second, CoP involvement results in social environments in which group members are engaged with one another and work together toward a common goal. Third, CoP allows for the development of shared repertoires, which are common resources and communication techniques that members can use to negotiate meaning. In sum, these factors result in social environments that facilitate knowledge sharing and development.[9] Thus, the logic of the current study suggested that involvement in MMORPG would afford members the shared language, trust, and resources necessary for intragroup learning.

According to Barker et al.,[32] perceived knowledge acquisition can be understood as the product of both incidental and focused processes. Incidental knowledge acquisition can be understood as nondeliberate learning that occurs during the course of media exposure and use. Alternately, focused knowledge acquisition results from situations wherein users are motivated to acquire specific bits of information. Relative to the current study, it was suggested that user integration into MMORPG-based groups would facilitate perceived incidental and focused learning.

H3: MMORPG Community involvement will be a positive predictor of (a) focused and (b) incidental knowledge gain.

Notably, the current study focused on perceived rather than objectively measured learning processes. This decision was made for several reasons. First, prior research has shown that self-reported perceptions relative to knowledge gain are strongly tied to objectively measured learning outcomes.[33,34] Second, it was presumed that socially facilitated learning in CoP environments is often spontaneous, wide-ranging in nature, and likely to be focused on a diverse array of topics that are not necessarily related to the activity/set of activities around which the CoP is structured. As such, the current study focused on learning outcomes as topically nonspecific, perceptive-level variables.

Method

Consistent with prior research on MMORPG use, convenience sampling was used.[2–4,8] Data were collected using Amazon's Mechanical Turk (AMT). Participation was limited to those with U.S.-based IP addresses, and recruitment efforts were specifically aimed at those who were current MMORPG players. In contrast to previous studies, which generally recruit from a handful of MMORPG fan communities/messageboards, it was reasoned that use of AMT would allow for data collection from users of a wide array of MMORPG titles. The current project was part of a larger effort exploring the uses and effects of interactive technologies in contemporary society.

As such, the data points were a subset of a larger sample of approximately 6,000 U.S. adults who reported using the Internet on a daily basis.

In the present subsample, users were asked to name their favorite MMORPG title. Respondents selected from a predefined list of 21 popular MMORPG titles. Additionally, respondents were allowed to select an ''other'' category and manually enter their favorite title.

A total of 807 responses were collected. Data cleaning was conducted as follows. First, a check was made that individual response times were not greater than two standard deviations below the mean time required to complete the survey ($M = 7.27$ minutes, $SD = 3.00$ minutes). No responses were deleted as a result of this test. Next, the favorite game title provided by those who checked the ''other'' category in reference to their favorite game was manually checked. Respondents who failed to provide an identifiable favorite game ($n = 12$) or provided a title that was not a MMORPG ($n = 257$) were deleted from the sample. Finally, the data set was visually scanned to identify participants whose responses featured very low levels of variance across the survey (i.e., those who simply ''clicked through'' the survey instrument), resulting in the deletion of a single case. After data cleaning, a total of 547 responses were included in the analytic sample.

Respondents reported playing a total of 54 different titles, with *World of Warcraft* being the most frequent response ($n = 252$). The sample was primarily male (60.9%) and white (81.7%, including Hispanic/Latino). The next highest levels of identification were Asian/Asian-American (9.0%) and black/African American (8.4%). The average age of the sample was 30.89 years ($SD = 8.52$ years). The sample reported a mean annual household income of US$48,999 ($SD =$ US$51,101). In terms of educational attainment, 82.4% of the sample reported that they had completed at least some college coursework. In all, 36% of the sample reported possessing at least a bachelor's degree. Respondents indicated that they spent, on average, 8.51 hours ($SD = 3.44$ hours) on the Internet per day. Respondents reported that they primarily play MMORPG games on a desktop or laptop (97.1%), with a small number (2.9%) indicating that they most commonly played MMORPG games on tablets, smartphones, or other handheld devices. Finally, respondents were asked to estimate the frequency with which they play their favorite MMORPG game (ranging from 1 = ''never'' to 7 = ''always''). The mean score for the sample was 4.75 ($SD = 0.95$, range 3.00–7.00).

Measures

All individual indictors were placed on 5-point scales ranging from 1 = ''strongly disagree'' to 5 = ''strongly agree.''

Interdependent self-construal. Interdependent self-construal was measured using four items, all taken from Singelis's[28] pre-existing interdependent self-construal inventory. The indicators used to measure interdependent self-construal included the following sample items: ''I have respect for the authority figures with whom I interact'' and ''It is important to me to respect decisions made by the group'' ($M = 3.97$, $SD = 0.65$; skew = -0.65, kurtosis = 0.85; $\alpha = 0.70$).

Game-specific self-efficacy. Self-efficacy beliefs relevant to the participants' identified MMORPG were measured using five items, all developed using the self-efficacy inventory construction guidelines provided by Bandura.[17] Sample items included: ''I can troubleshoot problems when playing this game'' and ''I am more knowledgeable than most about this game'' ($M = 3.89$, $SD = 0.83$; skew = -0.57, kurtosis = -0.17; $\alpha = 0.88$).

MMORPG community involvement. The degree to which respondents perceived themselves to be meaningfully integrated into/involved with an MMORPG-based virtual community was measured using five items, all adapted from Halverson.[35] Sample items include: ''The atmosphere while playing this game is very social'' and ''Playing this game has become a habit so I can hang out with others'' ($M = 3.52$, $SD = 0.79$; skew = -0.20, kurtosis = -0.40; $\alpha = 0.80$).

Focused knowledge gain perceptions. Three items were used to measure reported focused knowledge gain from MMORPG gameplay. These items, all taken from Barker et al.,[32] were indirect measures of perceived knowledge gain. Sample items include: ''This game helps me learn what I want to know'' and ''This game effectively communicates what I want to know'' ($M = 3.95$, $SD = 0.77$; skew = -0.57, kurtosis = 0.19; $\alpha = 0.81$).

Incidental knowledge gain perceptions. Four items, all taken from Barker et al.,[32] were used to measure incidental knowledge gain from MMORPG gameplay. Sample items included: ''I sometimes learn interesting new things by accident'' and ''I am pleased how often I learn something unexpected'' ($M = 3.82$, $SD = 0.80$; skew = -0.69, kurtosis = 0.78; $\alpha = 0.88$).

Missing data analysis

Overall, a trivial amount of data (0.65%) was missing. Little's MCAR test[36] suggested that the pattern of missing data was random in nature, $\chi^2 = 430.79$, $df = 408$, $p = 0.21$.

Table 1. Loading Ranges, Commonalities, Composite Reliabilities, and Average Variance Extracted for Each Latent Item

Measure	*Loading range*	*h^2 range*	*Composite reliability*	*Average variance extracted*
Game-relevant self-efficacy	0.66–0.88	0.44–0.77	0.89	0.62
Interdependent self-construal	0.48–0.70	0.23–0.49	0.70	0.37
MMORPG community involvement	0.55–0.75	0.30–0.57	0.81	0.46
Incidental knowledge gain	0.77–0.84	0.59–0.71	0.88	0.65
Focused knowledge gain	0.65–0.85	0.43–0.73	0.82	0.60

MMORPG, massively multiplayer online role-playing game.

Table 2. Latent Correlations Between Items

Measure	*1*	*2*	*3*	*4*	*5*
Game-relevant self-efficacy (1)	**0.79**	0.19	0.45	0.25	0.40
Interdependent self-construal (2)		**0.61**	0.32	0.24	0.33
MMORPG community involvement (3)			**0.68**	0.42	0.48
Incidental knowledge gain (4)				**0.81**	0.52
Focused knowledge gain (5)					**0.78**

Note: Discriminant validity is shown in bold and appears on the diagonal; all p values < 0.01.

Results

Mplus 7.3 was used for model estimation. Generally speaking, missing data were replaced using multiple imputation. However, because Mplus cannot generate the bootstrapped confidence intervals necessary for evaluation of indirect effects when using multiple imputation, exploratory evaluation of model-implied indirect effects was accomplished using listwise deletion. Following convention, the two-step model testing process described by Anderson and Gerbing[37] was followed. First, a measurement model was estimated. This model suggested that the data fit the model acceptably well, $\chi^2 = 471.98$, $df = 179$, $\chi^2/df = 2.64$, $p < 0.001$; CFI = 0.94; RMSEA = 0.055 [90% CI 0.049, 0.061]; SRMR = 0.05.

Next, convergent validity was examined for each latent item. According to Fornell and Larcker,[38] convergent validity is demonstrated when indicators possess significant t values, demonstrate robust standardized factor loadings (>0.50), show an average variance extracted (AVE) coefficient > 0.50, and have a composite reliability (CR) coefficient > 0.70. The current data broadly indicated convergent validity. However, the interdependent self-construal had a single item that posted a standardized loading score < 0.50 ($\Lambda = 0.48$). Moreover, the measures of community salience and interdependent self-construal posted AVE values < 0.50 (0.46 and 0.37, respectively). Nonetheless, it was deemed appropriate to continue with estimation of the structural model in this exploratory study because removing the problematic indicators did not change the outcomes of the model tests, the model fit statistics were acceptable, and the problematic items were all drawn from previously validated measurement inventories. Information relevant to convergent validity is provided in Table 1.

Finally, discriminant validity was assessed. Discriminant validity is demonstrated when the square root of the AVE is larger than the correlation between each of the other measures included in the model.[38] As seen in Table 2, this criterion was met.

Hypothesis testing

The second step in the analysis involved testing the structural model. Initial estimation suggested an acceptable fit between the data and the model, $\chi^2 = 553.80$, $df = 184$, $\chi^2/df = 3.02$, $p < 0.001$; CFI = 0.93; RMSEA = 0.061 [90% CI 0.055, 0.067]; SRMR = 0.07.

Examination of the parameter estimates suggested that both self-efficacy ($b = 0.28$, $p < 0.01$) and interdependent self-construal ($b = 0.29$, $p < 0.01$) were significant predictors of community involvement. For its part, community involvement was a significant predictor of both incidental ($b = 0.60$, $p < 0.01$) and focused ($b = 0.78$, $p < 0.01$) knowledge gain. These findings provided support for H1, H2, H3a, and H3b. Figure 1 shows the standardized parameter estimates and squared multiple correlations associated with the research model.[a]

Constraining the path between self-efficacy and community involvement and the path between interdependent self-construal and community involvement to equality did not significantly worsen model fit, $\Delta df = 1$, $\Delta\chi^2 = 0.05$, $p > 0.05$, suggesting that the effect of self-efficacy was not significantly more influential than the effect of self-construal on MMORPG community involvement. Constraining the paths between MMORPG community involvement and both of the learning outcomes to equality did, however, significantly degrade model fit, $\Delta df = 1$, $\Delta\chi^2 = 4.31$, $p < 0.05$. This finding suggested that MMORPG community involvement exerted a comparatively greater effect on focused learning outcomes.

Indirect effects

In addition to testing the posited hypotheses, the model-implied indirect effects were examined. Significance of all indirect effects was examined using the 95% confidence intervals obtained through the use of 10,000 bias-corrected bootstrapped resamples of the data.[39] If the confidence intervals did not include 0, evidence of significance was obtained. For self-efficacy, the results indicated that MMORPG community involvement facilitated a significant indirect effect on both incidental knowledge gain ($b = 0.17$ [95% CI 0.12, 0.22]) and focused knowledge gain ($b = 0.22$ [95% CI 0.16, 0.26]). Similarly, community involvement also facilitated the relationship between interdependent self-construal and both incidental ($b = 0.17$ [95% CI 0.10, 0.28]) and focused ($b = 0.23$ [95% CI 0.14, 0.35]) knowledge gain.

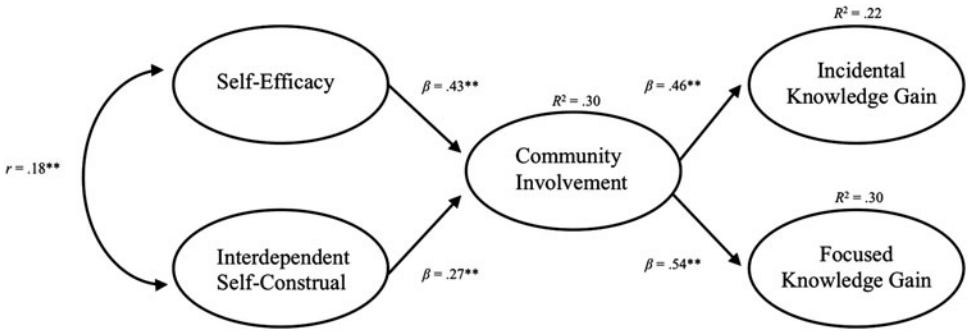

FIG. 1. Structural model results. All reported coefficients are standardized. $^{**}p < 0.01$.

Discussion

The current findings contribute to the literature in two ways. First, and perhaps most importantly, this study's results suggest that MMORPG community involvement is meaningfully associated with player learning outcomes. Previous research has indicated that MMORPG gameplay can be linked to a number of (potentially) negative effects, including escapism,[40,41] problematic/excessive involvement,[42,43] and the exacerbation of negative psychological symptoms.[44] The present data, which suggest the existence of desirable learning outcomes, underscore the notion that emergent social technologies—such as MMORPG worlds—offer affordances that elicit a complex array of negative and positive individual/social outcomes. Future research should explicitly investigate MMORPG gameplay from a social cost–benefit standpoint as a means of better understanding the broader individual and societal implications of MMORPG involvement.

Second, the current results suggest that online CoP involvement is meaningfully tethered to individuals' domain-specific self-efficacy perceptions. While previous research has explored the influence of self-efficacy on a number of online, group-based behaviors,[45,46] this study is novel in its specification of MMORPG-relevant self-efficacy as an antecedent to in-game social involvement. Furthermore, analysis of the structural model suggested that self-efficacy levels indirectly influence learning outcomes. Future research should continue to explore both the direct and indirect effects of self-efficacy on MMORPG gameplay.

In addition to its contributions to the academic literature, this study also has at least one practical implication. As game designers and educators explore how best to embed educational content within video game environments, the hypothesized model suggests that social factors, such as community involvement, may exert a nonignorable influence on learning outcomes. Thus, when designing multiplayer games tied to identifiable learning outcomes, game designers should pay close attention to the degree to which the game environment facilitates *lasting* social interaction. Relatedly, the current model suggests that self-construal orientations and domain/environment-specific self-efficacy levels both directly influence community involvement and indirectly influence learning outcomes in focused and incidental forms. Accordingly, when developing games that are tied to learning outcomes, it seems important—if not essential—that developers pay close attention to the degree that the game environment meaningfully corresponds to user characteristics. For instance, the current findings suggest that a game environment that requires self-efficacy levels that extend beyond those levels found in the game's target demographic may be unable to facilitate the desired learning outcomes.

A number of factors limit the current findings. First, given the use of convenience sampling, the findings cannot be generalized to the population of MMORPG players as a whole. Second, although structural equation modeling allows researchers to test presumed casual relationships, the survey-based nature of the current effort curbs the ability to make casual claims. Third, the measures of incidental and focused learning were not, by design, anchored to a particular topic or subject. As such, the current study cannot speak to what types of information MMORPG users acquire during the course of game play.

Notes

a. To assess the degree to which the results were influenced by demographic and gameplay factors, an additional structural model wes estimated that controlled for the effects of demographics (age, sex, race, and education level) and gameplay frequency on each of the endogenous variables (community involvement, incidental learning, and focused learning). Comparisons between the two models indicated that the inclusion of demographic and gameplay factors did not substantively influence the direction, significance, or magnitude of the primary parameters of interest.

Acknowledgments

The authors gratefully acknowledges the School of Journalism and Media Studies, San Diego State University, which provided funding for this study.

Author Disclosure Statement

No competing financial interests exist.

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