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Women Hold Up (More Than) Half of the Sky: Examining the Motivations, the Behaviors, and the Social Capital in a Multiplayer Game Popular Among Female Players

Abstract

This study combined survey and behavioral data to examine the connections between socio-relational motivations, socializing behaviors, and social capital. Participants were U.S. players ($N = 1,027$; 65% female) from a fantasy mobile game popular among female players. Consistent with gender role theory, female players partook in higher socializing behaviors. Moreover, in support of uses and gratifications theory and the social capital framework, the smarty-pants and socializing motivations, and socializing behaviors were positively associated with social capital. Partly in support of gender role theory and the social capital framework, both bridging and bonding social capital were higher for female players. This study's results offer nuance to how certain game affordances and incentives may be predictive of social capital outcomes.

Keywords: female gamers, gender role theory, multiplayer game, social capital, uses and gratifications

According to the Entertainment Software Association (2021), 45% of video game players identify as women. However, the game industry is male dominated, with a history of employing

female staff and decisionmakers at 3% to 30% (Lynch et al. 2016). Even research on games has been predominantly about male players (Shen et al. 2016). Nevertheless, the limited research with surveys and unobtrusive data on female players suggests that they can be as active and experienced as male players (Fox and Tang 2017; Shen et al. 2016; Williams et al. 2009).

One particularly understudied area of research about female players is their social capital accumulation, especially how their specific gameplay motivations and behaviors are reflected in their social capital. Most of the extant research on gameplay motivations and behaviors of female players has mostly examined gender with other sociodemographics, such as age (van Reijmersdal et al. 2013; Greenberg et al. 2010; Yee 2006), cultural background (Ratan et al. 2022), sexual orientation (Williams et al. 2009), etc. However, associations with social capital are particularly worthy of research. Social capital is critical for players in their lives in and outside of the game, such as for professional advancement and emotional support (Williams 2006; Putnam 2000). It is important to study the motivational and behavioral antecedents to social capital because such studies may have practical implications for how players can strategically and actively accumulate social capital. It is particularly important to study social capital accumulation of women in games because female players more often experience gender-based harassment, female objectification, and toxicity that may place them at a disadvantage in games (Vella et al. 2020; Cote 2020; Fox and Tang 2017). Furthermore, in broader contexts, although extant research finds that women have extensive sources of emotional support (Pearce, Machin, and Dunbar 2021; Antonucci and Akiyama 1987; Gerstel, Riessman and Rosenfield 1985), women are still economically and politically marginalized (Cote 2020; Fox and Tang 2017; Eagly and Koenig 2006), which means that higher social capital accumulation could help attenuate such marginalizations.

This study aimed to examine how certain gameplay motivations and behaviors associated with social relationships predict social capital within a mobile massive multiplayer online game, *Sky: Children of the Light (Sky)*. Surprisingly, contrary to the existing literature, only socializing behavior differed between female and male players. Additionally, several motivations consistently predicted social capital. Finally, partly consistent with past literature, social capital was higher for female players than male ones. In general, this study offers evidence of the social nature of a mobile multiplayer online game and finds that while male and female players are similar in their gameplay motivations, the female players' socializing behaviors and social capital are higher.

Literature review and hypotheses

Gender role theory

Gender is socially constructed and mutable, though often related and conflated with biological sex (Cote 2020). *Socially constructed* means that gender is socially established, and it is different from determinism by biological sex. *Mutable* means that gender views change over time. Some historical examples in the computing and creative fields that are now male dominated illustrate this. Early computing, which involved extensive hand calculations, was deemed more women's work (Cote 2020). Early film scriptwriting, which focused more on storytelling and less on technical writing, was more inclusive to women (Casella 2017). Gender role theory suggests that there are common cultural expectations placed on individuals; for example, the desirability of certain habits and behaviors, due to their socially defined gender (Stickney and Konrad 2007; Eagly 1987). This theory came about from social role theory (Eagly 1987), which is a broader explanatory theory about the distal and proximal causes for biological sex and gender roles in the society (Eagly and Koenig 2006). Broadly, the gender role process

moves from social expectations to individuals and their internalization of gender roles (Williams et al. 2009).

Different mechanisms have been proposed for this process: society tends to reward individuals who conform to those gender roles and punish them when they do not (Huh and Williams 2010; Malcom 2003), there is more new information about the role as one partakes in it and one adjusts one's views to favor the socially conceptualized role due to the new information (Stickney and Konrad 2007). There is also cognitive dissonance (Festinger 1957) with gender roles, with an initial discrepancy between one's own conceptualization of role contrasted with society's conceptualization of it. These societal forces often lead individuals to change their position to that of the society to achieve consistency and acceptance (Stickney and Konrad 2007).

In most Western cultures, the main difference between the roles for men and women is the difference between agency and communion, which is ascribed to the respective genders (van Reijmersdal et al. 2013; Eagly and Koenig 2006). Men are ascribed agentic attributes, such as independence, assertiveness, competitiveness, and individualism. In contrast, women are ascribed communal attributes, such as concern for others, generosity, nurturing, and expressiveness (Shen et al. 20016; Eagly and Koenig 2006). The agency-communion dichotomy is more common among groups that have patriarchal leanings than those with egalitarian ones (Eagly and Koenig 2006). Groups with more patriarchal leanings are more likely to normalize women focusing more on family and romantic relationships, and less on careers; but normalize men focusing more on their careers, and not family and romantic relationships (Stickney and Konrad 2007; Malcom 2003). In contrast, more egalitarian groups value more similar roles for women and men in all aspects of life (Stickney and Konrad 2007).

Gender roles affect how men and women approach work and leisure activities. As this paper focuses on leisure activities (i.e., gameplay), it is worth noting that past research found that gender roles affect how individuals approach playing sports (Clopton 2012; Malcom 2003), self-presentation (Malcom 2003), and gameplay (Ratan et al. 2022; Shen et al. 2016; van Reijmersdal et al. 2013), the latter of which will be examined more closely below in terms of gameplay motivations and behaviors. Past research found that gender roles affect sports as male athletes report higher social capital if they played individual sports (i.e., favoring more agency) than team sports, while the opposite relationship was found for female athletes (i.e., favoring more communion; Clopton 2012), and female athletes showed concerns with appearing too masculine (Malcom 2003). Past research found that gender roles affect self-presentation, with women showing concern for fashion, hair, and makeup (Malcom 2003).

Uses and gratifications

Uses and gratifications (U&G) is a theoretical framework about media choice and use focusing on individuals' purpose and motivation, rather than producers' (Ruggiero 2000). Under U&G, motivation refers to why an individual makes a media choice (Rubin 1981). That motivation may be based on what the individual expects to receive of value by consuming their media of choice, though their expectancy does not necessarily have to be met (Ruggiero 2000). Thus, U&G focuses on the agency of the individuals who use the media though their desired outcomes may not always be met.

In gaming, U&G proposes that players consume media to reach greater internal and socio-relational equilibria (Sherry et al. 2006) and assumes that players can explain their purposes and motivations (Greenberg et al. 2010). Extant U&G literature in gaming has certain methodological and sample limitations. U&G scholars' work has involved classifying and

taxonomizing player motivations (Sherry et al. 2006; Ruggiero 2000), which has been focused more on self-reported motivations and less on behavior (Ruggiero 2000). Yet, behaviors can be more valid to what the player motivations actually are, as self-reports could be prone to cognitive biases (Ruggiero 2000). Moreover, not much U&G research has been dedicated to studying the motivations of female players. Rather, the research tends to be more of male-dominated samples (e.g., Kahn et al. 2015; Sherry et al. 2006). It is important to study U&G for female players because they have been historically perceived as being less socially valuable (Cote 2020; Lynch et al. 2016).

In studying female players, it is useful to understand how their agency can be analyzed with gaming motivations as understood by U&G. This study focuses on three types of motivation proposed by Kahn and colleagues (2015) that are related to social relationships and interactions. First, *escapists* are individuals motivated to play in order to step away from other social situations. These individuals may be motivated to escape from problems from other contexts or try to forget other tasks (Kahn et al. 2015; Williams et al. 2009; Yee 2006). Some players are escapists because they may feel marginalized in offline and mainstream environments. Williams et al. (2009) found that the most active players of the massively multiplayer online (MMO) game *EverQuest II* were women and not men, and the former of which tend to be more marginalized. Additionally, Williams, Kennedy, and Moore (2011) found that active *EverQuest II* players who prefer role play (i.e., pretend to be the character and act accordingly) have a higher likelihood of belonging to marginalized groups, including sexual orientation, religious, and ethnic minorities. Thus, escapists may be especially drawn to the social dynamics in games because they find social support not available in more mainstream offline environments. Some players are escapists not because they feel marginalized, but more due to mood management reasons. They

may play games to escape from stress, relax, and to escape from boredom (Sherry et al. 2006; Yee 2006). These players are less likely to engage with others in the game; they were found to act more like audience members and passively enjoy the social presence of others in games (i.e., being “alone together”) (Ducheneaut et al. 2006).

Second, so-called “*smarty-pants*” are individuals motivated to play to improve their brain capacity and intellect. They may wish to become more knowledgeable than other players or have meta-contexts outside of the specific game they play where they wish to acquire skills (Kahn et al. 2015; Yee 2006). This motivation is related to how games can be learning tools, and not merely for leisure (Greenberg et al. 2010). Smarty-pants may try to acquire transferable skills in leadership and organization, technical proficiency, and foreign languages (Kahn et al. 2015; Williams, Kennedy and Moore 2011; Bartle 1996). Social relationships help individuals acquire those skills, proficiencies, and language fluencies. For example, connecting with other players is needed to improve leadership skills (Yee 2014; Williams, Kennedy and Moore 2011), test out the technical work product (Bartle 1996), and practice foreign languages (Williams, Kennedy and Moore 2011). Moreover, smarty-pants are drawn to display their prowess to other players who act like audience members (Ducheneaut et al 2006; Yee 2006). In this way, the patterns among the players resemble the more traditional media, with the smarty-pants players acting more like media producers and the other players acting more like audience members.

Finally, *socializers* are individuals motivated to collaborate and interact with others. They are drawn to a game’s aspects that involve teamwork and conversations (Yee 2006; Bartle 1996). Socializers use games to interact with family members and friends, and to make new friendships that carry beyond the games (Fuster et al. 2013; Williams et al. 2009). Thus, the relationship between socializing and social relationships is the most definitional, and in-game socializing

behaviors such as collaboration and conversing can be most plainly observed. Although the motivation of competitors implies social interactions and relationships, this motivation is not as relevant to this study because the game studied involves few competitive features.

Gameplay Motivations and Behaviors Associated with Gender Roles

There are differences in the expectations of how men and women should approach gameplay. They primarily rely on the general assumption that men are more serious about games (Fox and Tang 2017; Shaw 2012) and, in particular, that male players should take agentic roles while female players should take communal ones (Shen et al. 2016; Shen 2014). In the gaming context in general, such deterministic views based on biological sex are common, such that spatial reasoning abilities (Ratan, Shen, and Williams 2020) and direct competition (Greenberg et al. 2010) are often seen as characteristics of male but not female players.

Moreover, gender roles are related to social exclusion and self-selection in gameplay. These exclusions and self-selection patterns are most salient across different game genres. First, certain genres are almost exclusively deemed spaces for male players, such as “green-brown” games about war and sports with very few female players (Ratan, Shen and Williams 2020; van Reijmersdal et al. 2013). Simply put, these “video games have been designed by males for males” (Greenberg et al. 2010: 254). Gender-based harassment and the objectification of female bodies are prevalent in many green-brown games, which are then associated with the female players’ withdrawal from these games (Fox and Tang 2017; Lynch et al. 2016).

Second, for genres played both by male and female players, such as fantasy MMOs, male players tend to take more agentic roles (e.g., fighters) and female players more communal ones (e.g., healing priests) (Shen 2014). Under gender role theory, these players self-select based on the players’ internalization of gender stereotypes for men and women (Shen et al. 2016; Shen

2014). Nevertheless, gender swapping and masking may also occur in MMOs, as newer media technologies allow for more game avatar flexibility and control (Huh and Williams 2010).

Assuming a binary gender conceptualization, gender swapping (also known as gender switching or gender bending) occurs when a player takes on an avatar of a different gender of their own, such as male players taking on female avatars and female players taking on male avatars.

Studies of *EverQuest II* and *World of Warcraft* have found that gender swapping occurs more often with male players taking on female avatars than with female players taking on male avatars (Yee et al. 2011; Huh and Williams 2010). Male players may take on female avatars to watch female avatars that they find visually attractive (Huh and Williams 2010) and to experience more attention from other players. Female players may take on male avatars to deal with gender-based harassment and female objectification issues (Vella et al. 2020). Particularly for the female gender swapping players, their player behaviors may resemble more of their avatar gender than their personal gender, possibly to subvert stereotypes of women (Yee et al. 2011; Huh and Williams 2010).

Unlike gender swapping, gender masking refers to players choosing gender-neutral usernames and avatar appearances (Vella et al. 2020). This phenomenon has not been as studied in quantitative research. Qualitative interviews have found that female players may take on gender masking so as not to be ‘outed’ as female (Vella et al. 2020: 927) and may mask their gender by avoiding voice technology. Gender masking has further consequences in how female players cannot fully engage in games and limit how female players may connect with other female players (Vella et al. 2020).

Third, genres that imply the seriousness or commitment of the players—the so-called “casual games” (vs. hardcore games)—are dominated by female players (Cote 2020; Shen et al.

2016). Female players self-select into the casual games because they imagine hardcore players as being more male (Cote 2020; Shaw 2012).

Lastly, at the other end of the spectrum of green-brown games are “pink” games, which are almost exclusively targeted at female players and address activities like cooking, dress-up, and caregiving (Vieira 2014; van Reijmersdal et al. 2013). Female players’ interest in pink games is related to their internalization of stereotypes for women in those activities (van Reijmersdal et al. 2013). Thus, different game genres make gender roles more salient and activate gender stereotypes. As further elaborated below, *Sky* resembles fantasy MMOs and is more popular among female players, though the game does not particularly prime male or female genders.

Gender roles are also related to gameplay motivations and behaviors. Most gameplay motivations are on average higher for men than women possibly due to the internalization of stereotypes that male players are more serious about games than their female counterparts (Ratan et al. 2022; Shaw 2012). Past research has found that male players are higher than female players in escapist motivations, possibly due to the male players being more interested in gameplay for diversion (Ratan et al. 2022; Greenberg et al. 2010). Similarly, past research found that male players are higher than female players in smarty-pants motivations, possibly due to the internalized gender roles that men should focus more on achievement (Ratan et al. 2022; Williams et al. 2009) and be more task oriented (Zhou, Jin, and Fang 2014).

However, one possible exception is socializing, as some research suggests that women tend to have higher socializer motivations and behaviors than men (Cote 2020; Shen 2014; Zhou, Jin, and Fang 2014; Williams et al. 2009). The rationale behind this is that female players are more likely to prioritize building and maintaining social relationships (Williams et al. 2009). Yet,

the findings are more mixed. For every study that finds that female players have higher socializing motivations and behaviors (Zhou et al. 2014; Shen 2014; Williams et al. 2009; Yee 2006), there are those that report socializing as higher for male players (Ratan et al. 2022; Greenberg et al. 2010). Upon closer inspection, it may be possible to reconcile these findings due to their contextual differences. For studies of players across multiple genres, socializing tends to be higher for male players possibly due to the popularity and high involvement of male players in green-brown games, particularly those that involve violence (Huang-Isherwood and Peña 2021). In contrast, for studies of players of specific genres, such as social virtual games (Zhou, Jin and Fang 2014) and fantasy MMOs (Shen 2014; Williams et al. 2009; Yee 2006), female players tend to be higher socializers. As this study examines a fantasy mobile MMO, the latter studies may be more relevant. Therefore, we predict:

H1. Male players are higher than female players in (a) escapist and (b) smarty-pants motivations, but lower than female players in (c) socializer motivations and (d) socializer behaviors.

Bridging and Bonding Social Capital, and Gameplay Motivations and Behaviors

Social capital refers to the value of network structure and content, whether it is a network of individuals or groups (Adler and Kwon 2002). The value of social capital can be in the form of information quality, goal attainment, and social support (Williams 2006; Adler and Kwon 2002; Bourdieu 1986). Social capital is a resource, like economic capital (Adler and Kwon 2002), though economic capital relates to money and private property (Bourdieu 1986); indeed, one can convert one type of capital to another. Economic capital can be converted to social capital (Bourdieu 1986), for example, through using money to buy in-game gifts to in-game friends so as to strengthen one's network. In fact, some scholars argue that it is easier to use

economic capital to convert social capital than vice versa (Adler and Kwon 2002; Bourdieu 1986). Social capital may come about from bridging or bonding relationships (Putnam 2000; Williams 2006). We will first examine bridging social capital and then bonding social capital. *Bridging social capital* tends to come from weaker relationships that offer novel opportunities. They can be from relationships as basic as a single interaction and tend to involve individuals of varied backgrounds (Putnam 2000).

Escapist motivations may negatively predict bridging social capital because players attempting to step away from other contexts are less likely to interact with weaker acquaintances. Specifically, for players belonging to marginalized groups and drawn to relationships with substantive support (Williams et al. 2009, 2011), their needs are unlikely to be met from weaker relationships. Likewise, for players using games to escape from stress and from boredom, they may prefer to be “alone together” and steer away from weaker relationships (Shen 2014; Ducheneaut et al. 2006).

In addition, the smarty-pants motivation may predict bridging social capital because individual advancement essential to smarty-pants often occurs in bridging relationships. Smarty-pants may require new information that can be exchanged in bridging relationships, information that is not as available in relationships with repeated interactions. In a seminal study about individual advancement through job opportunities, Granovetter (1973) reported that jobseekers found more novel opportunities through their weaker, bridging ties precisely because they were people unlike the jobseeker. Similarly, within games new knowledge may come from outside the player’s immediate and typically similar inner circle. For example, Zhong (2011) studied joint playing in MMOs and found that even avatar-based interactions among players—without knowledge of another player’s real identity and characteristics—was positively associated with

bridging social capital. Indeed, additional related studies suggest that having more information about another player undermines bridging social capital. Trepte, Reinecke, and Juechems (2012) studied members of electronic sport clans and found that higher availability and accessibility for player-to-player interaction was negatively associated with bridging social capital. Putnam (2000) summarized that “bridging social capital is crucial for ‘getting ahead’” (p. 23). Players are more likely to acquire transferable skills from individuals who they are otherwise not close to (Yee 2014).

Finally, socializers may be positively associated with bridging social capital because some players are more motivated to collaborate with others to get ahead in games (Lindtner et al. 2008; Yee 2006). Even for socializer players who are not motivated to get ahead, they may unintentionally acquire bridging social capital due to in-game features requiring teamwork (Shen 2014; Yee 2014). Focusing on the bridging social capital as outcome variable, the following hypothesis was predicted:

H2. Bridging social capital is negatively predicted by (a) escapist motivation, but positively predicted by (b) smarty-pants motivation, (c) socializer motivation, and (d) socializer behavior.

Bonding social capital tends to come from close-knit relationships that offer emotional and substantive support. They tend to be from relationships that involve repeated interactions and reinforce common identities (Putnam 2000). Thus, bonding social capital tends to come from people who are more similar than dissimilar, in other words, from homophilous relationships (McPherson, Smith-Lovin and Cook 2001). Bonding social capital offers a social safety net because it “undergird[s] specific reciprocity and mobilize[s] solidarity” (Putnam 2000: 22).

Smarty-pants may predict bonding social capital because the players' overt behaviors displaying superior knowledge may cause their social acquaintances to invest more in their social capital. Smarty-pants are motivated and intentional to display their abilities and intellect to other players (Ducheneaut et al. 2006; Yee 2006). The display in turn would make these smarty-pants players stand out with their stronger acquaintances and cause them to be more motivated and commit more resources to activate the social capital of the smarty-pants players. This process creates a "rich get richer" pattern (Choi et al. 2021).

Moreover, socializers may predict bonding social capital because they are more motivated to employ games to maintain existing close relationships and convert new weak ones into strong ones (Reer and Krämer 2019; Williams et al. 2009). Focusing on bonding social capital as outcome variable, the following hypothesis was predicted:

H3. Bonding social capital is positively predicted by (a) smarty-pants motivations, (b) socializer motivations, and (c) socializer behaviors.

Furthermore, escapists may predict bonding social capital because they may seek support from games that they cannot find offline, especially for those players who are politically or economically marginalized (Williams et al. 2009, 2011), for example, those marginalized according to sexual orientation, religious, and ethnical minority status (Williams et al. 2011). Thus, for players who are not male and are more politically or economically marginalized, they may be more motivated to escape from non-game contexts and use games to acquire bonding social capital.

Because male players tend to be more politically and economically privileged in society (Cote 2020; Fox and Tang 2017; Eagly and Koenig 2006), players who are not male were deemed as necessitating more escapist motivations.

H4. The association between escapist motivations and bonding social capital is weaker for men than other genders.

Gender roles and social capital

Men and women differ in how they accumulate bridging and bonding social capital. First, men tend to rely on their individual network while women tend to rely on the network of a mentor or superior (Kumra and Vinnicombe 2010). Historically, women are more likely to partake in caregiving of family members, thus restricting their network size (Kim 2014; Kumra and Vinnicombe 2010). As such, women tend to have fewer resources than men to directly create their personal networks and are more likely to access the network of someone more influential than them (Kumra and Vinnicombe 2010). Second, men tend to focus on self-advancement-related networking behaviors, while women tend to focus on advancing other individuals' and groups' networks (Kim 2014; Kumra and Vinnicombe 2010). These differences are related to the social normalization of rewarding men who are confident and assertive, while punishing women who possess similar characteristics. For women, it is more accepted that they advocate for other individuals and groups (Kumra and Vinnicombe, 2010).

Bridging and bonding social capital comparisons by gender in multiplayer game contexts is an understudied area, and the extant research has mostly examined offline professional contexts, such as academia (van Emmerik 2006), consultancy firms (Kumra and Vinnicombe 2010), microenterprises (Kim 2014), and family relationships (Antonucci and Akiyama 1987; Gerstel, Riessman and Rosenfield 1985). The closest leisure context where social capital has been compared by gender is in sports (Clopton 2012). These studies offer insight into how there may be gender differences in bridging and bonding social capital.

In terms of bridging social capital, past research in different professional contexts have found that the key network links for accumulating bridging social capital are more likely to be men (McPherson et al. 2001), possibly due to the gender roles that favor male achievement (van Emmerik 2006). Men were found to have higher bridging social capital than women in academia (van Emmerik 2006) and in microenterprise contexts (Kim 2014).

Moreover, in terms of bonding social capital, past research has found it to be more salient among marginalized groups, possibly due to their more vulnerable status. Members of these groups tend to be more vulnerable and in greater need for emotional and substantive support, and bonding social capital is associated with such support (Clopton 2012; van Emmerik 2006; Putnam 2000). Thus, bonding social capital is likely to be higher for female players because they are more socially marginalized. Bonding social capital may also be more salient among the female players in *Sky* because of gender homophily patterns (McPherson et al. 2001). Homophilous relationships by gender can happen in various contexts when women are more likely to connect with other women, and men more likely to connect with other men (Kumra and Vinnicombe 2010; McPherson et al. 2001). Homophilous relationships associated with bonding social capital are likely to be higher for female players than male ones, just by the virtue of there being more female *Sky* players to connect among each other.

H5. Male players are higher than female players in (a) bridging social capital, but lower than female players in (b) bonding social capital.

Method

Sky: Children of the Light

Sky is a popular prosocial fantasy mobile game created and released by *thatgamecompany* that provides players an immersive virtual world that allows for both goal-oriented and

exploration-oriented play. For the goal-oriented focus, players may forge candles (the in-game currency), free spirits, and save children. After players complete all the game maps, the game credits roll, and players can go through the maps again. For the game's exploration-oriented focus, players may travel by foot or flight in *Sky*'s vast world, filled with natural sights, ancient structures, eerie wasteland, and more.

Although *Sky* player avatars are human-like, the game has many fantasy elements. The player avatars have a mostly androgynous appearance, wear capes that enable them to fly, the spirits resemble giant ancestors, the *Sky* children are made up of rays of light, and dead entities can come back to life.

Sky is prosocial, as its game architecture incentivizes players to help one another and rarely encourages aggression. The main way the architecture incentivizes prosocial behavior is that team play results in synergy. For example, players receive a boost in energy for playing with other players near them. Moreover, *Sky* has many affordances only available to players with in-game friends.

In-game friends can socialize in many ways, such as holding hands, offering high fives, bowing, dancing together, performing musical instruments, giving gifts, and text chatting. Therefore, *Sky* was a relevant research site for exploring the main research question of this study, which is about social capital, the value that comes about from network relationship structures (Adler and Kwon 2002). Moreover, *Sky* was chosen because it was one of the video games to which the authors' research group had access to survey and behavioral data.

Procedure

Ethics approval was requested and approved by the institutional review board of the authors' university. The participants ($N = 1,771$) were recruited and surveyed in November 2020.

The recruitment involved a collaboration between the authors and *thatgamecompany*. The authors designed and programmed the online survey (including an introductory page with the informed consent) on the SurveyMonkey platform, while *thatgamecompany* created the sampling mechanism, added the survey link, and distributed the remuneration through the *Sky* platform. The participants were recruited through *Sky* with random sampling after they completed the last game level right before the game credits stage. That allowed for inclusion of beginner and veteran players who experienced the whole game. As such, participants who did not experience the whole game were not included in the sample. Participants received in-game currency for completing the survey from *thatgamecompany*, a meaningful six candle units, almost 1,000 pieces of light units.

The survey questions used in this research were a subset of a larger survey which included demographic questions about gender, age, and income. Despite the informed consent page asking players under 18-years-old not to advance in the survey, 606 participants who answered the survey reported that they were under 18-years-old, and thus they were removed. Moreover, 138 were removed for giving inconsistent answers, leaving a final sample of 1,027. Through hashed identifiers only known to *thatgamecompany*, the survey data of the sample were matched with players' back-end unobtrusive behavioral data for the six months prior to November 2020 (4/12 to 10/12/2020). *thatgamecompany* relied on the terms of service agreement to obtain informed consent for the unobtrusive behavioral data. This behavioral data used in this study included the total number of messages sent in game, mobile device language, and the device's operating system. This matched survey and behavioral data was fully anonymized before reaching the research team and was used to test the hypotheses.

Sample characteristics

The sample gender makeup was a majority female players (65%), with a mean age of 25 ($SD = 9.70$). Most players used the iOS operating system (72%), with the rest Android (28%). Finally, their device language was mostly English (97%).

Survey and behavioral measures

Escapist motivation

Two survey items measured the escapist motivation (i.e., “I like to do things in *Sky* that I cannot do in real life” and “*Sky* allows me to pretend I am someone else”) on a 5-point Likert-type scale (1 = *disagree completely*, 5 = *agree completely*) (adapted from Kahn et al. 2015). The Kahn measure was selected for assessing escapist motivation and the motivations below because the measure addressed multiple video game genres, including *Sky*’s genre (Körner and Schütz 2021; Turkey and Adinolf 2018). The items were averaged into a single score ($M = 3.80$, $SD = 1.10$, $\alpha = .70$).

Smarty-pants motivation

Two survey items measured the smarty-pants motivation (i.e., “Playing *Sky* makes me smarter” and “I play *Sky* to enhance my intellectual abilities”) on a 5-point Likert-type scale (1 = *disagree completely*, 5 = *agree completely*) (adapted from Kahn et al. 2015). The items were averaged into a single score ($M = 2.70$, $SD = 1.20$, $\alpha = .85$).

Socializer motivation

Three survey items measured the socializer motivation (i.e., “I like to chat with other players while playing *Sky* [either through the game or some outside method],” “I like to use some voice system to talk with other people when I play *Sky*,” and “It’s important to me to play *Sky* with a tight knit group”) on a 5-point Likert-type scale (1 = *disagree completely*, 5 = *agree*

completely) (adapted from Kahn et al. 2015). The items were averaged into a single score ($M = 3.40$, $SD = 1.00$, $\alpha = .68$).

Socializer behaviors

One in-game unobtrusive behavioral measurement was operationalized as socializer behavior, that is, the total number of messages the player sent in the *Sky* universe while playing. This behavioral measurement quantifies the amount of player interaction with other players and has been found to be an indication of socializer motivations (Choi et al. 2021). While other behavioral measurements are available, they are more *Sky*-specific and less generalizable to other contexts. Such measurements cannot be as easily replicated in future studies. The socializer behavior measurement had a right-skewed distribution ($M = 5,979$, $SD = 14,146$). Only socializer behaviors were available, but no escapist or smarty-pants behaviors, because socializer behaviors could be most plainly observed.

Gender

One open-ended survey item measured player gender (i.e., “What gender do you identify as?”), which were then categorized as female (65%; e.g., “female,” “transfemme,” etc.), male, (24%; e.g., “male,” “dude,” etc.), other (9%; e.g., “nonbinary,” “bigender,” etc.), and non-response (2%). Note that the gender variable in the analyses for H1 and H5 differ from the gender variable in the correlation table and the analysis for H4. While the variable for H1 and H5 was made up of male and female as categories (omitting other and non-response) as to test male and female gender roles, respectively, the variable for the correlation table and H4 analysis was dummy coded (1 = male and 0 = all other genders [i.e., female, other, and non-response]) as H4 is more concerned to test how males tend to be more politically and economically privileged in the society. The dummy coding also allowed more participants to be included for analysis.

Bridging social capital

Ten survey items measured bridging social capital (e.g., “Interacting with people in *Sky* makes me interested in things that happen outside of my town in real life,” “In *Sky*, I come in contact with new people all the time”) on a 5-point Likert-type scale (1 = *disagree completely*, 5 = *agree completely*) (adapted from Williams 2006). The Williams measure was selected for assessing bridging and bonding social capital (below) because the measure was concerned about online social capital, including social capital associated with online video game interactions as here (Kim et al. 2022; Depping, Johanson, and Mandryk 2018; Trepte et al. 2012; Zhong 2011). The bridging social capital items were averaged into a single score that had a left-skewed distribution ($M = 4.10$, $SD = .80$, $\alpha = .91$).

Bonding social capital

Ten survey items measured bonding social capital (e.g., “There are several people in *Sky* I trust to help solve my problems,” “When I feel lonely, there are several people in *Sky* I can talk to”) on a 5-point Likert-type scale (1 = *disagree completely*, 5 = *agree completely*) (adapted from Williams 2006). The items were averaged into a single score that had a right-skewed distribution ($M = 2.80$, $SD = 1.00$, $\alpha = .89$).

Control variables

Additionally, control variables were used because they may affect social capital acquisition. Language of the device used to play *Sky* was used, dummy coded 1 = English, due to English being the dominant language in the U.S. and past research suggesting that English fluency is associated with ability to acquire social capital (Wang 2020; Straubhaar 2013).

Additionally, income level was used as an ordinal variable, ranging from “Under \$15,000” to

“\$250,000 or more,” due to the interconnected relationship between economic resources and social capital acquisition (Adler and Kwon 2002; Bourdieu 1986).

Results

All descriptive and statistical analyses were performed in RStudio version 1.2.5042. Spearman’s rank correlations were carried out considering that some variables, especially the social capital ones, are skewed and do not appear to be normally distributed (Field, Miles, and Field 2012). Table 1 reports the correlations of the key variables.

Table 1

Spearman correlations of the key variables

	1	2	3	4	5	6
1 Escapists						
2 Smarty-pants	.28					
3 Socializers (survey)	-.08	.21				
4 Socializers (behavioral)	-.39	-.29	-.02			
5 Gender (1 = Male)	-.39	-.46	-.42	-.44		
6 Bridging social capital	.23	.49	.42	-.03	-.63	
7 Bonding social capital	-.01	.39	.53	.20	-.62	.66

Note. No correlation had a p value lower than .05 ($ps > .109$).

To examine H1, which predicted the gameplay motivation and behavior differences between male and female players, data of the players who did not identify as male/female and

did not provide a gender response were omitted. Mann Whitney Wilcoxon or Mann Whitney U tests, which compare medians, were carried out because some of the motivation variables do not appear to be normally distributed (Field, Miles and Field 2012). For H1(a), there were no significant differences between the escapist motivation of male ($Mdn = 4.00$) and female players ($Mdn = 4.00$), $U = 88,928$, $p = .100$. Similarly, for H1(b), there were no significant differences between the smarty-pants motivation of male ($Mdn = 2.70$) and female players ($Mdn = 2.70$), $U = 86,819$, $p = .300$. For H1(c), with survey data, there were no significant differences between the socializer motivation of male ($Mdn = 3.30$) and female players ($Mdn = 3.30$), $U = 83,734$, $p = .900$. However, when examining H1(d) with unobtrusive data (i.e., total number of messages sent), there was a significant difference between the socializer behavior of male ($Mdn = 74$) and female players ($Mdn = 485$), $U = 97,162$, $p < .001$, $r = .13$. Thus, only H1(d) regarding socializer behavior was supported.

To examine H2 through H4, which predicted how gameplay motivations and behaviors predicted social capital, multiple linear regression models were carried out with the control variables (step 1), survey predictors (step 2), and behavioral predictors (step 3). The social capital outcome variables were log-transformed because they were not normally distributed (Field, Miles and Field 2012). As multicollinearity could have been a concern among the predictor relationships, especially among the survey and behavioral variables measuring socializer-related constructs, variance inflation factors (VIFs) were calculated for the control variables, survey predictors, and behavioral predictors from the models. The VIFs were well below the level of concern of 10 (Field, Miles and Field 2012), with the highest VIF being 1.5.

The regression models predicting bridging social capital (Table 2) show that the escapist motivation was a significant predictor of log-transformed bridging social capital, increasing

every one unit (out of five units) in the escapist survey measure increased bridging social capital by 4% ($p < .001$). The smarty-pants motivation was a significant predictor of log-transformed bridging social capital, increasing every one unit (out of five units) in the smarty-pants survey measure increased bridging social capital by 5% ($p < .001$). Additionally, socializer motivation was a significant predictor of log-transformed bridging social capital, increasing every one unit (out of five units) in the socializer survey measure increased bridging social capital by 8% ($p < .001$). Finally, socializer behavior was a significant predictor of log-transformed bridging social capital, increasing every one message sent in the socializer behavioral measure increasing the bridging social capital by $< 1\%$ ($p = .016$). In summary, H2(b-d) were supported, but, though H2(a) regarding escapist motivation was statistically significant, it resulted in the opposite direction from what was predicted. Instead of finding that escapist motivation negatively predicted bridging social capital, escapist motivation positively predicted it.

Table 2

Regression models predicting bridging social capital (log transformed)

	Log transformed bridging social capital		
	1	2	3
Device language (1 = English)	-.03 (.05)	.05 (.05)	.05 (.05)
Income level	< .01 (< .01)	< .01 (< .01)	< .01 (< .01)

Escapists		.04*** (.01)	.04*** (.01)
Smarty-pants		.05*** (.01)	.05*** (.01)
Socializers (survey)		.08*** (.01)	.08*** (.01)
Socializers (behavioral)			< .01* (< .01)
Constant	1.41*** (.05)	.77*** (.06)	.77*** (.06)
Adjusted R^2	< -.01	.28	.28

Note. Standard error values in parenthesis.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The regression models predicting bonding social capital (Table 3) showed that the smarty-pants motivation was a significant predictor of log-transformed bonding social capital, increasing every one unit (out of five units) in the smarty-pants survey measure increased bonding social capital by 9% ($p < .001$). Moreover, socializer motivation was a significant predictor of log-transformed bonding social capital, at step 3 of the regression model, increasing every one unit (out of five units) in the socializer survey measure increased bonding social capital by 16% ($p < .001$). Additionally, socializer behavior was a significant predictor of log-transformed bonding social capital, increasing every one message sent in the socializer

behavioral measure increasing bonding social capital by less than 1% ($p < .001$). Thus, H3 was supported.

Table 3

Regression models predicting bonding social capital (log transformed)

	Log transformed bonding social capital		
	1	2	3
Device language (1 = English)	-.29** (.09)	-.14* (.08)	-.11* (.08)
Income level	< -.01 (.01)	.01 (.01)	.01 (.01)
Escapists (survey)		.03* (.01)	.03* (.01)
Gender (1 = Male)		-.05 (.09)	-.05 (.08)
Escapists × Gender (1 = Male)		< .01 (.02)	< .01 (.02)
Smarty-pants		.09*** (.01)	.09*** (.01)
Socializers (survey)		.16*** (.01)	.15*** (.01)

The study's findings extend gender role theory and uses and gratifications framework by examining how men and women differ in their gameplay motivations, gameplay behaviors, and social capital outcomes in a prosocial mobile game. There was an expected finding about female players partaking in more socializer behaviors. Contrary to expectations, there were no significant findings about female players having higher socializer motivations or male players having higher non-socializer motivations. The reason for the nonsignificant findings could be that the players in *Sky* might be more egalitarian, hewing to beliefs that male and female players have similar roles in the game.

That said, the result that female players have higher socializer behaviors indicates that gender roles are still present. Under gender role theory, the attribute of wishing to connect with others is related to the communal characteristic deemed more appropriate for women. In doing research on gaming, it is critical to constrain findings to the single game or related ones. Like television shows, games can be radically different, especially in their mechanics and affordances. Thus, the architecture of *Sky* itself may be a factor in these findings.

The prosocial affordances of *Sky* appear to incentivize cooperation and egalitarianism, rather than competition and differentiation. Moreover, the androgynous appearances of the player avatars could make their gender roles less salient, and previous research has shown that players often take on the characteristics of game characters (e.g., Yee et al. 2011; Peña, Hancock, and Merola 2009). Since the avatars are more androgynous as part of the game design, they do not particularly make player gender swapping or masking necessary. Most likely, the only way that players could gender swap or mask is through text messaging, by revealing a different gender than their own or declining to talk about their gender, but such an assessment would be more intrusive and require access to the chat content. Additionally, *Sky* could be part of a greater

movement of women becoming more active in video games (Cote 2020; Lynch et al. 2016). Future research could further examine these processes.

Theoretically, this study's findings can inform U&G in that it examined the more socio-relational motivations of playing games, rather than only focusing on individual players. The findings offer insight into the smarty-pants and socializer motivations, constructs that are associated with player-to-player social interactions, and are not purely individual. Moreover, this study extends previous U&G research that rely on self-reports (Ruggiero 2000) by employing unobtrusive behavioral data.

The findings can also inform social capital research in that it examined what could be some of its motivational and behavioral antecedents. As expected, the smarty-pants motivation, socializer motivation, and socializer behaviors predicted bridging and bonding social capital. Surprisingly, there was also support for the escapist motivation being positively associated with bridging social capital and predicting bonding social capital. The discrepancies between what was expected of escapist motivation and what was found could be due to the self-selection effect of *Sky* players. Due to *Sky* being prosocial and exploration-oriented, the individuals who selected to play *Sky* may be especially drawn to how these elements can offer opportunities for social capital accumulation. They may be especially drawn to verbal elements such as text chatting about in-game features, individual interests outside of the game, and emotional support; and even nonverbal elements such as mimicking avatar movements, dancing together, performing in-game musical instruments for others, giving gifts, etc. Players who are aversive to such interactions with in-game acquaintances may have already excluded themselves from playing *Sky*.

Moreover, since no significance was found for H4 about escapist motivation and bonding capital being weaker for men than other genders, more elaboration is needed of the finding. Even

if women are more politically and economically marginalized than men, previous research found that women and men differ in their bonding relationships. Women were found to have a higher number of bonding relationships (Pearce, Machin and Dunbar 2021; Antonucci and Akiyama 1987) and have bonding relationships in more diverse contexts (Gerstel, Riessman and Rosenfield 1985; Antonucci and Akiyama 1987). Similarly, more recent work on transgender and nonbinary adults suggests that these adults also have strong bonding relationships (Holcomb et al. 2022; Muzzey et al. 2021; Stone et al. 2020). In short, despite the higher marginalization of those from genders other than male, they may have existing bonding relationships that cushion them from the harms. Alternatively, the *Sky* players may have experienced certain barriers to forming bonding relationships in the game. These barriers have been found to be especially concerning for female players (Vella et al. 2020; Zhong 2011).

The findings offer insight into the research on both gender roles and social capital in a new context of multiplayer games. It is important to examine this context because it can be instructive on how female players can strategically and effectively accumulate social capital. Similar to patterns in team sports (Clopton 2012), bonding social capital was higher among female players than male ones. Regarding bridging social capital, the findings were the opposite of the framing of gender role theory.

This may be a mismatch in our study's reliance on the literature of professional contexts, where males have more bridging behaviors and networks. This may simply not apply in fantasy multiplayer games that incentivize cooperation (Shen 2014) such as *Sky*, where female players have more advantages in accumulating bridging social capital through chatting about game strategies and working together to complete game quests. These patterns may not be found in

less cooperative games such as the green-brown genres that involve high competition and low prosocial goals (van Reijmersdal et al. 2013; Clopton 2012).

This difference is an important nuance for game researchers in that we can start to identify affordances and incentives such as cooperation as being predictive of social capital outcomes. Future research should continue to explore these affordances across genres and with different affordances. In other words, gender roles and social capital may show different relationships in a violent social game with more competitive affordances compared to prosocial games such as *Sky* or *Journey*, both games by *thatgamecompany*. Additionally, *Sky* shares some similarities with the more popular fantasy free-to-play mobile game *Genshin Impact*, though the latter relies more on combat features and gendered avatars.

Overall, the findings about social capital comparisons by gender are encouraging because they show that marginalized groups can acquire higher bridging and bonding social capital. Possibly, these patterns could be extended to other marginalized groups, such as sexual orientation, sexual expression, racial, ethnic minorities, etc. as they also share with women characteristics of political and economic marginalization. In this way, future research should more directly examine this.

The study findings have practical implications for game companies that may want to appeal to female players. Given that the socializer motivation was consistently found to predict bridging and bonding social capital, companies should focus on socializer affordances before addressing any other gameplay motivations if they want to encourage and take advantage of strong player communities. For instance, the study findings offer specific design recommendations for text chatting affordances. Chatting affordances could facilitate accumulation of bridging and bonding social capital, such as recommending players to converse

about in-game features (e.g., avatars, customization, locations for hidden rewards, etc.), individual interests outside of the game (e.g., hobbies, occupation, current events, etc.), and emotional support (e.g., venting, celebrating together, validating emotions, etc.). That said, the affordances should be tested and proofed for risk of player toxicity, which is of special concern to female players (Depping et al. 2018; Vella et al. 2020). To help prevent toxicity in chatting, games could include algorithms that detect toxic behaviors in the chatting text, for example, programming algorithms that detect when profanities are used; and algorithms that allow for more player control, for example, player ability to mute others, change settings, and opt-in settings, etc. (Vella et al. 2020).

The implications of the study findings are relevant for entertainment, and serious and educational games developers. Social capital should not be limited to entertainment games because its processes of information flow also support player learning (Kim et al. 2022). For example, serious and educational games could encourage more interest in learning by connecting players with their acquaintances or in-game friends. Moreover, the findings can be applied to other types of multiplayer social games to promote better player experience based on the understanding of gender roles, play motivations, and social capital, which can potentially lead to less player churn.

The study may also have implications for policymakers interested in social interventions to increase social capital benefits in socially distant online interactions. For example, policymakers can take pandemic precautions while still encouraging online social interactions that build social capital. Through these interventions, policymakers may be prioritizing marginalized groups and contexts (e.g., science, technology, engineering, and mathematics

fields; entrepreneurship) where women are underrepresented (Ratan, Shen and Williams 2020; Kim 2014).

Limitations and future directions

As with any study, this one has limitations. The most obvious ones relate to generalizability. This particular game may have attracted certain kinds of male and female players, or it may not have same effects on all players. As with most media research, we cannot be certain about self-selection biases unless we assert the kinds of control that are not possible in true field research like this. Next, only socializer behavior, but not escapist or smarty-pants behavior was available for analysis. Having behavioral data in those domains could further strengthen the study's findings. Moreover, note that this study did not have available data that could further measure social capital, such as the exchange of messages directed at specific friends, the strength of relationships, and preestablished relationships among players. Future research could include these aspects as variables to elicit more rigorous results. Lastly, although the study's survey data is cross-sectional, employing longitudinal analytical approaches with the behavioral data could further help to explain the processes from gameplay motivations to social capital and why there are gender differences. Specifically, one could examine how gaining in-game friends over a long term affects bridging and bonding social capital among male or female players. As another suggestion, one could examine how the rate of messages sent affects bridging and bonding social capital for male or female players.

Another limitation concerns the study's reliance on Likert-type measures. These measures relied on calculating mean scores from Likert-type items that are more ordinal in nature, in other words, the difference between the response options is not equidistant (Sullivan and Artino 2013; Boone and Boone 2012; Pimentel 2010). This is particularly concerning for the

measures where the means hovered around 3 (i.e., ‘neither agree or disagree’), which occurred with smarty-pants motivation, socializer motivation, and bonding social capital. To help address this limitation, future studies could provide items that avoid the ‘neither agree or disagree’ response by allowing non-response instead and could replicate this study with more continuous measures (Sullivan & Artino 2013).

When examining social capital, the literature tends to focus on the benefits. Social capital can also be studied from the perspective of its risks (Adler and Kwon 2002; Portes 1998). Future studies could examine social tensions and conflicts in games. Social tensions in games, particularly harassment, are a serious concern for female players (Cote 2020; Fox and Tang, 2017). One follow-up study could be how gameplay motivations, especially motivations to compete, relate to how social tensions occur and are managed in games popular among female players. Finding such a relationship would be helpful for game companies to prevent social tensions before they occur.

Although this study differed from some of the previous research by focusing on gender differences, it still has limitations in conceptualizing gender, as it took a primarily binary and simplified approach. To test H1 and H5, male players were compared against female players. This binary conceptualization of gender is also due to currently there not been extensive research on gender roles other than males and females. To examine H4, female players were combined with other players of marginalized genders. While this study is not the first to combine women with adults of other marginalized genders, there are critical differences between these groups (Holcomb et al., 2022).

However, gender is much more complex, more operating like spectra and in more than two categories (Ratan et al. 2022; Ratan, Shen and Williams 2020; Huh and Williams 2010).

Future studies could examine gender in a more nuanced way, perhaps through bimodal analysis, qualitative, or mixed methods approaches.

Finally, this study concerns one game. Although it examined motivations, behaviors, and social capital variables that can be generalized to other games, it would be important to attempt to replicate these findings in other games, particularly other games popular among female players, and with careful control over the affordances that may differ between titles. *Sky*, for example, features a high degree of cooperation and androgynous avatars.

Another game may not have high cooperation and may have more stereotypical or even sexualized avatars. These differences could both have different effects as well as attract different players. Such games would include pink games targeted at female players (e.g., *Kim Kardashian: Hollywood*) and casual games with predominantly female players (e.g., *Candy Crush Saga*).

Conclusion

This study investigated the association between social-relational gameplay motivations and behaviors, and social capital in a multiplayer game popular among female players. This study found that socializing behaviors and social capital were higher for female players than male ones. Additionally, it provides insight on motivations (i.e., escapist, smarty-pants, and socializer) that can predict social capital. Most importantly, the results offer robust evidence based on survey and behavioral data that multiplayer games can be, particularly for female players, gregarious and rewarding social spaces. This evidence can be useful for game researchers, game developers, and policymakers in guiding them in understanding how gender differences can influence their communities of interest and effectively foster social capital.

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