



Original Article

Association among social-networking service usage via smartphone, internet addiction, and psychological stress in Japanese physical therapy university students: a single-university cross-sectional study

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Abstract. [Purpose] This study aimed to examine the influence of social-networking service usage via smartphone on internet addiction and psychological stress in Japanese university students studying physical therapy. [Participants and Methods] This single-university cross-sectional study involved 247 physical therapy students in the second to fourth years (ages 19 to 22). By use of self-administered questionnaires, we collected information on daily time of smartphone usage, social-networking service usage via smartphone, and daily self-learning time outside of class hours. We assessed internet addiction and psychological stress using the Internet Addiction Test and Stress Response Scale-18, respectively. After excluding twelve participants, we analyzed the data collected for the other 235. [Results] Multiple regression analysis showed an association of the Internet Addiction Test score with gender and daily time of smartphone usage. “Surfing without any purpose”, which is one of the purposes of social-networking service usage, and the Internet Addiction Test score were associated with the Stress Response Scale-18 score. Other variables were not associated with the Internet Addiction Test or Stress Response Scale-18 scores. [Conclusion] Our results suggest that gender (males), longer time of smartphones usage, or using social-networking service usage passively cause internet addiction or psychological stress in Japanese physical therapy university students.

Key words: Social-networking service, Internet addiction, Psychological stress

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INTRODUCTION

Social networking service (SNS) through the internet has been used worldwide with the spread of smartphones and computers. There are various applications for SNS, which are uniquely distributed across Japan. A report which investigated 1,500 people aged 13–69 years by a Japanese administrative organization showed that the most popular SNS application was “LINE” (LINE Corp., Tokyo, Japan); the utilization ratio of which was 82.3%, followed by “Twitter” (37.3%; Twitter, Inc., San Francisco, CA, USA), “Instagram” (35.5%; Facebook, Inc., Menlo Park, CA, USA), and “Facebook” (32.8%; Facebook, Inc., Menlo Park, CA, USA)¹⁾. These applications are important tools not only to send and receive social information and news, but also to communicate with friends and families.

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Besides its advantages, SNS dependence has gradually become a serious and common problem due to the spread of smartphone usage. SNS dependence is caused by excessive smartphone usage and displays clinical characteristics of behavioral addiction, such as preoccupation and compulsive behavior²⁻⁴). Past studies have reported the spread of smartphone and SNS dependence in university students⁵⁻⁷). In addition, a study targeting 200 university students showed that Facebook addiction correlated positively with narcissism and negatively with self-esteem⁸).

The usage rates of smartphone in Japan are 90.8% in 13–19 years old and 99.0% in 20–29 years old¹). Most Japanese teenagers and young adults, including university students generally aged 18–22 years, use their smartphones throughout the day. Many Japanese university students may depend on smartphone and SNS, and feel compulsive in their sense of fellowship, although it is being used for contacting close friends⁹). The previous studies showed that internet addiction and psychological stress via smartphone and SNS have increased in non-medical Japanese university students^{10, 11}). However, little is known about the influence of SNS usage via smartphone on physical therapy university students, who have a long learning period for acquiring their physical therapy licenses. Therefore, we hypothesized that internet addiction and psychological stress would be increased by SNS usage via smartphone for them, owing to fear- and/or anxiety-behavior¹²). In this study, we examined the impact of SNS usage via smartphone on internet addiction and psychological stress in Japanese physical therapy university students.

PARTICIPANTS AND METHODS

A total of 247 physical therapy students in the second, third, and fourth years (age, 19–22 years) who entered a single university in 2015–2017 volunteered for this study in April–May 2018. All of them had smartphones. Individuals who had diseases which affected their physical activity performance or answering of questionnaires, such as motor dysfunction or cognitive impairment, were excluded. All participants provided written informed consent before the examination. The protocol for this study was approved by the institutional review board of the Aino University (Ibaraki, Japan; approval number: 2018-026), which was in accordance with the guidelines stipulated in the Declaration of Helsinki.

The study was administered during the break time of the participants before or after classes at the university. They were asked to answer the questions regarding the SNS usage via smartphone, including modality of applications (LINE, Twitter, Instagram, Facebook, and/or other), frequency of upload (often, sometimes, or seldom), and purpose of SNS usage (communicating with friends, self-promotion, collecting information, building friendship, seeking counselling services, and/or surfing without any purpose). Using self-administered questionnaires, they also answered questions regarding daily time of smartphone usage, daily self-learning time except class-hours, internet addiction, and psychological stress.

Daily time of smartphone usage and self-learning time were assessed by questions based on the recall methods: “For how much time do you use a smartphone on weekdays?” and “For how much time outside of class do you study on weekdays?” respectively. Internet addiction and psychological stress were assessed using the IAT¹³) and Stress Response Scale-18 (SRS-18)¹⁴), respectively. These are widely used questionnaires, the validities and reliabilities of which have been proven in the Japanese population^{14–16}). The IAT consists of 20 items regarding internet overuse, e.g., “How often do you find that you stay online longer than you intended?” and “How often do you choose to spend more time online over going out with others?”¹³), which were scored on a 5-point scale (1=Rarely, 2=Occasionally, 3=Frequently, 4=Often, 5=Always). The total score was within the range of 20–100 points, and 50 points was set as the cut-off point for high internet addiction^{17, 18}). The SRS-18 consists of 18 items, e.g., “feeling uneasy” and “feeling sad,” which were scored on a 4-point scale (0–3) per item; the total possible scores were between 18–72 points¹⁴). Although the cut-off point for high psychological stress was unknown, the mean values in the Japanese general population were reported by Suzuki: males (n=482), 13.7; females (n=847), 15.8¹⁹).

All values were expressed as mean \pm standard deviation. To confirm a normal distribution, all variables were analyzed using the Shapiro-Wilk normality test. Comparisons of variables among the years (second, third, and fourth years) were analyzed using the χ^2 test or Fisher’s exact test for nominal variables, and one-way analysis of variance (ANOVA) followed by Tukey-Kramer test for continuous variables. Correlations among variables were analyzed using the Spearman’s rank correlation coefficient while setting nominal variables to absence and males=0 or presence and females=1. In addition, multiple regression analysis was performed to determine the predictors of the IAT and SRS-18 scores, retaining variables with p-values <0.1 in the above analyses as the explanatory variables (model 1, including all variables with p-values <0.1; model 2, including the year and gender, in addition to model 1 variables). The results were analyzed using the IBM SPSS statistics (version 20.0, IBM, Tokyo, Japan). The statistical significance was set at p<0.05.

RESULTS

The characteristics of the study participants and the results of questionnaires are shown in Table 1. Twelve participants were excluded due to omission or errors in the questionnaires, and responses of 235 participants were finally analyzed. There were no significant differences in the IAT and SRS-18 scores among the years, and the number of individuals with internet addiction (IAT, >50 points) was also the same for years and gender (total: males, n=46 (29.9%); females, n=16 (19.8%), p=0.12). Daily self-learning time in the fourth-year students was longer by 31.3% and 23.5%, than that in the second- and third-year students (p<0.01, p<0.05, respectively).

Table 1. Participant characteristics and questionnaire results

Variables	Total (n=235)	Second year (n=83)	Third year (n=80)	Fourth year (n=72)	p-value
Age (years)	20.1 ± 1.0	19.1 ± 0.2	20.1 ± 0.4	21.4 ± 0.5	<0.01
Gender (males/females)	154/81	59/24	50/30	45/27	0.42
Daily time of smartphone usage (h/day)	3.6 ± 1.4	3.6 ± 1.5	3.5 ± 1.4	3.6 ± 1.3	0.93
SNS application					0.93
LINE, n (%)	235 (100)	83 (100)	80 (100)	72 (100)	
Twitter, n (%)	195 (83.0)	69 (83.1)	64 (80.0)	62 (86.1)	
Instagram, n (%)	173 (73.6)	63 (75.9)	55 (68.8)	55 (76.4)	
Facebook, n (%)	26 (11.1)	9 (10.8)	7 (8.8)	10 (13.9)	
Other, n (%)	1 (0.4)	0 (0)	0 (0)	1 (1.4)	
No use, n (%)	0 (0)	0 (0)	0 (0)	0 (0)	
Frequency of SNS upload					0.13
Often, n (%)	19 (8.1)	3 (3.6)	7 (8.8)	9 (12.5)	
Sometimes, n (%)	153 (65.1)	62 (74.7)	49 (61.2)	42 (58.3)	
Seldom, n (%)	63 (26.8)	18 (21.7)	24 (30.0)	21 (29.2)	
Purpose of SNS usage					0.48
Communicating with friends, n (%)	193 (82.1)	67 (80.7)	65 (81.3)	61 (84.7)	
Self-promotion, n (%)	24 (10.2)	7 (8.4)	9 (11.3)	8 (11.1)	
Collecting information, n (%)	178 (75.7)	61 (73.5)	57 (71.3)	60 (83.3)	
Building friendship, n (%)	44 (18.7)	16 (19.3)	16 (20.0)	12 (16.7)	
Seeking counselling services, n (%)	10 (4.3)	1 (1.2)	7 (8.8)	2 (2.8)	
Surfing without any purpose, n (%)	5 (2.1)	2 (2.4)	3 (3.8)	0 (0)	
IAT (points)	43.0 ± 11.7	40.8 ± 10.1	44.8 ± 11.9	43.5 ± 13.0	0.17
Internet addiction (males/females)	46/16	12/5	19/5	15/6	0.81
SRS-18 (points)	17.4 ± 9.6	17.4 ± 9.7	16.2 ± 9.5	18.6 ± 9.6	0.45
Daily self-learning time (h/day)	1.8 ± 1.1	1.6 ± 1.1**	1.7 ± 0.9*	2.1 ± 1.2	<0.01

Values are presented as mean ± standard deviation. SNS: social networking service; IAT: Internet Addiction Test; SRS-18: Stress Response Scale-18. p-values: comparisons among the years. *p<0.05, **p<0.01 vs. corresponding the fourth year.

The correlation analysis data, except for LINE and other SNS applications which were used by either all participants or only one, are shown in Table 2. Based on this analysis, multiple regression analysis was performed (Table 3). Gender (males), daily time of smartphone usage, and the SRS-18 score were associated with the IAT score in both models (both p<0.05, p<0.01, p<0.01, respectively). The “surfing without any purpose” under the purpose of SNS usage, as well as the IAT score, was associated with the SRS-18 score in both models (both p<0.01, p<0.01, respectively).

DISCUSSION

The present study, to the best of our knowledge, is the first to examine the associations among SNS usage via smartphone, internet addiction, and psychological stress in Japanese physical therapy university students. SNS has various useful features to communicate with friends and families and to gather social information; however, there may also be unfavorable effects and loss of precious time^{20, 21}. Our main findings in this study showed that gender (males), longer daily time of smartphones usage, and “surfing without any purpose” under the purpose of SNS usage negatively influenced internet addiction and psychological stress.

The mean IAT scores in all and each year were within the range of approximately 40–45 points (Table 1). Generally, 40 or 50 points is set as the cut-off point of IAT for internet addiction^{17, 18, 22, 23}, and we chose 50 points based on the study on Japanese university students¹⁸. Thus, the mean scores in all and each year were not assessed as internet addiction, and were similar to the results in the previous studies (41.0–45.3 points) which investigated in non-medical Japanese university students^{10, 11}.

Gender, daily time of smartphone usage, “surfing without any purpose”, and SRS-18 correlated with IAT (Table 3). As smartphone use spread across all ages in Japan, especially among youth, smartphone and SNS addiction increased as did internet addiction^{11, 18}. The prevalence may be higher, although not significantly, in male students¹¹. Among the Japanese general population, females use the internet mainly for chatting with their friends on SNS applications via smartphones,

Table 2. Correlations among IAT, SRS-18, and other variables (n=235)

Variables	IAT		SRS-18	
	r	p-value	r	p-value
Year	0.08	0.21	0.04	0.55
Gender	-0.13	0.05	-0.04	0.50
Daily time of smartphone usage	0.33	<0.01**	0.07	0.26
SNS application				
Twitter	0.02	0.73	0.02	0.78
Instagram	-0.09	0.19	0.04	0.49
Facebook	-0.04	0.51	0.07	0.26
Frequency of SNS upload	-0.13	0.05	-0.09	0.19
Purpose of SNS usage				
Communicating with friends	0.02	0.75	-0.07	0.29
Self-promotion	0.20	0.01*	0.08	0.24
Collecting information	-0.05	0.47	-0.001	0.99
Building friendship	0.11	0.08	-0.03	0.61
Seeking counselling services	0.14	0.03*	0.11	0.09
Surfing without any purpose	0.13	0.06	0.22	<0.01**
IAT	-	-	0.41	<0.01**
SRS-18	0.41	<0.01**	-	-
Daily self-learning time	-0.09	0.15	-0.06	0.37

IAT: Internet Addiction Test; SRS-18: Stress Response Scale-18; SNS: social networking service. *p<0.05, **p<0.01.

Table 3. Multiple regression analysis for IAT, SRS-18, daily self-learning time, and sedentary behavior (n=235)

Variables	Model 1						Model 2					
	Adjusted R ²	B	SE	β	p-value	VIF	Adjusted R ²	B	SE	β	p-value	VIF
IAT	0.29						0.29					
Year		-	-	-	-	-		1.25	0.94	0.07	0.18	1.02
Gender		-3.87	1.64	-0.13	0.02*	1.06		-4.03	1.64	-0.14	0.01*	1.07
Daily time of smartphone usage		2.92	0.56	0.30	<0.01**	1.07		2.92	0.56	0.30	<0.01**	1.07
Frequency of SNS upload		-0.28	1.48	-0.01	0.85	1.21		-0.30	1.48	-0.01	0.84	1.21
Purpose of SNS usage												
Self-promotion		5.35	2.60	0.11	0.07	1.09		5.20	2.60	0.12	0.06	1.09
Building friendship		2.23	2.05	0.06	0.28	1.12		2.31	2.05	0.07	0.26	1.12
Seeking counselling services		6.51	3.86	0.10	0.09	1.06		6.30	3.86	0.09	0.10	1.07
Surfing without any purpose		-0.39	5.42	-0.004	0.94	1.07		0.16	5.42	0.002	0.98	1.08
SRS-18		0.43	0.07	0.37	<0.01**	1.08		0.43	0.07	0.36	<0.01**	1.08
SRS-18	0.19						0.18					
Year		-	-	-	-	-		0.23	0.85	0.02	0.79	1.02
Gender		-	-	-	-	-		0.23	1.46	0.01	0.87	1.03
Purpose of SNS usage												
Seeking counselling services		2.08	3.43	0.04	0.54	1.03		2.03	3.45	0.04	0.56	1.03
Surfing without any purpose		13.43	4.79	0.17	<0.01**	1.03		13.56	4.83	0.17	<0.01**	1.03
IAT		0.33	0.05	0.38	<0.01**	1.03		0.33	0.05	0.38	<0.01**	1.06

B: partial regression coefficient; SE: standard error; β: standardized partial regression coefficient; VIF: variance inflation factor; IAT: Internet Addiction Test; SNS: social networking service; SRS-18: Stress Response Scale-18. *p<0.05, **p<0.01.

whereas males prefer playing online games and devote time and attention for many hours^{24, 25}). Therefore, in males and in those who use smartphones longer, the IAT scores might have been raised in this study. In addition, the passive attitude might induce mental illnesses, such as depression and jealousy²⁶), which were associated with internet addiction^{25, 27}). Furthermore,

SRS-18, which correlated with “surfing without any purpose”, reflects depression, anxiety, gloom, or spiritlessness¹⁴). Thus, the IAT score was affected by “surfing without any purpose” and the SRS-18 score, although the daily time of SNS usage was not measured.

Daily self-learning time increased with year advancement. Japanese physical therapy students learn expert skills, take routine exams, and train actively to acquire their physical therapy licenses in the upper years more than the lower ones. In the study university, the third-year students usually took classes from 9 AM to 6 PM. Conversely, the fourth-year students studied from 9 AM to 4 PM for acquiring their physical therapy licenses and studied at their homes at night. Therefore, the longest daily self-learning time might be observed in the fourth year. Conversely, daily self-learning time did not affect the IAT and SRS-18 scores, although we hypothesized that shorter daily self-learning time would be induced by excessive smartphone usage, which increased internet addiction, due to fear- and/or anxiety-behavior¹²) associated with the learning activities. Further studies need to confirm whether students learn via smartphones, such as researching for medical information.

In this study, there was no difference in the ranking of SNS applications between the general¹⁾ and student populations. All participants used LINE, which is the most popular application for communication among youth¹⁾. LINE users may experience distress and irritation when they do not receive responses from others, such as the absence of the “Read” sign¹¹). In this study, we did not assess the purpose and daily time of LINE usage. Thus, it may be important to confirm whether LINE usage affects the IAT and SRS-18 scores.

Some limitations of this study need to be noted. First, this investigation was only performed in a single university and for a certain period (April–May) before clinical training. Thus, it is unclear whether the results in this study can apply to all Japanese physical therapy students, especially those during or after clinical training. Second, more specific contents of smartphones and SNS usages, such as daily time of each purpose of SNS usage, were not investigated. Medical students may search and gather medical information for clinical training and license, social information, or general information for personal interest. A past study showed that even non-medical university students often used the internet to search for health information, such as nutrition, sexual health, and fitness²⁸). Therefore, medical students, including physical therapy students, may use smartphones and SNS applications to communicate like other young people, to search for health-related information and acquire knowledge or skill for their occupation. Third, it is unclear whether influences other than smartphone and SNS usages, such as part-time jobs, may have impacted psychological stress because we did not assess them. Fourth, daily time of smartphone usage and self-learning time were not evaluated objectively. These variables might be underestimated due to recall bias; thus, the time measured in this study might lack accuracy. Fifth, sleep information was not obtained. The poor quality of sleep may be caused by smartphone addiction and may change psychological status²⁹). Therefore, further studies in multiple universities and other investigation periods are needed to confirm the influence of smartphone and SNS usages surveyed in more detail with objective measures of time.

In conclusion, we found that males, those who spend longer periods of time using their smartphones, or those who passively used SNS were more likely to be associated with internet addiction or psychological stress in Japanese physical therapy university students. Although further studies are needed, educating physical therapy students on the proper usage of smartphone and SNS may be necessary to reduce internet addiction and psychological stress.

Conflict of interest

The authors declare no conflicts of interest.

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