Factors Affecting Smartphone Usage Time according to Subjective Happiness of adolescents

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청소년의 주관적 행복에 따른 스마트폰 사용 영향 요인

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Abstract The purpose of this study was to examine the factors influencing on the smartphone usage time according to the happiness perceived by adolescents. This study underwent the approval procedure for using the raw data of the 13th (2017) Adolescents' Health Behavior Online Survey through the homepage of Korea Centers for Disease Control and Prevention and selected 54,603 persons of 12-18 age groups as subjects of the study. The analysis was performed after generating a complex sample plan file by assigning weights using the IBM SPSS 23.0 program. There were significant differences in general characteristics and physical & psychological characteristics according to the use of the smartphone in the happy group and the unhappy group (p<.05). And there was a statistically significant difference in factors affecting smartphone usage time between the group of adolescents who perceived as happy and the group who perceived themselves as unhappy. It is necessary to improve the quality of life by increasing the level of happiness through the correct use of smartphones among adolescents.

Key Words : Mobile device, Happiness, Adolescents, Health Behavior, Smartphone Usage Time

요 약 본 연구의 목적은 청소년들이 인지하는 행복감에 따라 스마트폰 사용시간에 영향을 미치는 요인을 파악하는 것이다. 본 연구에서는 질병관리청 홈페이지를 통해 제13차(2017) 청소년 건강행태 온라인 설문조사 원자료 사용 승인 절차를 거쳐 만 12-18세 54,603명을 연구 대상자로 선정하였다. 자료는 IBM SPSS 23.0 프로그램을 이용하여 가중치를 부여한 후 복합 샘플 계획 파일을 생성하여 분석하였다. 행복한 그룹과 행복하지 않은 그룹의 스마트폰 사용에 따른 일반적 특성과 신체, 심리적 특성 간에는 유의한 차이가 나타났다(p<.05). 그리고 스마트폰 사용시간에 영향을 미치는 요인은 행복하다고 인식한 청소년 그룹과 행복하지 않다고 인식한 청소년 그룹 간에 통계적으로 유의한 차이가 있었다. 그러므로 청소년들의 올바른 스마트폰 사용으로 행복도를 높여 삶의 질을 향상시킬 필요가 있다.

주제어 : 모바일기기, 행복, 청소년, 건강행위, 스마트폰 사용시간

1. Introduction

Smartphones, which have become the most popular personal media in the modern world, show stronger dominance than any other media ever seen [1]. In Korea, the penetration rate of smartphones, which was only 2.6% in 2009, increased from 57.5% in 2012 to 78.8% in 2015. Moreover, 46.4% of the respondents chose smartphone as an indispensable medium in their daily lives, and seven out of ten in their teens and twenties selected smartphones as an essential medium [1]. In this way, the rapid spread of smartphones in a shorter period than any other media and the spread of smartphones based on the characteristics of devices such as simplicity, mobility and immediacy, they experience the convenience of daily life, but there is a risk of use addiction more easily compared to other media [2].

According to 2018 smartphone excessive dependence survey conducted by the Ministry of Science & ICT [3], the risk group of smartphone excessive dependence of all 3−69 years' group was reported to account for 19.1% while the same of adolescents group was 29.3%, the highest dependence out of all age groups in Korea. In addition, other contents most frequently encountered by smartphone users were messenger function (94.2%), news reading (87.7%), movies, TV, video viewing (85.2%), traffic and location information searching (85.2%), etc. Contents found to have a large gap in utilization between the risk and normal groups include e−books, web toons, and web novels (15.6%), new friends (11.8%), and games (11.7%), respectively.

The smartphone has the advantage that it can be easily connected to the internet anytime, anywhere, and can use various applications such as SNS and games without limitation on time and space, but it may cause physical, psychological and social problems when they are excessively depended on the smartphone [4]. Smartphone addiction is a kind of behavioral addiction that is used continuously to be immersed and lose control despite the negative result of smartphone use [5]. Many people are concerned about various addiction problems caused by excessive use of smartphones. In particular, the increase in the using time of E−media, including smartphones, can lead to addiction, which can affect adolescents' school adaptation and daily life [6]. Smartphone addiction is not only a variety of physical diseases (wrist tunnel syndrome, turtle neck syndrome, upper extremity pain, etc.), but also serious mental illnesses (anxiety, depression), social problems (negative interpersonal relationship, social development deterioration), adaptation problems (school maladjustment, daily life) that can cause a number of problems [7,8]. In particular, adolescents may be more affected by the problem of addiction because they are in the process of developing their own control. According to some reports in Korea, the risk of smartphone addiction was reported to be 2.6 times higher for adolescents (29.2%) than for adults (11.3%), and the adolescent risk group showed a significant increase every year [9].

This study was conducted to investigate the influencing factors that affect smartphone usage time other than academic purposes depending on the happiness that Korean adolescents perceive subjectively. Past studies related to teenagers' use of smartphones seem to have highlighted the negative effects of adolescents' use of smartphones on their health and studies, mainly by utilizing smartphone addiction measurement tools. In other words, it has classified and researched subjects into smartphone addictive groups and non−addictive groups among adolescents. As such, studies have focused on subjects who show extreme behavior such as smartphone addiction, it seems that there have been difficulties in accurately

explaining how smartphone use in ordinary adolescents affects their health. Smartphone use affects emotions and is particularly an influencing factor on happiness [10].

Therefore, the purpose of this study is to investigate the factors affecting smartphone usage time according to the perceived happiness of Korean adolescents. The results of this study suggest the relationship between problematic behaviors and mental health that may occur when adolescents use smartphones, and are expected to provide basic data when mediating the appropriate use of smartphone by adolescents in Korea.

2. Method

2.1 Research design

This study is the second analysis of the 13th (2017) Adolescents' Health Behavior Online Survey in South Korea. This is also a descriptive study to derive the factors that affect the smartphone usage time according to the subjective happiness among Korean adolescents.

2.2 Subject of Research

This study used raw data from the 13th (2017) Adolescents' Health Behavior Online Survey. This survey categorized 43 regions (metropolitan, small and medium cities, county regions) across Korea for sampling, and classified the population to 129 strata in order to collect samples using middle schools, general high schools and specialized high schools as stratification variables within each region. After that, the size of the sample was set to 400 middle schools and 400 high schools, and then the number of sample schools was set using the proportional distribution method so that the composition ratio of the sample matches the composition ratio of the population. Finally, stratification

cluster sampling was used for sampling. Therefore, the unit of the first sampling was a system sampling method using the school, and the second sampling was a random sampling method for each grade level in the selected school. This study underwent the approval procedure for using the raw data of the 13th (2017) Adolescents' Health Behavior Online Survey through the homepage of Korea Centers for Disease Control (KCDC) and selected 36,957 persons who answered that they are happy and 17,646 persons who answered that they are not happy, total 54,603 persons out of total 62,276 of 12-18 age groups as subjects of the study.

2.3 Research variables

The variables in this study were classified into general characteristics, physical and psychological characteristics based on the items of KNHANES.

• General characteristics

Gender (male or female), age (12-15 years old or 16-18 years old), academic grade (upper, middle, lower), economic level (upper, middle, lower), pocket money per week (less than 30,000 won or more than 30,000 won), part-time work experiences (yes or no), anxiety counselors (family, other than family, none), drug use experiences (yes or no), and sexual experiences (yes or no).

• Physical factors

Smoking (yes or no), drinking (yes or no), experience of treatment due to the violence in the last 12 months (yes or no), fatigue recovery by sleep over the last 7 days (enough or not enough), Body Mass Index (BMI) (less than 18.5 kg/m^2, 18.5-24.9 kg/m^2, 25 kg/m^2 or more), number of days of physical activity for more than 60 minutes per day for the last 7 days (3 days or more or 2 days or less), number of breakfasts per week (less than three times and more than four times), and number of fast food eating per week (two or less or three or more times).

• Psychological factors

Feeling of sadness & despair (yes or no), suicidal thoughts (yes or no), suicide planning (yes or no), suicide attempts (yes or no), stress (a lot of feelings or a little feeling), weight control efforts (yes or no), subjective health (good, normal, bad), subjective physical appearance (underweight, normal, overweight), and smartphone use time within two weeks (less than 270 minutes and more than 271 minutes: 50% of the time spent on using smartphones in this study was 270 minutes).

2.4 Data analysis method

The analysis was performed after generating a complex sample plan file by assigning weights using the IBM SPSS 23.0 program. The significance level was set to .05.

Complex samples chi-square tests were then conducted to compare the weighted percentage or mean of all variables by smartphone usage time. Finally, variables that had a significant association in the bivariate analyses were entered in a logistic regression model. Logistic regression was performed to examine the association between smartphone usage time and the variables according to happy. The significance level was set at .05.

3. Results

3.1 Comparison of general characteristics of subjects

As shown in Table 1, smartphone usage time of happy subjects differed according to gender (p<.001), academic grade (p<.001), economic level (p<.001), pocket money for week (p<.001), part-time work experience (p<.001), anxiety counselor (p<.001), and sexual experiences (p<.001).

Smartphone usage time of unhappy subjects

Table 1. General Characteristics of Two Groups   (n=54603)

| Characteristics | | Happy (n=36,957) | | | Unhappy(n=17,646) | | |
| | | Smartphone usage time(minute) | | | Smartphone usage time(minute) | | |
		≤270 (n=19,763) n(weight %)	≥271 (n=17,194) n(weight %)	x^2(p)	≤270 (n=7,870) n(weight %)	≥271 (n=9,776) n(weight %)	x^2(p)
Gender	Male	11756(60.5)	7522(44.8)	907.35 (<.001)	4234(55.1)	3418(36.3)	627.53 (<.001)
	Female	8007(39.5)	9672(55.2)		3636(44.9)	6358(63.7)	
Age (year)	12–15	12069(57.8)	10411(56.7)	5.05 (.253)	3921(46.6)	5048(47.7)	2.12 (.315)
	16–18	7610(42.2)	6717(43.3)		3882(53.4)	4687(52.3)	
Academic grade	Upper	3896(19.4)	1903(10.9)	761.54 (<.001)	1001(12.6)	676(6.7)	360.45 (<.001)
	Middle	14879(75.6)	13651(79.2)		6075(77.5)	7421(75.7)	
	Lower	988(5.0)	1640(9.9)		794(9.9)	1679(17.6)	
Economic level	Upper	2821(14.4)	1626(9.7)	210.54 (<.001)	618(8.2)	445(4.7)	125.44 (<.001)
	Middle	16692(84.4)	15247(88.4)		6990(88.6)	8830(90.1)	
	Lower	250(1.3)	321(1.9)		262(3.2)	501(5.2)	
Pocket money (won)	<30,000	14479(72.1)	11617(66.5)	138.54 (<.001)	5671(71.1)	6569(66.4)	46.13 (<.001)
	≥30,000	5284(27.9)	5577(33.5)		2199(28.9)	3207(33.6)	
Part-time work experience	Yes	1627(8.5)	2849(17.1)	635.96 (<.001)	914(11.8)	2078(21.6)	308.64 (<.001)
	No	18136(91.5)	14345(82.9)		6956(88.2)	7698(78.4)	
Anxiety counselor	Family	9727(49.3)	6901(40.2)	377.11 (<.001)	2505(32.0)	2445(25.3)	187.26 (<.001)
	Other than family	6936(35.5)	7704(45.0)		3014(38.6)	4712(48.6)	
	Absence	3100(15.2)	2589(14.8)		2351(29.4)	2619(26.0)	
Drug use experience	Yes	45(39.8)	32(34.9)	.528 (.542)	41(44.1)	27(29.7)	3.99 (.067)
	No	70(60.2)	63(65.1)		54(55.9)	60(70.3)	
Sexual experience	Yes	711(3.9)	801(5.1)	31.29 (<.001)	403(5.4)	628(6.6)	12.17 (.002)
	No	19052(96.1)	16393(94.9)		7467(94.6)	9148(93.4)	

differed according to gender (p<.001), academic grade (p<.001), economic level (p<.001), pocket money for week (p<.001), part-time work experience (p<.001), anxiety counselor (p<.001), and sexual experiences (p=.002).

3.2 Comparison of physical and psychological characteristics of fubjects

As shown in Table 2, smartphone use time of happy subjects differed depending on smoking (p<.001) and drinking (p<.001), fatigue recovery by sleep (p<.001), BMI (p<.001), number of physical activity per week (p<.001), number of breakfast per week (p<.001), and number of fast food eating per week (p<.001), feeling of sadness and despair (p<.001), suicidal thoughts (p<.001), suicide planning (p=.031), suicide attempts (p<.001), stress (p<.001), weight control effort (p<.001), subjective health (p<.001), subjective physical appearance (p<.001).

Smartphone usage time of unhappy subjects differed depending on smoking (p<.001), drinking

Table 2. Physical & Psychological Characteristics of Two Groups   (n=54603)

Characteristics		Happy(n=36,957)			Unhappy(n=17,646)		
		Smartphone usage time(minute)			Smartphone usage time(minute)		
		≤270 (n=19,763) n(weight %)	≥271 (n=17,194) n(weight %)	x^2(p)	≤270 (n=7,870) n(weight %)	≥271 (n=9,776) n(weight%)	x^2(p)
Smoking	Yes	1849(9.9)	2405(14.9)	208.81 (<.001)	1090(14.5)	1780(18.6)	55.08 (<.001)
	No	17914(90.1)	14789(85.1)		6780(85.5)	7996(81.4)	
Drinking	Yes	6412(33.5)	7368(44.0)	425.24 (<.001)	3174(41.4)	4943(51.3)	173.03 (<.001)
	No	13351(66.5)	9826(56.0)		4696(58.6)	4833(48.7)	
Experience of treatment due to violence	Yes	126(0.7)	118(0.7)	.016 (.908)	83(1.0)	118(1.2)	1.42 (.281)
	No	19391(99.3)	16914(99.3)		7590(99.0)	9522(98.8)	
Fatigue recovery by sleep	Much	6703(32.6)	4643(26.4)	173.36 (<.001)	1168(14.2)	1099(11.1)	37.82 (<.001)
	A little	13060(67.4)	12551(73.6)		6702(85.8)	8677(88.9)	
Body Mass Index (kg/m^2)	<18.5	4413(22.7)	3430(20.6)	23.49 (<.001)	1498(19.2)	1721(18.1)	3.47 (.247)
	18.5−22.9	9749(51.3)	8590(52.4)		4002(54.0)	4981(54.5)	
	≥23	4879(26.0)	4383(27.1)		1996(26.8)	2560(27.5)	
Physical activity (day/week)	≤2	12453(63.8)	11502(67.7)	62.44 (<.001)	5565(71.4)	7286(75.3)	33.83 (<.001)
	≥3	7310(36.2)	5692(32.3)		2305(28.6)	2490(24.7)	
Breakfast (day/week)	≤3	6134(31.0)	7131(41.4)	432.16 (<.001)	3081(38.9)	4725(48.2)	154.65 (<.001)
	≥4	13629(69.0)	10063(58.6)		4789(61.1)	5051(51.8)	
Fast food eating (day/week)	≤2	16602(83.5)	13359(76.9)	254.27 (<.001)	6364(80.4)	7378(74.9)	74.80 (<.001)
	≥3	3161(16.5)	3835(23.1)		1506(19.6)	2398(25.1)	
Feeling of sadness & despair	Yes	2962(15.3)	3441(19.8)	131.60 (<.001)	3063(38.6)	4384(44.7)	68.59 (<.001)
	No	16801(84.7)	13753(80.2)		4807(61.4)	5392(55.3)	
Suicidal thought	Yes	1042(5.3)	1294(7.3)	61.86 (<.001)	1739(21.5)	2639(26.7)	64.11 (<.001)
	No	18721(94.7)	15900(92.7)		6131(78.5)	7137(73.3)	
Suicide planning	Yes	366(1.8)	376(2.2)	5.52 (.031)	567(7.0)	799(7.9)	6.17 (.020)
	No	19397(98.2)	16818(97.8)		1303(93.0)	8977(92.1)	
Suicide attempt	Yes	178(0.9)	271(1.6)	37.08 (<.001)	371(4.5)	567(5.7)	12.02 (.001)
	No	19585(99.1)	16923(98.4)		7499(95.5)	9209(94.3)	
Stress	Much	4278(21.8)	4681(26.7)	121.71 (<.001)	4940(62.4)	6687(67.6)	51.41 (<.001)
	A little	15485(78.2)	12513(73.3)		2930(37.6)	3089(32.4)	
Weight control effort	Yes	10086(50.6)	9547(54.9)	68.65 (<.001)	3786(47.7)	5272(53.4)	58.00 (<.001)
	No	9677(49.4)	7647(45.1)		4084(52.3)	4504(46.6)	
Subjective health	Good	16547(83.5)	13656(79.1)	120.33 (<.001)	4293(54.4)	4713(47.8)	82.16 (<.001)
	Normal	2667(13.7)	2885(16.9)		2658(33.9)	3662(37.6)	
	Bad	549(2.8)	653(4.0)		919(11.7)	1401(14.6)	
Subjective physical appearance	Underweight	5382(27.4)	4195(24.5)	94.83 (<.001)	2001(25.4)	2081(21.4)	74.39 (<.001)
	Normal	7461(37.4)	6128(35.5)		2686(34.3)	3125(32.1)	
	Overweight	6920(35.2)	6871(40.0)		3183(40.3)	4570(46.4)	

(p<.001), fatigue recovery by sleep (p<.001), number of physical activity per week (p<.001), number of breakfast per week (p<.001), and number of fast food eating per week (p<.001), feeling of sadness and despair (p<.001), suicidal thoughts (p<.001), suicide planning (p=.020), suicide attempts (p=.001), stress (p<.001), weight control effort (p<.001), subjective health (p<.001), subjective physical appearance (p<.001).

3.3 Factors influencing on using time of smartphone of subjects

As shown in Table 3, significant influencing factors of smartphone usage time in each group are as follows.

For the happy group who spent more than 271 minutes on the use of smartphone per day, the male (OR=0.49) than the female, middle (OR=0.62) and upper (OR=0.40) academic grade, upper economic level (OR=0.77), and less than 30,000 won (OR=0.91) for pocket money, the

counselor family (OR=0.74), suicide planning (OR=0.78), enough recovery from fatigue by sleep (OR=0.93), in yes compared to no in weight control effort (OR=0.74), perceiving subjective health as good (OR=0.83), perceiving subjective physical appearance as normal (OR=0.92) and eating fast food less than 2 days per week was found to have an effect (OR=0.70). On the other hand, part time work experience (OR=1.67), smoking (OR=1.32) and drinking (OR=1.26), suicide attempt (OR=1.61), lots of stress (OR=1.06), less than 3 breakfasts per week took greater occupancy (OR=1.36).

For the unhappy group who spent more than 271 minutes on the use of smartphone per day, the male (OR=0.46) than the female, middle (OR=0.60) and upper (OR=0.38) academic grade, upper (OR=0.56), middle (OR=0.79) economic level, and less than 30,000 won (OR=0.91) for pocket money, the counselor family (OR=0.84), suicide planning (OR=0.89), in yes compared to

Table 3. Factors Influencing Smartphone Usage Time

(n=54603)

Characteristics (reference)		Happy(n=36,957)		Unhappy(n=17,646)	
		OR	95% CI	OR	95% CI
Gender (female)	Male	0.49	0.45−0.53	0.46	0.42−0.51
Academic grade (lower)	Upper	0.40	0.35−0.45	0.38	0.32−0.44
	Middle	0.62	0.57−0.69	0.60	0.54−0.67
Economic level (lower)	Upper	0.77	0.62−0.96	0.56	0.44−0.71
	Middle	1.0	0.82−1.23	0.79	0.66−0.95
Pocket money (/won) (≥30,000)	<30,000	0.91	0.86−0.96	0.91	0.85−0.99
Part−time work experience (no)	Yes	1.67	1.53−1.81	1.61	1.44−1.79
Anxiety counselors (absence)	Family	0.74	0.68−0.80	0.84	0.77−0.92
	Other than family	0.99	0.92−1.07	1.14	1.04−1.24
Smoking (no)	Yes	1.32	1.21−1.44	1.13	1.00−1.26
Drinking (no)	Yes	1.26	1.20−1.33	1.27	1.18−1.37
Suicidal thought (no)	Yes			1.17	1.06−1.28
Suicide planning (no)	Yes	0.78	0.63−0.97	0.89	0.76−1.04
Suicide attempt (no)	Yes	1.61	1.24−2.09		
Fatigue recovery by sleep (a little)	Much	0.93	0.88−0.99		
Stress (a little)	Much	1.06	1.00−1.12		
Weight control effort (no)	Yes	0.94	0.89−0.99	0.92	0.86−0.99
Subjective health (bad)	Good	0.83	0.72−0.96	0.89	0.80−0.99
	Normal	0.91	0.78−1.06	0.98	0.88−1.09
Subjective physical appearance (overweight)	Underweight	0.94	0.86−1.03	0.90	0.83−0.98
	Normal	0.92	0.86−0.99	0.88	0.82−0.96
Frequency of breakfast/week (≥4)	≤3	1.36	1.29−1.43	0.77	1.17−1.35
Frequency of fast food eating (≥3)	≤2	0.70	0.65−0.74	1.26	0.71−0.84

no in weight control effort (OR=0.92), perceiving subjective health as good (OR=0.89), perceiving subjective physical appearance as normal (OR=0.88), underweight (OR=0.90) and less than 3 breakfasts per week took greater occupancy (OR=0.77). On the other hand, part time work experience (OR = 1.61), smoking (OR=1.13) and drinking (OR=1.27), suicide thoughts (OR=1.17), eating fast food less than 2 days per week was found to have an effect (OR=1.26).

4. Discussion

This study attempted to identify the factors that influence on the usage time of smartphone according to happiness.

As a result of this study, girl students spent more time than boys in comparing smartphone usage time according to adolescent gender. These results support the results of previous studies. Lee et al. [11] reported that the proportion of women in the high-risk group of smartphone addiction was more than six times higher than that of men. Hwang et al. [12] showed significantly higher smartphone addiction of women than that of men. Therefore, gender considerations are required for smartphone intervention.

If the economic level is low, the chances of participation in academy or various extracurricular activities are relatively low, which increases the dependence on smartphones [13]. In this study, people in lower economic level used smartphones longer. However, further study is needed because the people with pocket money less than 30,000 Won used the internet longer than those with pocket money more than 30,000Won. In addition, the longer use of the Internet in the group with part-time job experience and the longer use of the Internet in the lower academic grade group can be attributed to the more interest elsewhere than

the study [14]. Therefore, the active interest of society in these adolescents is required.

This study found that the adolescents who have no suicidal thoughts use smartphones longer than those who don't have suicidal thoughts in the unhappy group. According to Nam et al. [15], the higher the smartphone addiction index and the higher the suicide thought index, the lower the happiness index. If they use the Internet for a long time with smartphone, they may experience addictive mental diseases such as depression and anxiety, which may lead to suicide [16]. Conversely, depression and anxiety that lead to suicide can lead to obsessive use of smart phones [17]. Therefore, in order to control the use of smart phones, it is necessary to examine and judge emotional problems first.

In this study, smartphone usage time was less by the group who did not have enough recover from fatigue by sleep. This result is the same as that of Kim and Lee [18]. However, the results of Öz et al. [19] showed a positive correlation between the use of smartphones and the quality of sleep. Sleep is an important factor that influences the physical and mental health of humans, and it may be related to emotional stability, cognitive function and behavioral development, especially in adolescents [20, 21]. Many studies have reported that pathological use of smartphones can interfere with sleep and reduce sleep time and quality [22]. Therefore, it is necessary to maintain proper sleep time and quality by preventing improper use of smartphone for adolescent's physical and mental health.

This study found that drinking and smoking groups used smartphones longer. These results are the same as those of Kim et al. [23], and adolescents are more likely to do other risk behaviors when they engage in health risks such as drinking or smoking [24]. In addition, if the stress is high, there is a lack of a way to solve the problem, such that it is likely to be caught in

the smartphone [24]. It needs various ways to relieve adolescents' stress.

Park and Lee [13] found that the user's perceived health status is an important risk factor for the problematic experience of using a smartphone. In this study, the subjective health was perceived to decrease smartphone usage time. Therefore, it is necessary to reflect the subjective health perception when intervening on the use of smartphones. The upper group with higher smartphone use time had lower subjective perception than the lower group. This psychiatric state is thought to be associated with long-term use of smartphone, inactive lifestyle and low level of euphoria [25, 26]. There is a need to improve the quality of life by increasing the happiness of young people with the proper use of smartphones.

5. Conclusion

This study attempted to identify factors that influence the usage time of smartphone according to the happiness of Korean adolescents.

The results showed that the gender, academic grade, economic level, pocket money, part-time job experience, counselors for concern, smoking, drinking suicide plans, weight control efforts, subjective health, subjective physical appearance, breakfast frequency per week, and fast food eating were significant influencing factors in both groups. Suicide attempts, recovery from fatigue and stress were found to be significant influencing factors in the Happy Group and suicide thought in the Unhappy Group.

Smartphones are indispensable for modern people to meet a variety of purposes, but there are also serious problems that can arise from their overuse. Many studies have already reported on the factors and side effects that affect the use of smartphones. This is an important issue that is frequently discussed repeatedly by many people in society as well as the research issue.

Smartphones are double-edged swords, so the professional and interpersonal effects that can be obtained are great, but they need to pay a keen attention on the physical and emotional factors that can be lost. Another important thing is that users who overuse the smartphone need professional help because it is very difficult for them to control by themselves.

Considering the influencing factors of adolescents' using time of smartphones, the intervention of smartphone users is necessary. In addition, individual interventions considering individual characteristics are required.

In order to improve adolescents' excessive use of the smartphone, education and intervention on proper use of the smartphone is necessary. In particular, the development of professional behavior intervention programs to promote the health and academic grade of students who overuse the smart hone is necessary.

The authors of this study propose the development and application of intervention programs with excessive users of smartphones, and further research on more diverse influencing factors with different age groups.

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