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Long-Term Effects of Social Mechanics on Young Mobile Social Game Players in Japan[1]

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ABSTRACT

The social mechanics of mobile online games, namely, connections to social networking services（SNSs）and cooperative and competitive play, can influence players' motivations, real social interactions, and tendency to engage in excessive or pathological play. In this study, we assessed the long-term effects of social mechanics by integrating a systematic analysis of mobile games and a longitudinal study conducted in Japan. The results demonstrated that exposure to the social mechanics of real SNS interactions later increased the problem-solving social skills of female game players. The same effect was not found in male players; instead, increasing the amount of one's monthly expenditures increased conversational social skills, pathological gaming scores, and weekly game exposure. This study shows that the effects of social mechanics can be both positive and negative and differ by gender and possibly also by playing style.

KEYWORDS: mobile games, social mechanics, social skills, pathological gaming, Japan

Social Mechanics in Mobile Games: Introduction

In a puzzle-based game played on SNSs, players often receive gift items from real friends, which induces them to play an additional game. In SNS games, players can see their real friends playing the same game and track their scores and rankings. These social mechanics can motivate players to continue playing a game in the hope of scoring higher than their friends. The experience can motivate players to initiate conversations with their friends, thus providing more opportunities for real social interactions.

In a second puzzle-based game, players occasionally receive text messages from unfamiliar players asking them to designate a specific character as “a leader” so that the unfamiliar players can engage in their own adventures with the character. When players possess a strong character with special skills, they often receive many friend requests, and the players whose characters are used in others' quests also receive points as a reward. These minimally demanding social interactions can provide players with instant gratification and motivate them to continue playing a game and spending money to obtain stronger characters.

In a third mobile game, players often visit their friends' rooms or areas because they can receive points as a reward and obtain additional points when writing text messages. One of the authors often exchanges text messages with unfamiliar players, from simple greetings (e. g., “hello, it is hot today”) to more personal messages (e. g., “my husband is out today and I am glad to have more free time”). These messages can be trivial, but visiting and exchanging experiences with online friends, or within a group, can motivate players to continue playing a game. They begin to engage in more online and real social interactions involving emotional connections and begin to spend more time playing when the number of friends they have in the game increases.

As described in the above three cases, the social mechanics of mobile social games can affect players' motivations, real and online social interactions, time spent playing games, number of in-game purchases, and pathological game play patterns. In this study, we assessed the long-term effects of social mechanics by integrating game analysis and a longitudinal study in Japan.

Theoretical and Social Backgrounds of the Study

Ersatz Social Engagement Theory

The ersatz social engagement theory proposed by Green and Clark (2015) classifies social activities as ersatz (“substitute”) and “real.” Real social activities involve less mediation, a higher number of sensory channels, and a stronger degree of emotional connection than ersatz social activities (Green & Clark, 2015). According to this theory, online social interactions involve fewer risks, and it is easier to find others who have similar interests and obtain instant gratification than in face-to-face communication. However, online social interactions are also more likely to have negative effects than face-to-face communication. On the other hand, through real social interactions, people can learn social skills and gain more positive effects. Green and Clark (2015) also noted that some online interactions can involve stronger emotional connections and have similar positive effects. In mobile social games, some social interactions may be classified as ersatz and may have negative consequences. However, some online social interactions with real friends via SNS may help users establish real friendships and learn social skills, as mentioned in the first case. As indicators of real friendship, Green and Clark (2015) mentioned the development of social skills and well-being. On the other hand, ersatz social interactions within mobile online games can lead to negative outcomes, such as the development of pathological gaming patterns.

In Japan, several SNS-based gaming platforms for mobile phones have been developed. For example, Mobage (formerly called Mobage Town and owned by DeNA) and GREE became popular in 2006 and 2007, before the emergence of the smartphone game app market. Currently, LINE also functions as a platform for social games. LINE is the most popular free messaging app, like WhatsApp, in Japan, and it also functions as an SNS platform for sharing mobile games, music, and comics.

Studies of Pathological Gaming and Gambling

A pathological gaming study is another piece of the theoretical background of this study. Griffiths and Kuss (2015) argued that a combination of individual, situational, and structural characteristics determines whether and to what extent individuals engage in various online activities and emphasized the need to distinguish excessive engagement from pathological gaming. Several scales have been developed to measure the severity of pathological gaming patterns (e. g., Gentile, 2009; Lemmens, Valkenburg, & Peter, 2009). Among them, Lemmens et al. (2009) differentiated addicted from non-addicted game players using seven questions (concerning salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems). In their study, game addiction scores were positively correlated with depression and time spent on games and negatively correlated with social competence. In 2018, the World Health Organization (WHO) adopted gaming disorder as a new disease in the 11th revision of the International Classification of Diseases (ICD-11; WHO, 2018). Although some argue that diagnosis facilitates treatment and prevention from clinical and public health standpoints (e. g., Rumpf et al., 2018), other scholars claim that there is a lack of empirical research and consensus and are afraid of the premature application of this definition to the diagnosis and treatment of false-positive cases (Aarseth et al., 2017). Therefore, an empirical study to determine which individual, situational, and structural characteristics can cause a person to engage in pathological gaming patterns is required.

Griffiths and Kuss (2015) reviewed studies on online gambling disorders. Several clinical measures have been used for the diagnosis of gambling disorders. For example, the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) includes gambling disorders (American Psychiatric Association, 2013). In Japan, lucrative lotteries, called *gacha,* have become popular and have begun to cause social problems (e. g., De Vere, 2012), and gaming researchers have begun to focus on the pathological use of time and money in games. Unlike in gambling, players in games are unable to obtain real money within the game' s context as a reward, but the perception of obtaining rare and special items in *gacha,* such as strong characters or weapons, can be like winning a sizable amount of money in gambling. Players can seek the sensation of a big win by paying increasingly large amounts of money to play a game. Although this article does not focus on the effects of these monetary features per se, pathological gaming scales must include not only problems related to the inappropriate use of time but also that of money. The most serious concern regarding excessive expenditures of money in games is related to the protection of minors.

Differential Susceptibility to Media Effects Model (DSMM)

The third component of the theoretical background of this study is the differential susceptibility to media effects model (DSMM). The DSMM suggests that children and adolescents are more vulnerable to the effects of media than adults (e. g., Valkenburg & Peter, 2013). This phenomenon is reflected in game play; some studies have suggested adolescent game players are more likely to become dependent on or addicted to games than adult players (e. g., Griffiths, Davies, & Chappell, 2004; Hirai & Kasai, 2006). Although several studies have been focused on children and adolescents (e. g., Gentile, 2009; Lemmens et al., 2009), few empirical studies have included comparisons of adolescents and young adults regarding mobile social game playing. If adolescents are more likely to become addicted to making in-game purchases or using social features, preventive measures to protect minors can be justified.

Studies of Social Mechanics

This study is based on studies of social mechanics in games. Some researchers have studied sociability in multiplayer and social games (e. g., Cole & Griffiths, 2007; Consalvo, 2011; Paavilainen, Koskinen, Korhonen, & Alha, 2015; Stenros, Paavilainen, & Mäyrä, 2011). For example, Stenros et al. (2011) emphasized the importance of distinguishing between the sociability of players and social play in a game. The former entails the social interactions or social contexts surrounding game play, whereas the latter involves the social mechanics or the rules of the game, which is the focus of this study. Stenros et al. (2011) divided social play into five relational styles: (1) single-player, (2) two-player, (3) multiplayer, (4) massive multiplayer, and (5) massive single-player. Massive single-player games, which belong to the fifth category, can be played by many people simultaneously but are often played as single-player games. Most mobile social games belong to this category, embodying a curious combination of massive multiplayer and single-player game types (Stenros et al., 2011). Competition, cooperation, and communication are possible; however, social play is controlled. Furthermore, this game genre often features gifting, helping, and sharing. Consalvo (2011) analyzed the social mechanics of 70 social games. In her study, social interactions were divided into five areas: the presence of a friend bar, gifting, visiting, challenge or competition, and communication. In the present study, the presence of a friend bar and gifting occurred through connections to SNSs; visiting and communication were expressions of cooperation, and challenge or competition represented the competitive aspects of play.

Connections to SNSs. In mobile social games, players have easy access to other players through SNSs or social apps. In some game apps, it is recommended that players connect to social apps such as Twitter and LINE. In addition, players may be encouraged to write a review, tweet, or comment. These activities often involve a reward (e. g., receiving points). In some SNS games, players are urged to send gifts to SNS friends who are not involved in the game. These activities are intended to familiarize other people with games and attract new players. In addition, as the ersatz social engagement theory suggests, these connections to SNSs can provide game players with opportunities to engage in real social interactions.

Competition and Cooperation. Competition and cooperation are also important aspects of social play. Competition is often the focus of game play as players try to win a race, beat their opponents, or achieve higher scores than the other players. The factors that motivate players to compete can include enjoyment, the possibility of increasing one' s self-esteem or self-satisfaction by achieving a higher ranking, and rewards (Paavilainen et al., 2015). In social games, players can receive additional points as rewards for winning battles or obtaining rare items or cards for completing an event if they score among the top 100 or 1,000 players. Even outside the game, players may receive the social reward of admiration from real or online friends when they achieve high scores or complete difficult stages. On the other hand, players may lose items or money in an unsuccessful battle, thereby experiencing a type of punishment as a consequence.

Compared to competition, cooperative play has been mostly limited to video games. In some games, two players can progress through stages cooperatively and act as a team. In multiplayer games, players can also become members of groups, such as guilds, and can assist or visit other members of their groups. In massive multiplayer games, communication and cooperation are critical (Stenros et al., 2011). Players are socially active (e. g., Cole & Griffiths, 2007), and social skills are important for success in group interactions. In a longitudinal study of male technical school students in Japan, Suzuki et al. (2003) found that playing “network games,” including massive multiplayer games, was positively correlated with the development of their social skills, especially problem-solving skills, two months later. This result suggests that some online group or individual interactions can lead to real social interactions, friendship, and the learning of social skills, as suggested by the ersatz social engagement theory (Green & Clark, 2015). In social games, even if communication is limited within the game, communication outside the game may be extended through real or online environments, such as SNSs.

Engaging in social interactions with real or online friends can have both positive and negative consequences. Among the positive effects, players can increase their social skills (e. g., Suzuki et al., 2003). In this process, the reward system and observation of other players may also contribute to the learning of desirable behaviors (Bandura, 2001). For example, players can receive reward points for sending greetings or text messages, which can motivate players to become more sociable. The gratitude received from other players, both in real life and online, can also serve as a reward. In addition, unlike in competitive play, punishments are rarely found in social games that involve cooperative play. Players may acquire social skills by exchanging greetings and text messages. In contrast, such social interactions might motivate players to play games more frequently or for longer periods than they would otherwise (e. g., visiting the rooms of all their friends daily and leaving text messages). Concern for these social interactions may lead some individuals to become addicted to gaming or cause them to spend large amounts of time and money on games.

To fulfill the need for empirical findings regarding the long-term effects of mobile games, we developed three major research questions based on the theoretical and social background of the existing studies.

RQ1: What kinds of social mechanics have long-term *positive* effects on young game players? In other words, what kinds of social mechanics, among connections to SNSs, cooperation, competition, social interactions with real friends, and group interactions are positively correlated with the later development of social skills, even after controlling for the social skills possessed earlier?

RQ2: What kinds of social mechanics have long-term *negative* effects on young players? In other words, what kinds of social mechanics, among connections to SNSs, cooperation, competition, social interactions with real friends, and group interactions are correlated with the later development of pathological gaming patterns, weekly game exposure, and high monthly expenditures, even after controlling for earlier pathological gaming patterns, weekly game exposure, and high monthly expenditures?

RQ3: Is there any difference in age and gender regarding vulnerability to the long-term positive and negative effects of the social mechanics in games?

Method

A Longitudinal Study and Sampling of Popular Games

A total of 2,660 teenagers and young adults, aged 15-29, who played mobile social games participated in the first survey through a mobile Internet research company in November 2013. Since one of the purposes of this study included exploring the effects of the monetary features of game mechanics on pathological gaming patterns, the authors attempted to include more players using in-game purchases in social games. Originally, 570 nonpaying player (NPP) were assigned to both teenagers and young adults. The number of paying players (PPs), 1,140, was double the non-paying amount expected to be sampled from both teenagers and young adults, and the number of PP teenagers was limited to 380, the expected maximum number. Six months later, in May 2014, the second questionnaire was sent to 2,660 participants. As shown in Table 1, a total of 948 players participated in both surveys. There were 281 teenagers (30%) and 667 young adults (70%) in the sample.

Table 1: Participants for Both the Wave 1 and 2 Surveys (Quota Sampling Method)

	Nonpaying players (NPPs)	Paying players (PPs)	Total
Teenagers (age 15-19)	168 (60%)	113 (40%)	281 (100%)
Young adults (age 20-29)	211 (32%)	456 (68%)	667 (100%)
Total	379 (40%)	569 (60%)	948 (100%)

* We attempted to include double the number of payment players (PPs) for both teenagers and young adults, but the number of PP teenagers was limited.

** This table shows the categories of groups in Wave 1.

Measures. The participants were asked whether they had played social games (games and apps in which the players could cooperate or compete with other players) by using mobile devices, such as cell phones, smartphones, or mobile terminals (except for game-only consoles) within the previous month. The answers were coded as either “yes” or “no.” The participants who responded “yes” to the above question and were aged 15-29 were asked to respond to the subsequent questionnaires.

Sampling of Popular Games. The participants were asked to list up to three games that they had played frequently within the last month. Two games were tied for the 30th most-popular game; thus, a total of 31 games representing the most popular social games were analyzed.

Weekly Game Exposure. The participants were also asked how many days a week they played social games. The options given ranged from “one day per week’ (1 pt.) to “every day of the week” (7 pts.). They were also asked how many hours a day they played social games; they were given a choice of seven items, ranging from “under 30 minutes” (.25 pts.), to “over 30 minutes but under 1 hour” (0.75 pts.), to “over 1 hour but under 2 hours” (1.5 pts.), and to “over 5 hours” (5 pts.). Accordingly, one’ s weekly exposure to social games was measured as the product of daily exposure multiplied by the number of days of play in a week (.25-35.00).

Monthly Expenditures. Regarding monthly expenditures, PPs were asked how much money they spent on playing social games (e. g., in-game purchases, paid *gacha*) in a month; they had a choice of seven items ranging from “under 1,000 yen” (500), to “1,000 to 2,000 yen” (1,500), to “2,000 to 4,000 yen" (3,000), and to "10,000 yen or more" (10,000). The NPPs were coded as "0" for this monthly expenditure.

Pathological Gaming. To measure the severity of participants' pathological gaming patterns, the game addiction scale for adolescents (Lemmens et al., 2009) was modified for application to social games in a Japanese setting. The original game addiction scale is a seven-item scale, and we added three items about monetary problems, as shown in Appendix I. The participants were asked to choose the most appropriate number according to their social game experiences within the previous six months. The options ranged from "strongly disagree" (1 pt.) to "strongly agree" (6 pts.). Three questions about money troubles were asked only to the PPs: "strongly disagree" (1 pt.) was assigned to all the NPPs. The reliability coefficients were .85 for both Waves 1 and 2 (W1 and W2). To test the validity of this measure, we also measured depression (10 items, SRQ-DII15, Kuraoka et al., 2007; alfas=.91 for both W1 and W2), life satisfaction (five items, Ohno, 1984; alfas=.86 for both W1 and W2), and loneliness (five items, Moroi, 1996; alfas=.80 and 79 for W1 and W2). The pathological gaming scores were positively correlated with depression (rs=.33 for both W1 and W2, p<.001) and negatively correlated with life satisfaction (rs=-.11 and -14 for W1 and W2, ps<.001). However, pathological gaming scores were not significantly correlated with loneliness, and their correlations were positive among the female participants (rs=.10 and .13, ps<.05) but negative among the male participants (r=-.14 only for W2, p<.05).

Social Skills. Social skills were measured using 13 items from Kikuchi' s Social Skills Scale (Kikuchi, 2007; Suzuki et al., 2004). Among the 13 items, five were used to measure conversation skills (alfas=.89 and 90 for W1 and W2; e. g., I can start a conversation with a new person), and eight were related to problem-solving skills (alfas=.90 and 91 for W1 and W2; e. g., When I have trouble with others, I can deal with the situation).

A Systematic Analysis of the Social Mechanics of Mobile Social Games[2]

The social mechanics of games were analyzed using content analysis. The content of mobile social games, however, is usually based on online services and can change depending on the amount of time a person has spent playing the game and the choices made by players. In addition, the mechanics of online services are subject to change by game publishers and developers. As the first step, in this study, we analyzed these interactive and online features, including game mechanics, by assigning multiple coders to play the games for multiple days.

Coding Process. Eleven coders with experience playing social games were recruited in February and March 2014. First, we held training sessions for all the coders and explained the game-coding procedures, operational definitions, and coding categories. After the training sessions, we randomly assigned three coders to each of the 31 games. Since the coders needed to understand the mechanisms of the games, they played the social games while recording the play screens for 30 minutes per day over three days. To activate the social features, new accounts on various platforms (e. g., GREE, Mobage, LINE, Twitter, and Google+) were created for all four mobile terminals (two Android OSs and two iPhones). All four accounts were registered as friends or followers. Each social game was used as the unit of analysis.

Operational Definition and Coding Categories. Social mechanics were operationally defined as functions that connected or introduced other players through SNSs or social apps or enabled cooperation or competition with other players. We first divided the social mechanics into three categories: connections to SNSs, cooperation, and competition; later, social mechanics with real friends (six items), and group interactions (six items) were added.

Connections to SNSs. Connections to SNSs were assessed by tracking requests for connections or comments made on SNSs and/or social apps. Moreover, the connections to eight SNSs were categorized. In each SNS, the presence of recommendations for the following three categories was also assessed: (1) introducing friends to the game, (2) commenting about the game, including Facebook "likes" and comments on LINE timelines; and (3) sending gifts to friends.

Competition. Competition was assessed by tracking the presence or absence of interactions in the following five categories: (1) battles with other players; (2) battles with other groups; (3) competition with other players for high scores; (4) competition with other groups for high scores; and (5) competition with real friends for high scores (e. g., via LINE or Facebook) . For (1)-(2) , (a) whether players could gain or lose items as a result of battles and (b) whether the point rankings were evident were also assessed.

Cooperation. Cooperation was assessed by tracking the presence or absence of activities in the following eight categories: (1) going on an adventure or fighting with a strong enemy cooperatively with other players; (2) cooperating with another player to engage in battles with other players; (3) sending greetings to other players; (4) writing text messages to other players; (5) sending friend requests to other players; (6) sending gifts to other players; (7) exchanging and buying and selling items; and (8) engaging in battles with a strong enemy as a group or team or competing with other groups or teams for high scores. In addition, we assessed the presence or absence of rewards for each category of cooperation.

Reliability of the Coding System. For all 31 games, the reliability coefficients of the six results (two coding sheets × three coders) were calculated using the multiple coder version of Scott' s pi (Scott, 1955; Wilson et al., 1997) for 26 categories. Nearly all the median reliability coefficients were above .86. For one variable, "competition with other players for points," the median coefficient was below .80 (it was .56). Because the feature was often found only during limited-time events or by certain players, all the categories were considered to have acceptable validity for conducting a systematic analysis of online services and interactive media.

Degree of Exposure to Social Mechanics: An Integration of the Analysis and a Longitudinal Study

For each survey participant, the degree of exposure to each of the social mechanics was calculated based on the selection of the games the participants played and the results of the systematic analysis. For example, when a participant listed three games and two had a specific cooperative feature while the third did not, the participant' s exposure to the cooperative feature was coded as approximately .67 (2/3). When any game a participant listed was not ranked in the top 31 games, the participant' s score was calculated as zero. These exposure scores ranged from 0 to 1. After the exposure scores for all the social mechanics were calculated, they were combined. For the variable representing connections to SNSs, an average of 11 measures was calculated (alpha=.81). Similarly, exposure to cooperative mechanics (8 items, alpha=.81), cooperative mechanics with rewards (5 items, alpha=.72), and competitive mechanics (8 items, alpha=.73, excluding competition with real friends) were calculated. In addition, exposure to social mechanics with real friends (6 items, alpha=.81; connections to Facebook and LINE, introducing friends to games, commenting on games, sending gifts to friends via an SNS, and competing with real friends) and exposure to group interactions (6 items, alpha=.90; three measures of battles with other groups, which included, in general, gains or losses and score rankings; scored competitions with other groups, and group cooperation in general and with rewards) were combined, and an additional three measures of exposure to cooperative mechanics with rewards were included in the analysis separately.

Results

Descriptive Statistics and Demographic Differences

Demographics. The average age of the players was 22.98 (SD=4.11) for W1. There were more female (n=646, 68%) than male participants (n=302, 32%).

Social Skills. The average scores for both social skills, conversation skills and problem-solving abilities, were 3.27 (SD=1.45) and 3.78 (SD=1.22) for W1 and 3.22 (SD=1.46) and 3.72 (SD=1.25) for W2. The teenagers had higher scores than the young adults for conversation in W1 (t (946)=2.08, p<.05) and problem-solving skills in W1 and W2 (W1: t (946)=3.16, p<.01; W2: t (946)=2.11, p<.05).

Pathological Gaming. The average scores for pathological gaming were 23.07 (SD=9.30) for W1 and 22.13 (SD=8.60) for W2. The young adults' scores were higher than those of the teenagers (W2: t (946)=2.20, p<.05), and the scores of the male participants were higher than those of the female participants for W2 only (W2: t (527.9)=2.78, p<.01).

Weekly Game Exposure. The average number of weekly playing hours was 12.69 (SD=10.26) for W1 and 12.04 hours for W2 (SD=9.93). The young adults played longer than the teenagers (W1: t (589.0)=3.59, p<.001; W2: t (594.8)=3.14, p<.01).

Monthly Expenditures. The average monthly expenditures for PPs (n=569) were 2,225 yen (SD=2,714, W1; nearly $22 USD) and 2,852 yen (SD=3,082, W2; nearly $28 USD). The young adults used more money for in-game purchases than the teenagers (W1: t (720.1)=5.51, p<.001; W2: t (602.4) =2.90, p<.01).

Correlational Analyses

As shown in Table 2, social skills, conversational abilities (SSC) and problem-solving skills (SSPS) were positively correlated in W1 (r=.72, p<.001). Pathological gaming scores were positively correlated with weekly game exposure and monthly expenditures (rs=.37, .32, ps<.001) in W1. Unlike the results of Lemmens et al. (2009), both types of social skills were also positively correlated with pathological gaming scores among the male participants (rs =.18, 17, ps<. 01).

Table 2: Correlations among Social Skills, Pathological Gaming Patterns, Weekly Game Exposure, and Monthly Expenditures in W1

	SSC	SSPS	PG	WGE	ME
SSC	1.00	.72 ***	.07 *	-.01	.01
SSPS		1.00	.04	.01	.01
PG			1.00	.37 ***	.32 ***
WGE				1.00	.37 ***
ME					1.00

Note: SSC=Social skills (conversation), SSPS=Social skills (problem-solving), PG=Pathological gaming, WGE=Weekly game exposure, ME=Monthly expenditures. N=948. *** p<.001, ** p<.01, * p<.05

In Table 3, the correlations between social mechanics and psychological and game-related variables (e. g., social skills and pathological gaming patterns) in W1 are shown. Neither type of social skills was correlated with any social mechanics in W1, but exposure to real interaction in SNSs was negatively correlated with pathological gaming patterns (r=-.09, p<.01). Instead, group interaction, cooperation in general and with rewards, and competition were positively correlated with weekly game exposure (rs=.17, .11, .14, .13, ps<.01), and monthly expenditures (rs=.11, .08, .09, .12, ps<.05).

Table 3: Correlations among the Social Mechanics of Games, Social Skills, Pathological Gaming Patterns, Weekly Game Exposure, and Monthly Expenditures in W1

	SSC	SSPS	PG	WGE	ME
SNS connections	.02	.02	-.05	.02	-.03
Competition	.01	.03	.00	.13 **	.12 **
Cooperation	.02	.04	.05	.11 **	.08 *
Cooperation with R	-.01	.02	.01	.14 **	.09 **
Real interaction	.03	.02	-.09 **	-.05	-.08 *
Group interaction	.02	.04	.02	.17 **	.11 **
Sending gifts w R	.04	.01	.01	-.02	-.02
Cooperative adventure w R	.05	.03	.06 *	-.01	.02
Cooperative battle w R	-.02	-.03	.00	.01	-.01

Note: SSC=Social skills (conversation), SSPS=Social skills (problem-solving), PG=Pathological Gaming, WGE=Weekly game exposure, ME=Monthly expenditures, w R= with Reward. N=948. *** p<.001, ** p<.01, * p<.05

Regressional Analyses and Path Analyses

Multiple regression analyses (stepwise method) were used to explore the effects of the social mechanics of mobile social games. Earlier corresponding measures (W1), age (0=teenager, 1=young adult), gender (0=female, 1=male) and all the social mechanics in mobile social games that each participant exposed, which are listed in Table 3, were included as independent variables. First, we excluded real and group interactions because some measures overlapped in more than one independent variable, and we added the real and group interactions later to test which were stronger predictors. In Table 5, the final model for all the participants and for the male and female participants is shown. All the earlier corresponding variables (W1) were positively correlated with later measures of social skills, pathological gaming scores, weekly game exposure, and monthly expenditures (W2; betas=.55-.73, ps<.001).

For RQ1, real interactions were positively correlated with the later development of social skills (problem solving) among the female participants (beta=.08, p<.05) and among young adults (beta=.07, p<.05). Figure 1 also shows that real interactions remained a significantly positive predictor of increased social skills in the path analysis of the female participants. For the male participants, a predictor that was positively correlated with social skills (conversation) was monthly expenditures (beta=.11, p<.05). Figure 2 also shows that monthly expenditures were a significant predictor of increased social skills (conversation) among the male participants in the path analysis. In addition, among the teenagers, monthly expenditures were positively correlated and cooperative battles with rewards were negatively correlated with the later development of problem-solving skills (betas=.11, -11, ps<.05).

Table 4: Regressional Analyses (Stepwise)

Regressional Analyses (Stepwise)			
	All	Males	Females
Dependent variable: SSC (W2)			
Independent variables (W1)			
SSC	.69 ***	.64 ***	.72 ***
ME	.05 *	.11 *	
Adjusted R^2	.47 ***	.40 ***	.51 ***
Dependent variable: SSPS (W2)			
Independent variables (W1)			
SSPS	.62 ***	.58 ***	.64 ***
Real interaction			.08 *
Adjusted R^2	.39 ***	.34 ***	.42 ***
Dependent variable: PG (W2)			
Independent variables (W1)			
GA	.62 ***	.56 ***	.66 ***
ME	.06 *	.17 ***	
Gender	.06 *		
Age	.06 *		
Sending gifts w R		-.11 *	
Adjusted R^2	.42 ***	.40 ***	.43 ***
Dependent variable: WGE (W2)			
Independent variables (W1)			
WGE	.57 ***	.66 ***	.55 ***
ME	.09 **	.13 **	
Cooperation	.07 *		.11 **
Cooperative battles w R	-.05 *		-.07 *
Adjusted R^2	.38 ***	.52 ***	.33 ***
Dependent variable: MP (W2)			
Independent variables (W1)			
ME	.65 ***	.73 ***	.61 ***
Competition	.07 **		.18 ***
Cooperation			-.10 *
Gender	.07 **		
Adjusted R^2	.46 ***	.53 ***	.40 ***

Note. SSC=Social skills (conversation), and SSPS=Social skills (problem-solving), PG=Pathological gaming, WGE=Weekly game exposure, ME=Monthly expenditures, w R= with Reward. N=948.
*** p<.001, ** p<.01, * p<.05

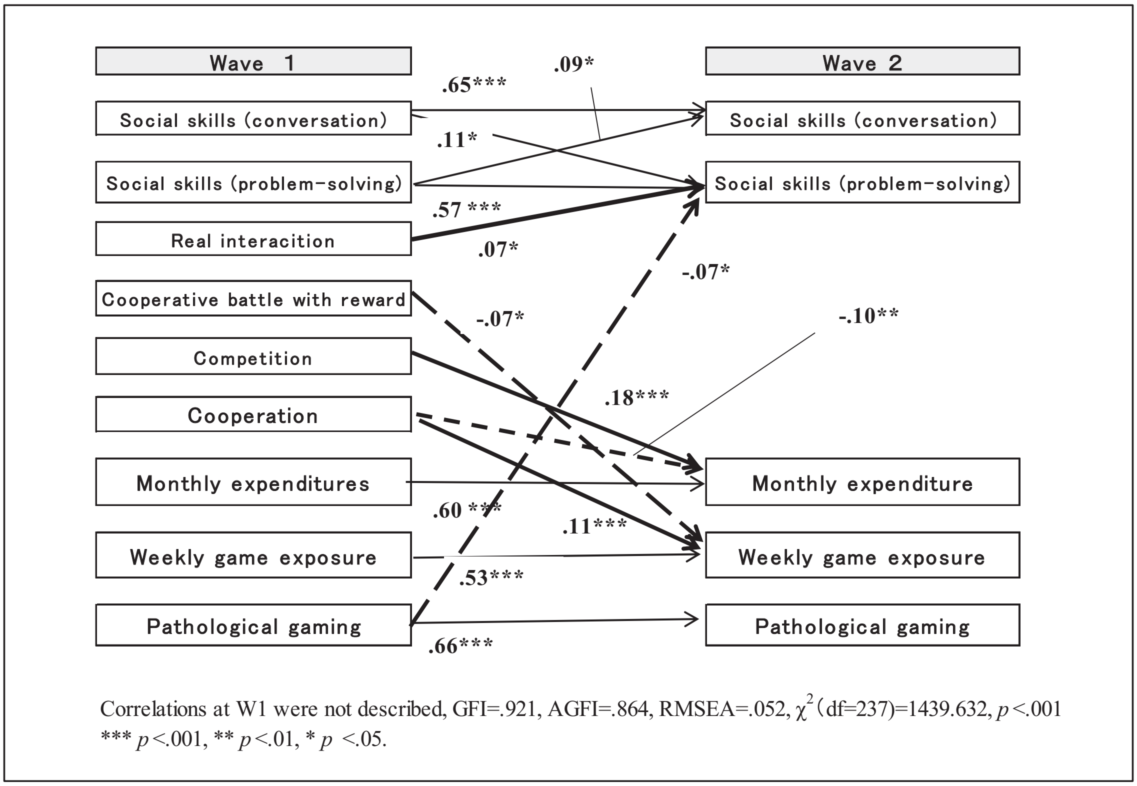

Figure 1. Path Analysis of Female Players

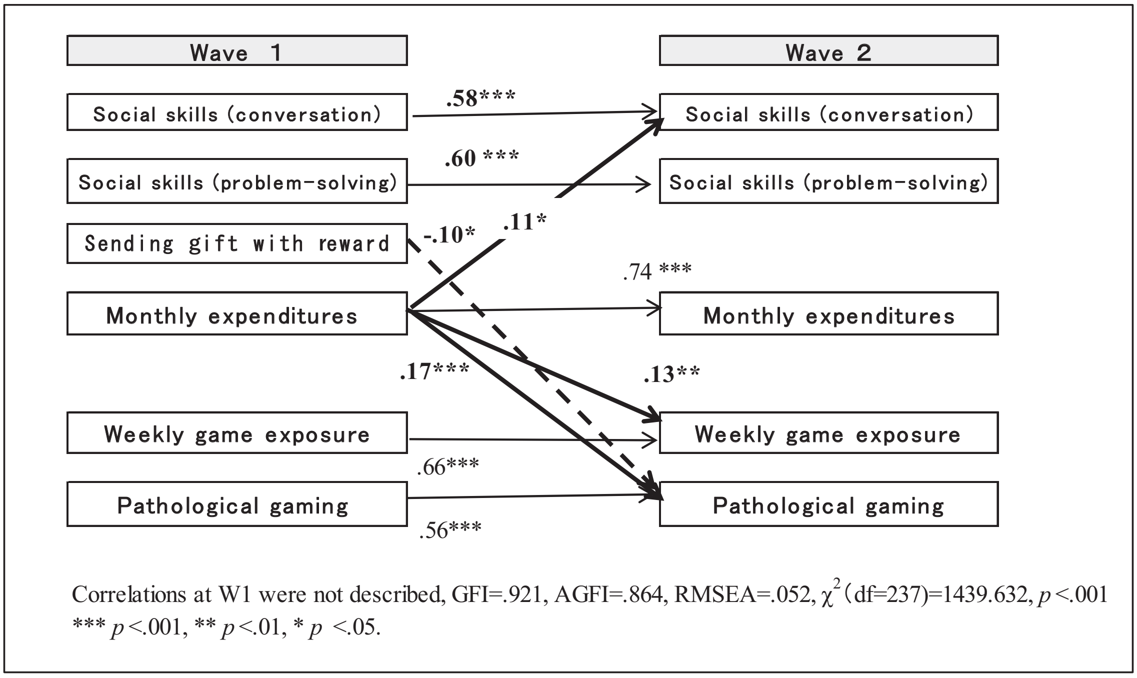

Figure 2. Path Analysis of Male Players

For RQ2, the male players with higher monthly expenditures were more likely to have higher pathological gaming scores and play for longer periods six months later (betas=.17, .12, *p*s<.01), and the teenagers who were exposed to group interactions were more likely to have higher pathological gaming scores six months later (beta=.09, p<.05). Exposure to gifts with rewards was negatively correlated with pathological gaming scores among the male participants (beta = -.11, p<.05). Similar effects were found in the path analysis of the male participants. Gender and age were positively correlated with later pathological gaming scores (betas=.06, *p*s<.05), which suggests that the male participants and young adults were especially likely to have pathological gaming styes six months later, even after controlling for their earlier pathological gaming scores.

Some social mechanics were also related to the excessive use of time and money for gaming six months later. For example, monthly expenditures were positively correlated with later weekly exposure among the male participants and among both the teenagers and young adults (betas=.12, 11, .08, *p*s<.05), even after controlling for their previous weekly game exposure. Among the female participants and young adults, competition was positively correlated with monthly expenditures (betas =.18, .07, *p*s<.05). Cooperation was positively correlated with later weekly exposure and negatively correlated with later monthly expenditures among the female participants (betas=.11, -.10, *p*s<.05).

Discussion

For RQ1, the results show that the female game players who were exposed to social mechanics with real interactions were more likely to improve their social skills, which is consistent with the ersatz social engagement theory and the findings of Suzuki et al. (2004). Between the first and second surveys, some puzzle games on the LINE platform were popular, especially among the female players. Some players might talk about games in online or real settings, and those experiences could improve their social skills, as mentioned previously. More notably, the male players who spent a lot of money on in-game purchases were more likely to improve their social skills. As shown in the second case, some players might spend more money on *gacha* or lotteries to obtain strong characters. If players have strong characters, which can be used to help many other players, and if they receive friend requests and invitations to talk with other players in online or real settings, they will be more likely to feel confident in their social and conversational skills.

For RQ2, however, the same variable, monthly expenditures, was also a predictor of the later development of pathological gaming patterns. Unlike in the findings of Lemmens et al. (2009), pathological gaming scores were positively correlated with social skills, especially among the male participants in this study, and some of the stereotypical images of gaming addicts with poor social skills may not reflect reality among male social game players in Japan.

For RQ3, gender- and age-related differences were found in this study. For example, whereas cooperative mechanics increased the number of later playing hours among the female players, they decreased monthly expenditures later. The results indicate that, even with an increase in a player' s number of friends, some players might feel obligated to spend more time in visiting rooms or the places occupied by their friends, or they may try to be responsive to other players' requests, as shown in the third case. Some games also ask players to pay money or cooperate with others for successful game play, and it is rational to suppose that players who choose to cooperate with others might not spend much money but play for a longer time. In contrast, competition increased monthly expenditures only among the female players. Since male players generally spend more money than female players, competitive mechanics might not affect the former. Although Griffiths and Kuss (2015) emphasized the importance of distinguishing mere excessive engagement from pathological gaming, some social mechanics, such as cooperation and competition, can be considered risk factors for spending too much time and money on game play.

Regarding age-related differences, young adults were more likely to have higher pathological gaming scores than teenagers, which is inconsistent with the DSMM (Valkenburg & Peter, 2013). However, this study included more paid players among young adults, partly because teenagers generally do not tend to spend money on mobile games. In addition, exposure to group interactions increased pathological gaming scores only among the teenagers, suggesting that teenagers are more sensitive to some social mechanics.

This study has several limitations. Firstly, the results are based on content analysis, in which the coders participated in each game for a total of only three days. Some games require several weeks of play before players can gain friends, engage in in-team play within games, and attain a competitive ranking. Secondly, the results of the analyses are likely to have been influenced by the popularity of some social games and by the number of players who chose the games. Thirdly, game players tend to also be influenced by the mechanics of the other features of game play (e. g., monetary features, limited-time event features), their motivations for playing (e. g., achievements), the other social contexts of play (e. g., number of real or online friends playing), and social interactions via SNSs. This study did not measure social interactions via SNSs, and conducting further studies to compare social interactions within and outside games could help researchers understand their mechanics. Fourth, social skills were measured with self-reported data from questionnaires, with higher scores among teenagers than young adults. This implies that social interactions among some game players may be limited to peers or close friends.

Despite these limitations, this study is the first to empirically assess the long-term effects of the social mechanics of mobile social games. The results showed that some social mechanics involve a risk of encouraging pathological gaming patterns and increasing playing time and expenditures; however, they also increased the participants' opportunities to enhance their social skills. It is noteworthy that even casual and controlled social mechanics in mobile social games can help yield positive social effects among game players.

Appendix I: Modified Pathological Gaming Scale (10 items, including three money-related items)

(1) (Salience) I have been thinking about playing a social game all day long; (2) (Tolerance) I have spent increasing amounts of *time* on social games; (3) I have spent increasing amounts of *money* on social games; (4) (Mood modification) I have played social games to forget about daily life; (5) (Relapse) A friend or family member has unsuccessfully tried to reduce the *time* spent on playing social games; (6) A friend or family member has unsuccessfully tried to reduce the *money* spent on playing social games; (7) (Withdrawal) I have felt irritated when I was unable to play social games; (8) (Conflict) I have had a fight with a family member or friend over the *time* spent on playing social games; (9) I have had a fight with a family member or friend over the *money* spent on playing social games; (10) (Problems) I have neglected other important activities (study, work, sports, etc.) to play a social game.

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Footnotes

[1] Earlier versions of this study were first presented in Japanese at the Digital Games Research Association Japan 2016 summer conference at Tokyo Polytechnic University and were presented in English at the 67th annual conference of the International Communication Association in 2017.

[2] The content analysis section was published in an article by Shibuya, Teramoto, and Shoun (2017). Please see their work for the results and titles of all the analyzed games.

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