How to Overcome Mobile Addiction? Leisure Activities and Life-Satisfaction

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Abstract: The number of mobile addicts is a growing concern. This research examines the role of leisure activities and life-satisfaction in order to overcome mobile addiction. We administered a survey to 293 students in Korea. The results of a Structural Equation Model (SEM) show that leisure activities lead to life-satisfaction which ultimately lowers mobile addiction. Furthermore, the results of multi-group SEM show that this effect holds for the high self-control group while the effect is insignificant for the low self-control group. The findings provide both theoretical and practical implications on mobile device addiction.

Key words: Leisure activity, life-satisfaction, mobile addiction, self-control, growing, implications

INTRODUCTION

With the rise in the use of mobile phones, the number of users with mobile addiction is also rapidly growing. When there is no sign of ringing or vibration, about 67% of mobile consumers check their phones to see if there are any messages or calls. Such preoccupation and oddly high dependence on mobile devices can be a symptom of addiction (Bian and Leung, 2015; Park, 2005). When their mobile devices are unreachable, mobile addicts express anger, depression and behave aggressively (De-Sola *et al.*, 2016). It not only harms individual's health but also increases societal costs in general. As a result, there is a growing need to end mobile addiction. Yet, research on mobile addiction is relatively nascent (Salehan and Negahban, 2013). Therefore, this research aims to examine factors that will help individuals overcome mobile addiction.

Through mobile devices individuals can escape reality to engage in cyberspace. According to gratification theory individuals go online to get away from their negative life events. For example, students try to relieve their school stress through mobile devices in classes (De-Sola *et al.*, 2016). The reason is that many individuals use mobile to find happiness and life-satisfaction. In this regard, low life-satisfaction can be a precursor of mobile over-usage which may translate into mobile addiction (Linnhoff and Smith, 2017).

Then, how can we enhance our life-satisfaction? This study examines the role of leisure activities. Leisure activity is non-compulsory behavior that one engages in during one's discretionary time. It includes recreation
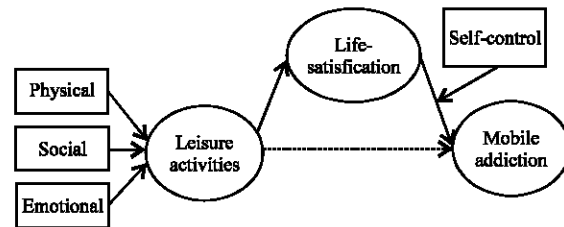

Fig. 1: Conceptual model

activities such as playing sports, games and going on tours. Leisure activity is known to generate positive benefits. For example, engaging in leisure activities enhances positive mood states, reduces anti-social behavior, facilitates better ability to cope with life stress and it contributes to physical fitness (Lu and Hu, 2005; Mahoney and Stattin, 2000; Iwasaki and Mannell, 2000). In all, a greater involvement in leisure activities is likely to increase one's life-satisfaction which can ultimately decrease mobile addiction.

In addition, an individual's self-control can show a moderating effect. Self-control is positively correlated with self-regulation and negatively correlated with addictive behavior. Low self-control group may further pursue gratifications and hedonic pleasures without restraining their behavior. In contrast, high self-control individuals are more likely to disengage in mobile over-usage behavior, thus, becoming less addicted to mobile devices. Hence, different self-control levels can differently affect mobile addiction. Our conceptual model is summarized in Fig. 1.

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MATERIALS AND METHODS

Design and participants: We conducted a cross-sectional survey to examine the relationships among the constructs. We recruited 293 university students to participate in the survey. We used a student sample because they are the most vulnerable age group to mobile addiction (De-Sola *et al.*, 2016). The data was collected at a university in Korea in 2017. There were more female participants (n = 195; 66.6%) than male participants (n = 98; 33.4%). The average age was 21.89 (SD = 1.87). All participants were university students and many of them were sophomore (37.5%) and freshmen (31.1%). About a half of them resided in the school's dormitory (51.9%); while, others lived with family (37.5%) or alone (10.6%).

Instrument: The leisure satisfaction scale was developed by Beard and Ragheb (1980). The original scale has six dimensions: psychological, educational, social, relaxation, physiological and aesthetic. Based on the scale, we developed 12 items which were answered on a 7 point Likert scale (1 = "Strongly disagree" and 7 = "Strongly agree"). Our pilot test confirmed that the items were divided into three dimensions: physical (3 items), social (5 items) and emotional relaxation (4 items). Items for physical leisure include "Enhancing physical fitness"; items for social leisure include "Associating with close friends" and items for relaxation include "Emotional well-being".

The satisfaction with life scale was developed by Diener *et al.* (1985). We used the original 5 items which were measured on a 5 point Likert scale (1 = "Strongly disagree" and 5 = "Strongly agree"). One of the items was "I am satisfied with my life."

The mobile addiction scale is adapted from original scales by Salehan and Negahban (2013) and Kwon *et al.* (2013). There were 8 items which were answered on a 7 point Likert scale (1 = "Strongly disagree" and 7 = "Strongly agree"). One of the items was "I check my mobile device even when there is no sign of ringing or vibration."

The self-control scale is modified based on the original scales (Tangney *et al.*, 2004). Some of the wording was changed in order to be relevant to our students. Specifically, one of the items was "I try to attend my classes on time without any tardiness." There were three items which were answered on a on a 7 point Likert scale (1 = "Strongly disagree" and 7 = "Strongly agree").

Data analysis: For the analysis, we used a Structural Equation Model (SEM). SEM is often used in research when assessing relationships between latent constructs. The latent constructs are measured by one or more of observed items. The analysis is conducted in two steps. First, we assessed the measurement model to show relationships between latent variables and observed items. We used Principal Component Analysis (PCA), Explanatory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). We also calculated a correlation matrix, Convergent Reliability (CR), Cronbach's Alpha and Average Variance Extracted (AVE) to assess both reliability and validity of the measurements. For the analysis, we used IBM Statistical Package for Social Sciences Statistics, Version 21.

Second, the overall structural model is assessed to show causal relationships between exogenous and endogenous variables. The causal relationships of latent constructs are evaluated based on analysis of covariance and regression equations in AMOS. The model's structural fit can be assessed by goodness-of-fit indexes. Also, a path diagram depicts each path's significance and direction through coefficients. In calculating the coefficients, we used maximum likelihood and generalized least squares.

To reduce any Common Method Bias (CMB), we devised a few remedies (Podsakoff *et al.*, 2003). First in the introduction, we stated that the answers will be kept confidential and anonymous. Second, we also stated that there were no right or wrong answers in order for our participants to freely provide their answers. Lastly, the clarity of the wording was maintained by avoiding any complex or unambiguous Syntax. Also, we empirically tested the CMB by using Harman's single-factor method. There was no single factor that completely explained the variance, thereby, we disproved CMB.

RESULTS AND DISCUSSION

Measurement model: As a data reduction procedure, we conducted factor analysis to find independent latent constructs. Without making any priori assumptions, we first conducted Exploratory Factor Analysis (EFA). All measurement items were modeled through linear combinations and produced five factors with Eigenvalues greater than one.

Then, to confirm whether the variability reduced into five factors, we proceeded to Confirmatory Factor Analysis (CFA). We used Varimax rotation with an extraction method of Principal Component Analysis (PCA). The results of CFA indicate that the observed items were theoretically loaded into the respective constructs.

Table 1: Factor analysis

	Component					
Construct/Items	1	2	3	4	5	6
Mobile addiction						
Addiction 1	0.851	0.064	-0.054	-0.019	-0.015	0.004
Addiction 2	0.843	-0.123	-0.015	0.037	-0.028	0.057
Addiction 3	0.837	-0.043	-0.034	0.015	-0.040	0.086
Addiction 4	0.833	0.038	-0.054	-0.118	-0.023	0.040
Addiction 5	0.815	-0.162	-0.007	0.114	0.187	0.053
Addiction 6	0.812	-0.113	0.024	-0.019	0.079	0.031
Addiction 7	0.798	-0.098	-0.059	0.068	0.077	-0.226
Addiction 8	0.747	0.044	-0.032	0.088	-0.081	-0.102
Life-satisfaction						
Satisfaction 1	-0.103	0.808	0.233	0.010	-0.040	0.043
Satisfaction 2	-0.034	0.794	0.201	0.107	0.213	0.117
Satisfaction 3	-0.074	0.789	0.211	0.146	0.278	0.133
Satisfaction 4	-0.063	0.740	0.040	0.195	0.372	0.055
Satisfaction 5	-0.081	0.682	0.266	0.077	0.152	0.360
Leisure activities						
Emotional 1	-0.053	0.192	0.839	0.231	-0.005	0.069
Emotional 2	-0.098	0.171	0.836	0.064	-0.015	0.215
Emotional 3	-0.085	0.182	0.827	0.197	0.084	0.169
Emotional 4	0.039	0.196	0.766	0.080	-0.031	0.058
Physical 1	0.046	0.089	0.139	0.919	0.147	0.121
Physical 2	0.063	0.174	0.196	0.886	0.156	0.151
Physical 3	0.023	0.123	0.219	0.873	0.125	0.189
Social 1	-0.015	0.230	0.298	0.245	0.008	0.826
Social 2	0.032	0.250	0.221	0.269	0.070	0.825
Self-control						
Control 1	0.082	0.164	-0.002	0.210	0.879	0.012
Control 2	0.086	0.174	-0.063	0.203	0.860	-0.005
Control 3	-0.056	0.262	0.065	-0.014	0.706	0.068

In addition, the Kaiser-Meyer-Olkin measure of sampling adequacy indicates the portion of variance caused by the latent constructs is high (0.874). Also, the Barlett's test of sphericity is significant (0.000) indicating that the variables are unrelated and that our correlation matrix is an identity matrix. All this points to a fact that our factor analysis results are useful. The results are summarized in Table 1.

Table 2 shows all measurement items satisfied convergent validity. Specifically, the composite reliabilities were above the required threshold of 0.6 (Bagozzi and Yi, 1988). Also, the Average Variance Extracted (AVE) exceeded the suggested threshold of 0.5 (Fornell and Larcker, 1981). Moreover, as seen in Table 3, discriminant validity is shown. The AVE for all constructs exceeded the squared correlations (Fornell and Larcker, 1981).

Structural model: In general, the fit indexes of our structural model were overall satisfactory: CMIN = 383.871, df = 191, p<0.000, CFI = 0.959, NFI = 0.923, RFI = 0.907, IFI = 0.960, TLI = 0.951, FMIN = 1.315, RMSEA = 0.059, AIC = 551.871. We then examined each path's significance level. As expected, the indirect effect of life-satisfaction between leisure activities and mobile addiction was significant. Specifically, the

Table 2: Measurement model

Construct/Items	SL	p-values	Cronbach's alpha	CR	AVE
Mobile addiction					
Addiction 1	0.784	***	0.930	0.931	0.628
Addiction 2	0.843	***			
Addiction 3	0.875	***			
Addiction 4	0.770	***			
Addiction 5	0.799	***			
Addiction 6	0.824	***			
Addiction 7	0.668	***			
Addiction 8	0.758	***			
Life-satisfaction					
Satisfaction 1	0.837	***	0.890	0.893	0.627
Satisfaction 2	0.760	***			
Satisfaction 3	0.892	***			
Satisfaction 4	0.756	***			
Satisfaction 5	0.700	***			
Leisure activities					
Emotiona l1	0.680	***	0.885	0.887	0.665
Emotiona l2	0.854	***			
Emotiona l3	0.875	***			
Emotiona l4	0.838	***			
Physical 1	0.926	***	0.947	0.947	0.856
Physical 2	0.916	***			
Physical 3	0.934	***			
Social 1	0.888	***	0.894	0.895	0.809
Social 2	0.911	***			

SL: Standard factor Loadings; CR: Composite Reliability; AVE: Average Variance Extracted; ***p<0.001

path from leisure activities to life-satisfaction was significant (b = 0.669, t = 8.064, p<0.001). Also, the path from life-satisfaction to mobile addiction was significant (b = - 0.208, t = -2.122, p<0.05) (Fig. 2).

Table 3: Squared correlations and AVE

Construct	Mobile addiction	Life-satisfaction	Leisure activities
Mobile addiction	0.628	-	-
Life-satisfaction	0.020	0.627	-
Leisure activities	0.000	0.269	0.761

Average Variance Extracted (AVE) in brackets

Table 4: Multi-group SEM

	Low group			High group		
Path	β	t-values	p-values	β	t-values	p-values
Leisure activities→ Life-satisfaction	0.599	4.851	p<0.001	0.691	5.785	p<0.001
Life-satisfaction→ Mobile addiction	-0.181	-1.513	p = 0.13	-0.405	-2.667	p<0.01
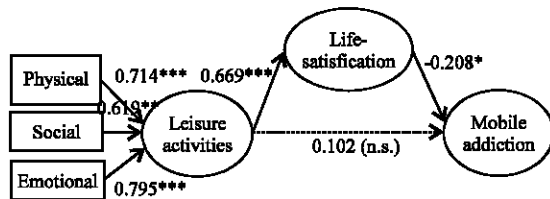
Fig. 2: Structural model; ***$0<p\leq0.001$; **$0.001<p\leq0.01$; *$0.01<p\leq0.05$

Multi-group structural equation model: we divided our participants into two groups based on the score of self-control through a median split. The median was 4.67. About half of them belonged to a low self-control group (n = 161; 54.9%) while the other half belonged to a high self-control group (n = 132; 45.1%). For the analysis, we dummy coded each group (0 = low, 1 = high).

Although, the path from leisure activities to life-satisfaction was significant in both groups, the path from life-satisfaction to mobile addiction was different by group. Specifically, the link between life-satisfaction and mobile addiction was significant to the high self-control group. However, the effect became insignificant to the low self-control group. The results are summarized in Table 4.

CONCLUSION

In summary, the findings empirically show that leisure activities significantly reduce mobile addiction through life-satisfaction. Yet, the results hold only for the high self-control group while the results become insignificant for the low self-control group. Therefore, the findings suggest that additional care and support is needed for those with low self-control to reduce their mobile addiction.

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