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Musical Habits and Smartphone Addiction: Mediating Role of Self-Control

Emergent Research Forum (ERF)

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Abstract

Smartphone overuse has led to many issues, one of which is smartphone addiction. At the same time, musical habits including (1) music listening, and (2) music playing and creating are becoming increasingly popular. Built on the theories of habit and self-control, the purpose of study was to examine how these two musical habits influence smartphone addiction. We found that self-control served as a mediator of the relationships between these musical habits and smartphone addiction. Our results also showed that the interaction between musical listening habit and musical preference positively affected self-control, while music playing and creating habit negatively affected it. This study has both theoretical and practical contributions to preventing and/or reducing smartphone addiction.

Keywords

Music listening, music playing and creating, smartphone addiction, self-control, music preference.

Introduction

With the advancement of mobile technology, smartphone use is prevalent over the world. Statista (2019a) predicted that 2.87 billion of the population around the world would use smartphone by 2020. However, smartphone overuse has led to many issues including smartphone addiction. We define smartphone addiction as a motivational behavior regarding the pathological dependency on smartphone use regardless of physiological, psychological, and behavioral consequences. Meanwhile, two types of musical habits (i.e. music listening, and music playing and creating) have been integrated into the fabric of people's daily lives in recent years (Statista 2019b and c). For example, nearly 70 percent of Americans listen to music daily, with the younger generations having even higher percentages (Statista 2019b). The popularity of music engagement including music playing and creating is manifested by growing market in musical instruments with US\$4,287 million revenue and a 3.2% growth in 2019 (Statista 2019c).

In the information systems (IS) field, technology adoption research has been extensively conducted (e.g., Davis 1989). Currently, a growing IS research attention has been placed on the dark side of technology adoption. For example, IS researchers have investigated on the associates (e.g., technology use habit and work conflicts) of technology addiction such as internet addiction, social network sites addiction, and smartphone addiction (Ning et al. 2018; Serenko and Turel 2020; Turel et al. 2011; Venkatesh et al. 2019).). To reduce the myriad harms such as low academic performance, high family conflict, and poor job outcomes due to people's technology addiction, we should exert more effort on identifying its antecedents. Thus, this study aimed to examining the mechanisms through which the musical habits influence smartphone addiction.

Accordingly, this study has theoretical and practical contributions. Firstly, we built a research model of the relationships between musical habits and smartphone addiction and the mediating role of self-control (see Figure 1). Secondly, practitioners can take advantage of the findings in this study to fight against smartphone addiction (e.g. developing and using music apps to increase self-control).

Literature Review and Hypotheses

Habits and Self-Control

Implicit goal models of habit posit that habits, as associative learning process, are developed when people repeatedly pursue goals (Aarts and Dijksterhuis 2000). Guided by these models, one approach was recently addressed about how habits affect self-control. This approach asserts that if habits can generate positive affect (i.e. emotion and mood), people will deliberately monitor their repeated behaviors and infer that they can achieve their goals. It is such positive affect and the associated goal inference that link the positive relationship between habits and self-control (Wood & R nger, 2016). Similarly, if habits generate negative affect, people will have low self-control.

The strength model of self-control states that people have limited internal resources such as willpower and glucose that have an association with self-control (Baumeister et al. 2007; Muraven and Baumeister 2000). These internal resources will be exhausted following physical and mental exertion, which is referred as ego depletion. Baumeister et al (1994) proposed that emotional distress contributes to the break downs in self-control. Baumeister (2002) also found that stress and coping with stress can deplete the one's internal resources that are used to implement self-control. To restore from ego depletion, Tice et al. (2017) found that the manipulated positive affect (i.e., emotion or mood) after an ego depletion boosts the self-control on subsequent tasks because the positive affect can return a person to a neutral physiological state from the negative affect.

In summary, from the above two models and the associated research evidence, we first propose that music listening habit only influences self-control with other factors such as musical preference. Second, we propose that musical playing and creating habit can produce stress and negative affect, which will lower self-control.

Music Listening Habit, Music Preference, and Self-Control

In the discipline of music, the impact of music on stress and affect has been found to be dependent on many factors including music preference and person (Juslin and Sloboda 2001). Music preference refers to an individual's predisposition toward a specific type or style of music that are related to music characteristics such as tempo and mode (Vanstone et al. 2016). Music researchers have repeatedly found that happy music is typically played in fast tempo and major mode, whereas sad music is characterized by slow tempo and minor mode (e.g. Pallesen et al. 2005). So far, several studies have shown that music preference affects people's intensity of emotion and mood (e.g. Swaminathan and Schellenberg 2015).

For normal people, they often listen to music either to regulate their affect or to enjoy it as an art. Happy music can generate positive affect and enhance the energy levels because it activates the ventral and dorsal striatum that are involved in reward experience. Sad music typically leads to negative affect since it involves the activation of the hippocampus and amygdala that are important for memory and emotion processing (Mitterschiffthaler et al. 2007; Saarikallio and Erkkilä, 2007). Some researchers also claimed that sad music can induce a pleasant emotion (Kawakami et al., 2013) when the listeners have a sweet anticipation from the sad music (Huron, 2006) and/or evaluate it as art and thus have enjoyment from listening to it (Koelsch, 2012). For those people who are under chronic negative affect and stress, listening to happy music can reduce their stress (Chafin et al. 2004; Getz et al. 2014). However, this group of people are more likely to listen to sad music, which ultimately enhances their current negative affect instead of alleviating it (Millgram et al. 2015; Yoon et al., 2019).

Given the above research evidence, we expect that musical listening itself does not affect self-control because its impact depends on both musical preference and person. Therefore, we hypothesize that music listening habit is not related to self-control (H1). We expect that people's music preference interacts with their music listening habit in influencing their affect and stress. Specially, for the normal people who prefer listening to happy music over sad music, they are supposed to have positive affect and less stress. For the normal people who like to listen to sad music, they may experience positive affect and less stress when they evaluate the music as an art and have sweet anticipation from it, or otherwise experience negative affect and more stress. For a small population who has mental issues (e.g., being chronically stressed and having long-term negative affect), they prefer listening to sad music, which can worsen their situation. Since the normal people outnumber the people with mental issues, we therefore hypothesize that overall the interaction between music listening habit and music preference is positively related to self-control (H2).

Music Playing and Creating Habit and Self-Control

Some may think that people such as musicians who play and/or create music are happy as they expose to music frequently that alleviates their stress and induces positive moods. However, research has showed that musicians tend to be more prone to negative thought patterns (e.g. Jones et al. 2014) and depression (e.g. Young et al. 2013) because they have higher levels of stress than normal people due to music playing and creating. For example, Getz et al. (2014) found that participants who had more experience with music training suffered with long-term stress and had less optimism that serves as a buffer to stress. Similarly, Roy et al. (2016) mentioned that college students' musical ability was positively related to short-term stress.

Moreover, for musicians or people with great musical ability, they tend to analytically and intelligently listen to music rather than do it to regulate the distressful emotions (Getz et al. 2012). Thus, the ego depletion will occur because they exert a great amount of mental effort to analyzing the music while listening to it, which lowers their self-control. Also, as mentioned above, some of them may use music to regulate their emotions and moods but in a negative direction because they incline to listening to and/or playing and creating sad music (Swaminathan and Schellenberg 2015). Such an emotional distress due to sad music exposure accelerates the

decrease of their self-control. Thus, we hypothesize that music playing and creating habit is negatively related to self-control (H3).

Self-Control and Smartphone Addiction

In recent years, an increasing number of studies on smartphone addiction has also shown that individuals' deficits in self-control are typically associated with the risk of developing smartphone addiction (Jeong et al. 2016; Kim et al. 2016; Mahapatra 2019). With the aid of neurological tools, researchers also found that the dysfunction of neural correlates such as orbitofrontal cortex (OFC; impulse control) and left anterior cingulate cortex (ACC; affect regulation) are related to internet addiction (Lin et al. 2012; Zhou et al. 2011). Thus, we hypothesize the self-control is negatively related to smartphone addiction (H4).

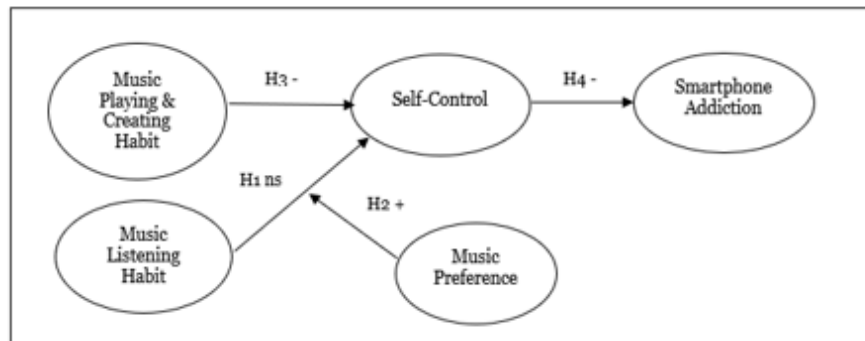


Figure 1. Research Model

Methodology

Participants and Research Design

A total of 290 undergraduate students from a southern university in U.S participated in this study. The participants earned class credit for their engagement. It took the participants approximately 10 minutes to fill out the online consent form and self-report surveys that measure their demographic information (e.g., age and gender), social desirability, two types of musical habits, smartphone addiction, self-control, and music preference.

Measures

We used the scales developed by Kwon et al. (2013) and Maloney et al. (2012) to measure smartphone addiction and self-control, respectively. We measured the music listening habit, music playing and creating habit, and music preference with relevant items from the survey by Vanstone et al. (2016). As mentioned previously, we also measured the social desirability bias with the short form of the Marlowe-Crowne social desirability scale (Reynolds, 1982). The main variables of interests will be modeled as reflective constructs.

Data Analyses

Firstly, we used Pearson correlation to examine the relationships between the variables previously mentioned. Secondly, we examined the common method bias with the marker variable technique (Malhotra et al. 2006). Moreover, we conducted a partial least squares (PLS) estimation with SmartPLS 2.0. to test both the measurement model and structural model by Ringle et al. (2005). Finally, we statistically controlled for the impact of age, sex, smartphone use habit, and social desirability on both self-control and smartphone addiction.

Results

Model 1 in Figure 2 shows that musical habits were not significantly related to smartphone addiction. Model 2 in Figure 3 indicates that self-control mediated the impact of music playing and creating habit on smartphone addiction. Specifically, music playing and creating habit ($\beta = -0.15$, $p < 0.01$) had a negative impact on self-control, and self-control ($\beta = -0.35$, $p < 0.001$) negatively affected smartphone addiction. As expected, music listening habit ($\beta = 0.02$, $p > 0.05$) was not a significant predictor of self-control. But the interaction ($\beta = 0.14$, $p < 0.01$) between music listening and music preference significantly influenced self-control.

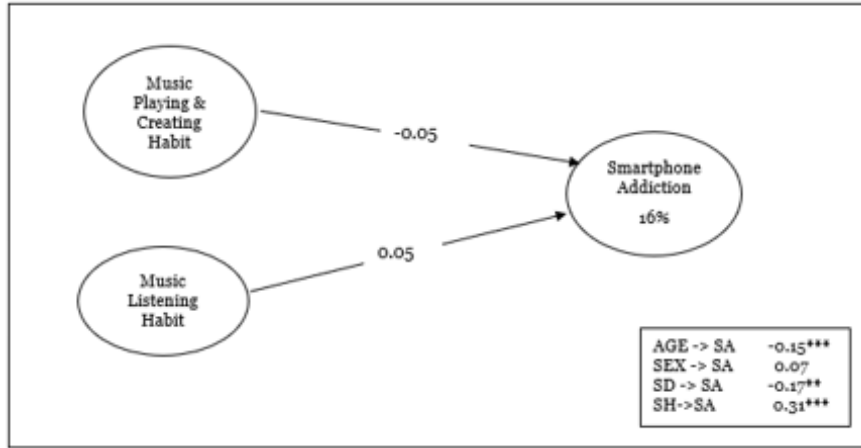


Figure 2. Model 1

Notes: *p < .05; **p < .01; ***p < .001.
SD=social desirability; SA=smartphone addiction; SH=smartphone use habit.

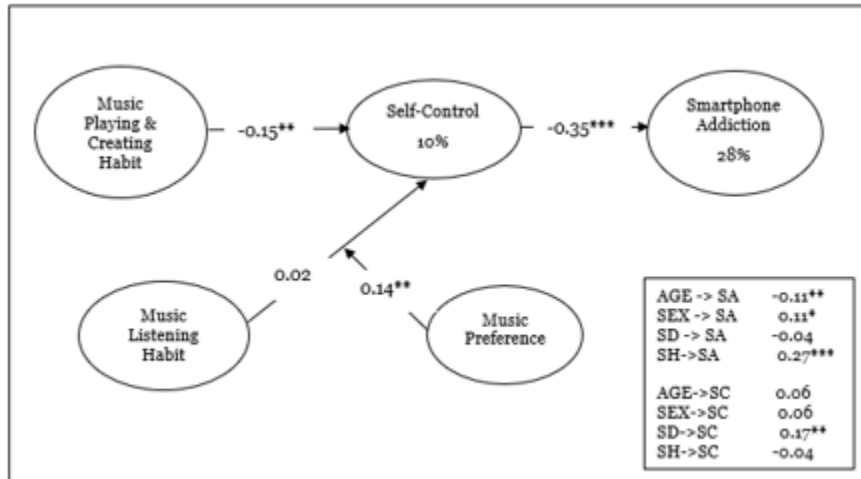


Figure 3. Model 2

Notes: *p < .05; **p < .01; ***p < .001.
SD=social desirability; SA=smartphone addiction; SH=smartphone use habit.

REFERENCES

Aarts, H. and Dijksterhuis, Ap. 2000. "Habits as Knowledge Structures: Automaticity in Goal-Directed Behavior," *Journal of Personality and Social Psychology* (78:1), pp. 53-63.

Aarts, H. and Dijksterhuis, Ap. 2000. "The Automatic Activation of Goal-Directed Behavior: The Case of Travel Habit," *Journal of Environmental Psychology* (20), pp. 75-82.

Baumeister, R. F., Heatherton, T. F., and Tice, D. M. (1994). "Losing Control: How and Why People Fail at Self-Regulation," San Diego, CA: Academic Press.

Baumeister, R. F. (2002). "Yielding to Temptation: Self-Control Failure, Impulsive Purchasing, and Consumer Behavior," *Journal of Consumer Behavior* (28:4), pp. 670-676.

Baumeister, R. F., Vohs, K. D., and Tice, D. M. 2007. "The Strength Model of Self-Control," *Current Directions in Psychological Science* (16:6), pp. 351-355.

Chafin, S., Roy, M., Gerin, W., and Christenfeld, N. 2004. "Music Can Facilitate Blood Pressure Recovery from Stress," *British Journal of Health Psychology* (9), pp. 393-403.

Davis, F. 1985. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3), pp. 319-340.

Getz, L. M., Marks, S., and Roy, M. 2014. "The Influence of Stress, Optimism, and Music Training on Music Uses and Preferences," *Psychology of Music*.

- Huron, D. 2006. *Sweet anticipation: Music and the psychology of expectation*. Cambridge, MA: MIT Press.
- Jeong, S-H., Kim, H., Yum, J-Y., and Hwang, Y. 2016. "What Type of Content Are Smartphone Users Addicted to?: SNS vs. Games," *Computers in Human Behavior* (54), pp. 10-17.
- Jones, M., M. M. Roy and J. Verkuilen. 2014. "The Relationship Between Reflective Rumination and Musical Ability," *Psychology of Aesthetics, Creativity and the Arts* (8), pp. 219-226.
- Juslin, P. N., and Sloboda, J. A. 2001. Series in affective science. *Music and Emotion: Theory and Research*. New York, NY, US: Oxford University Press.
- Kawakami, A., Furukawa, K., Katahira, K., and Okanoya, K. 2013. "Sad Music Induces Pleasant Emotion," *Frontiers in Psychology* (4), Article 311.
- Kim, Y, Jeong, J-E., Cho, H., Jung, D.J., Kwak, M., Rho, M. J., Yu, H., Kim, D-J., and Choi, I. Y. 2016. "Personality Factors Predicting Smartphone Addiction Predisposition: Behavioral Inhibition and Activation Systems, Impulsivity, and Self-Control," *PLoS ONE* (11:8).
- Koelsch, S. (2012). *Emotion. Brain and Music*. WestSussex, UK: Wiley-Blackwell.
- Kwon, M., Kim, D. J., Cho, H., and Yang, S. 2013. "The Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents," *PLOS ONE* (8:12), e83558.
- Lin, F., Zhou, Y., Du, Y., Qin, L., Zhao, Z., Xu, J., and Lei, H. 2012. "Abnormal White Matter Integrity in Adolescents with Internet Addiction Disorder: A Tract-Based Spatial Statistics Study," *PLOS ONE* (7:1), e30253.
- Mahapatra, S. 2019. "Smartphone Addiction and Associated Consequences: Role of Loneliness and Self-Regulation," *Behaviour & Information Technology* (38:8), pp. 833-844.
- Maloney, P. W., Grawitch, M. J., and Barber, L. K. 2012. "The Multi-Factor Structure of the Brief Self-Control Scale: Discriminant Validity of Restraint and Impulsivity," *Journal of Research in Personality* (46), pp. 111-115.
- Millgram, Y., Joormann, J., Huppert, J. D., and Tamir, M. 2015. "Sad as a Matter of Choice? Emotion-Regulation Goals in Depression," *Psychological Science* (26:8), pp. 1216-1228.
- Mitterschiffthaler, M. T., Fu, C. H., Dalton, J. A., Andrew, C. M., and Williams, S. C. 2007. "A Functional MRI Study of Happy and Sad Affective States Induced by Classical Music," *Human Brain Mapping* (28), pp. 1150-1162.
- Muraven, M., and Baumeister, R. F. 2000. "Self-Regulation and Depletion of Limited Resources: Does Self-Control Resemble A Muscle?" *Psychological Bulletin* (126:2), pp. 247-259.
- Ning, W., Davis, F., and Taraban, R. 2018. "Smartphone Addiction and Cognitive Performance of College Students," *Proceeding of Advances in Management Information Systems Research*, Americas Conference on Information Systems in New Orleans, LA.
- Reynolds, W. M. 1982. "Development of Reliable and Valid Short Forms of the Marlowe-Crowne Social Desirability Scale," *Journal of Clinical Psychology* (38:1), pp. 119-125.
- Ringle, C., Wende, S. and Will, A., 2005. "SmartPLS 2.0," University of Hamburg, Hamburg.
- Roy, M. M., Radzevick, J., and Getz, L. 2016. "The Manifestation of Stress and Rumination in Musicians," *Muziki: Journal of Music Research in Africa* (13:1), pp. 100-112.
- Saarikallio, S. and Erkkilä, J. 2007. "The Role of Music in Adolescents' Mood Regulation," *Psychology of Music* (35:1), pp. 88-109.
- Serenko, A. and Turel, O. (forthcoming). "Directing Technology Addiction Research in Information Systems: Part I. Understanding Behavioral Addictions," *The Data Base for Advances in Information Systems*.
- Statista. 2019a. "Number of Smartphone Users Worldwide from 2014 to 2020 (in billions)," (available online at <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>).
- Statista. 2019b. "U.S. Music - Statistics & Facts," (available online at <https://www.statista.com/topics/1639/music/>).
- Statista. 2019c. "Musical Instruments," (available online at <https://www.statista.com/outlook/19020000/109/musical-instruments/united-states>).
- Swaminathan, S. and Schellenberg, E. G. 2015. "Current Emotion Research in Music Psychology," *Emotion Review* (7:2), pp. 189-197.
- Tice, D. M., Baumeister, R. F., Shmueli, D., and Muraven, M. 2007. "Restoring the Self: Positive Affect Helps Improve Self-Regulation Following Ego Depletion," *Journal of Experimental Social Psychology* (43), pp. 379-384.
- Turel, O., Serenko, A. & Giles, P. 2011. "Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users," *MIS Quarterly* (35), pp. 1043-1061.
- Vanstone, A. D., Wolf, M., Poon, T., and Cuddy, L. L. 2016. "Measuring Engagement with Music: Development of An Informant-Report Questionnaire," *Aging and Mental Health* (20:5), pp. 474-484.
- Venkatesh, V., Sykes, T. A., Chan, F. K. Y., Thong, J. Y. L., and Hu, P. J. 2019. "Children's Internet Addiction, Family-to-Work Conflict, and Job Outcomes: A Study of Parent-Child Dyads," *MIS Quarterly* (43:3), pp. 903-927.
- Wood, W. and Rünger, D. 2016. "Psychology of Habit," *Annual Review of Psychology* (67:11), pp. 1-26.
- Yoon, S., Verona, E., Schlauch, R., Schneider, S., and Rottenberg, J. 2019. "Why Do Depressed People Prefer Sad Music?" *Emotion*.
- Young, L. N., E. Winner and S. Cordes. 2013. Heightened Incidence of Depressive Symptoms in Adolescents Involved in the Arts. *Psychology of Aesthetics, Creativity, and the Arts* (7:2), pp. 197-202.
- Zhou, Y., Lin, F.-C., Du, Y.-S., Qin, L., Zhao, Z.-M., Xu, J.-R., and Lei, H. 2011. "Gray Matter Abnormalities in Internet Addiction: A Voxel-Based Morphometry Study," *European Journal of Radiology* (79), pp. 92-95.