International Journal of Business and Social Science Research

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

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

Weihong Ning
Associate Professor
Department of Management Information Systems
School of Business
Central Connecticut State University
e-mail: weihong.ning@ccsu.edu
USA

Michael Gendron
Professor
Department of Management Information Systems
School of Business
Central Connecticut State University
e-mail: GendronM@ccsu.edu
USA

Joo Eng Lee-Partridge
Professor
Department of Management Information Systems
School of Business
Central Connecticut State University
e-mail: LeePartridge@ccsu.edu
USA

ARTICLE INFO

Article History:

Received	**: 20 March 2024**
Revised	**: 14 April 2024**
Accepted	**: 17 April 2024**
Publication	**: April 30, 2024**
DOI	**: 10.47742/ijbssr.v5n4p2**

https://orcid.org/0000-0002-4846-2568

ABSTRACT

This study uses theories of habit and self-control to explore the relationship between musical habits and smartphone addiction among college students. Our findings reveal that self-control mediates this relationship, with individual differences playing a significant role. While musical listening habits, impacted by personal genre preferences, positively impact self-control, active music engagement, through playing an instrument and/or creating music, negatively affects it. We suggest using interventions to promote mindful music engagement to mitigate smartphone addiction. These insights contribute to understanding how music habits influence digital behaviors and offer practical strategies for fostering healthier smartphone use among college populations.

Keywords: *Music listening, music playing and creating, smartphone addiction, self-control, music preference, college students*

1. Introduction

With the advancement of digital technology, smartphone use is prevalent all over the world. Statista (2022) predicted that 7.7 billion of the population around the world would use smartphones by 2027. Many smartphone users stated that they could not live without a smartphone (Observatory of Digital Uses, 2019, p. 9). One of the downsides of the prevalence of smartphones is smartphone addiction, especially among college students (Chen et al., 2019; Tayhan Kartal and Yanbanci Ayhan, 2020; Lin et al., 2016; Shahjehan et al., 2021; Yilmaz et al., 2023). Prior research has indicated that smartphone addiction can lead to negative impacts such as detrimental consequences in personal life, health, cognitive performance, and workplace performance (see for example, Charoensukmongkol, 2016; Chidambaram et al., 2022; Geng et al., 2021; Kayis et al., 2021; Chandrasekaran et al., 2019; Nongpong & Charoensukmongkol, 2016; Shahjehan et al., 2021; Zhao et al., 2021).

Meanwhile, music engagement (Bowman, 2004; Upadhyay et al., 2017; Wöllner et al., 2010), which includes two types of musical habits (music listening and music playing and creating), has been integrated into the fabric of people's daily lives in recent years (Statista, 2019a and b). Nearly 70 percent of Americans listen to music daily, with the younger generations having even higher percentages (Statista, 2019a). For example, the revenue from paid subscriptions of streaming music was US$60.4 million in 2019 compared to US$10.8 million in 2015 (Perez, 2020). The popularity of music production including music playing and creating is manifested in a growing market in musical instruments with US$4,287 million in revenue and a 3.2% growth in 2019 (Statista, 2019b). Further, the music production software market is projected to grow by US$ 368.15 million during 2020-2024 ("Music Production Software Market Analysis" 2020). Prior research has shown that social media use and online gaming are substantial predictors of smartphone addiction (Liu et al., 2016; Wang & Lee, 2020; Yang et al., 2022). Given the increasing use of online music streaming and production (Yang et al., 2020), we raise the question of the relationship between musical habits and smartphone addiction.

Given the number of people who are addicted to smartphones (Kuem et al., 2021), scholars should seek to identify the antecedents to reduce the innumerable harms caused by this addiction. So far, scholars have agreed that technology use habits

International Journal of Business and Social Science Research

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

and self-control are two main predictors of technology addiction (Soror et al., 2015; Turel & Bechara, 2016; Turel & Qahri-Saremi, 2016; van Deursen et al., 2015). For example, Turel & Bechara (2016) found that online social network use positively predicted online social network addiction and self-control negatively affected it. Also, Turel & Qahri-Saremi (2016) found that self-control is not only negatively associated with problematic uses of Facebook, but also negatively predicted Facebook use habits. Other research has also shown that smartphone use habits and self-control were positively related to smartphone use frequency and duration (Soror et al., 2015) and are thus significant contributors to smartphone addiction (van Deursen et al., 2015). In other academic fields, researchers have identified self-control as a mediator of the relationship between predictors (e.g., envy, physical activity) and smartphone dependence and addiction (Zhang & Xiang, 2022; Zhong et al., 2020). Although evidence has been provided to show a close relationship between technology use habits and self-control and technology addiction, the impact of other life habits on smartphone addiction remains unexplored.

Expanding on previous research, this study uses a survey to study musical habits and smartphone use among college students. We aim to examine how musical habits interact with self-control in influencing smartphone addiction.

This study offers both theoretical and practical contributions. Theoretically, it employs dual-systems theories to build a research model of the relationships between musical habits and smartphone addiction and the mediating role of self-control (see Figure 1). This expands the Information Systems literature on the negative aspects of technology adoption and usage, while also contributing to interdisciplinary research at the intersection of music and Information Systems. Practically, the findings of this study can be leveraged by practitioners to address college students' smartphone addiction. For instance, they can utilize music as a tool to enhance self-control, such as developing and implementing music-based applications aimed at reducing smartphone dependence. The remainder of this study is organized as follows. First, we present the theoretical background and propose the hypotheses. Next, we discuss the research methodology containing participants, measures, and analytical approach. Finally, we display the results and discuss the implications.

2. Theoretical background

2.1. Smartphone Addiction

Technology addiction, noted by Turel (2011), is the maladaptive dependence on technology use with accompanying negative consequences (e.g., salience, withdrawal, conflict, relapse and reinstatement, tolerance, and mood modification). Also, technology addiction, including smartphone addiction, is considered a category of behavioral addiction because of such similarities as continuous uncontrollability (Hooper & Zhou, 2007). Based on prior studies (Liu et al., 2016; Wang & Lee, 2020; Yang et al., 2022), we define smartphone addiction as a continuously maladaptive and uncontrollable smartphone use at the expense of negative physiological, psychological, and behavioral consequences. We recognize that this definition is by no means fixed as the terminology of smartphone addiction may change given future research and associated conceptual adaptations (Montag et al., 2021).

2.2. Musical Habits

Habits are often interpreted as 'learned sequences of acts that become automatic responses to specific situations which may be functional in obtaining certain goals or end states' (Verplanken et al., 1997, p. 540). According to the review by Wood and Rünger (2016), habits are goal-directed actions that reflect associative learning, which in turn affects self-control. Since musical habits and musical engagement are interchangeably used (Bowman, 2004; Upadhyay et al., 2017; Wöllner et al., 2011), we define musical habits as learned musical acts to achieve individual goals or states, and we follow Vanstone et al. (2016) by categorizing musical habits into (1) musical listening and (2) musical playing and creating.

Musical habits, whether listening or playing and creating, are goal-achieving actions. People listen to music daily to regulate their emotions (Bautch, 2020). For those who play instruments and/or create music, there is a desire to improve their musical skills. When faced with distractions, a choice has to be made between spending time on the music or allowing oneself to be distracted. As stated earlier, there is an increasing number of online music streaming and music production options that are likely to drive increased smartphone usage. This leads us to ask how musical habits like listening and creating affect smartphone usage and addiction.

2.3. Dual-Systems Theory

We examine the impact of musical habits on smartphone addiction based on the dual-systems theory (see Evans, 2008 for a review). According to the theory and existing literature (e.g. Everitt et al., 2008; Kahneman, 2003; Stanovich & West, 2000), humans process information through two structurally distinctive systems: System 1 (e.g. habit) and System 2 (e.g. self-control). System 1 is holistic, automatic, goal-oriented, emotionally charged, and relatively fast, while System 2 is rule-based, analytical, controlled, and relatively slow. Moreover, the two systems interact with each other to generate various behaviors. In recent years, some scholars have claimed that habits can influence self-control (see Carden & Wood 2018, for a review). For example, if a habit achieves goals, it can reduce the need for self-control and thus enhance desired behaviors or performance (Carden & Wood, 2018).

The dual-system theory has been particularly useful in explaining the etiology of problematic behaviors, such as problem gambling, overeating, problematic drinking, and smoking (Evans, 2008). IS scholars have used it to examine and explain the etiology of technology addiction (Gong et al., 2019; Ning et al., 2021; Osatuyi & Turel, 2018; Soror et al., 2015; Turel and Qahri-Saremi, 2016). For instance, Turel and Qahri-Saremi (2016) found that both Facebook use habits and self-control significantly predicted problematic use of Facebook. They also found that self-control is negatively associated with Facebook use habits. Given the similarities between smartphone addiction and these problematic behaviors (e.g., behavioral addiction and technology addiction), we sought to apply the dual-system theory to explain how musical habits interact with self-control to influence smartphone addiction.

3. Model Development

In this paper, we explore how musical habits interact with self-control to impact smartphone addiction. Per the dual systems

International Journal of Business and Social Science Research
Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

theory, musical habits are System 1 and self-control is System 2. While acknowledging that habits include both automaticity and goal pursuit, musical habits as defined in our study are focused more on goal pursuit. Figure 1 presents the theoretical model in this study. The model suggests that music listening habits only influence self-control with musical preference. The model then indicates that musical playing and creating habits can lower self-control. Finally, the model posits that self-control will hurt smartphone addiction.

3.1. Habits and self-control

According to the dual-systems theory, habits can interact with self-control (e.g. Evans, 2008). Guided by this theory, Wood and Rünger (2016) set up an approach to address the effect habits have on self-control. This approach asserts that if habits can generate positive affect (i.e., emotion or mood), people will deliberately monitor their repetitive behaviors and infer that they can achieve their goals. It is such positive affect and the associated goal inference that links the positive relationship between habits and self-control. Similarly, if habits generate negative effects, people will have low self-control.

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

From the dual-systems theory and the strength model of self-control, we conclude that the impact of habits on people's self-control depends on the effect that is associated with a habit and how people deal with the effect. That is, if a habit generates a positive effect, it can increase people's self-control, or vice versa. Of course, a habit may not be associated with self-control if the effect is neutral. Meanwhile, if people can cope with their affect well even when they are in negative affect, they can increase their self-control, or vice versa.

3.1.1. Music Listening Habit, Music Preference, and Self-Control

In the discipline of music, the impact of music on stress and affect is dependent on many factors, including music preference and individual differences (Juslin & Sloboda, 2001; Swaminathan & Schellenberg, 2015). Music preference refers to an individual's predisposition toward a specific type or style of music related to music characteristics such as tempo (i.e., the speed at which a piece of music is played) and mode (i.e., a scale pattern with unique qualities and sound) (Vanstone et al., 2016). Generally, happy music is played in a fast tempo and major mode, whereas sad music is characterized by a slow tempo and minor mode (e.g., Pallesen et al., 2005). Although music researchers have only examined relationships between people's interest in listening to happy or sad music and the associated effects, we use this limited literature to develop hypotheses on the impact of music listening habits and music preference on self-control.

Happy music can generate positive effects and enhance energy levels because it activates the ventral and dorsal striatum that are involved in the reward experience. Sad music typically leads to negative effects since it involves the activation of the hippocampus and amygdala which are important for memory and emotion processing (Mitterschiffthaler et al., 2007; Saarikallio and Erkkilä, 2007). Some researchers claimed that sad music can also 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, 2013).

Most people listen to music either to regulate their affect or to enjoy it as an art. Often, they prefer listening to happy music over sad music, which results in positive affect and less stress. Those who like to listen to sad music may experience positive effects and less stress when they evaluate the music as art and have sweet anticipation from it; otherwise, they will experience negative effects and more stress. For people with issues like being chronically stressed and having long-term negative effects), listening to happy music can reduce their stress (Chafin et al., 2004; Getz et al., 2012). However, this group of people seems to prefer listening to sad music, which can worsen their situation and ultimately increase their current negative affect instead of alleviating it (Millgram et al., 2015; Yoon et al., 2019).

Given the above evidence, we expect that the impact of musical listening habits on self-control depends on both musical preference (happy and/or sad) and individual disposition. Therefore, it would suggest that music listening habits are not related to self-control. We also expect that music listening habits with musical preference overall generate more positive effects than negative effects. We thus hypothesize that

H1: *Music preference moderates the relationship between music listening habits and self-control, such that the positive effect of music listening habits on self-control is stronger when music preference is strong.*

3.1.2. 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 are exposed to music frequently that alleviates their stress and induces positive moods. However, research has shown 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 associated with music playing and creation than those who do not perform or create music. For example, Getz et al. (2012) found that participants who had more experience with music training suffered from long-term stress and had less optimism which served as a buffer to stress. Similarly, Roy et al. (2016) showed that college students' musical ability was positively related to short-term stress.

Moreover, musicians or people with great musical ability tend to analytically and intelligently listen to music rather than listening to regulate distressful emotions (Getz et al., 2011). Thus, ego depletion will occur because they exert a great amount of

International Journal of Business and Social Science Research
Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

mental effort in 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 are inclined to listen to and/or play and create sad music (Swaminathan and Schellenberg, 2015). Such emotional distress due to sad music exposure accelerates the decrease of their self-control. Thus, we hypothesize that

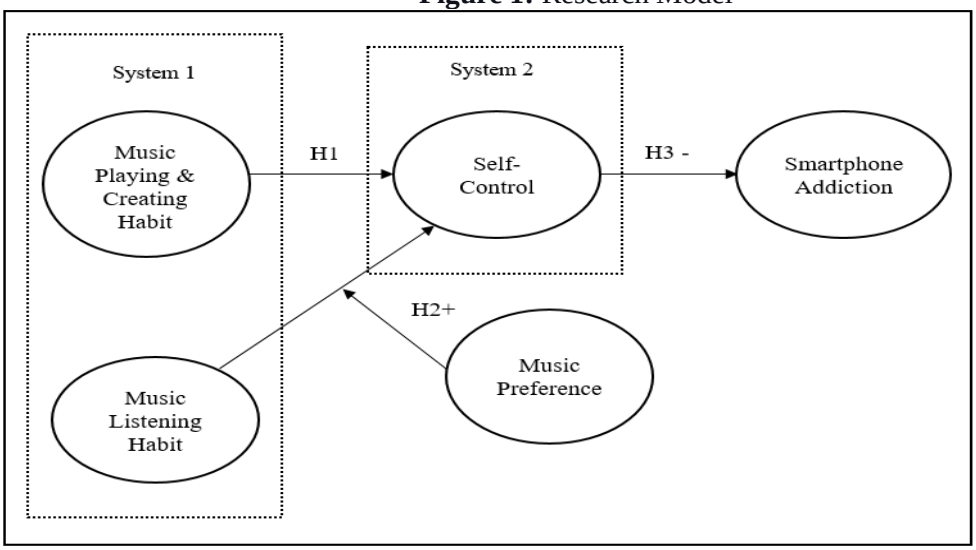
H2: *Music playing and creating habits is negatively related to self-control.*

3.2. 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; Zhang & Xiang, 2022; Zhong et al., 2020). In these behavioral studies, self-control was either a predictor or mediator of smartphone addiction. For example, Mahapatra (2019) found that adolescents' self-control was negatively related to their smartphone addiction. Also, college students with poor self-control due to physical inactivity had higher smartphone dependence (Zhong et al., 2020). 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 linked to internet addiction (Lin et al., 2012; Zhou et al., 2011). Thus, we hypothesize that

H3: *Self-control is negatively related to smartphone addiction.*

Figure 1: Research Model



4. Methodology

4.1. Participants and Research Design

A total of 290 college students (Mean age = 21.14, SD = 3.41) from a southern university in the U.S. participated in this study. The participants earned class credit for their engagement by filling out the online consent form and self-report surveys that measured their demographic information (e.g., age and gender), social desirability, two types of musical habits, smartphone addiction, self-control, and music preference. The participants consisted of 39% male and 61% female; 2.5% were freshmen, 4.1% were sophomores, 25.3% were juniors, 48.6% were seniors, and 19.5% were graduate students.

4.2. Common Method Bias

Common method bias is a potential threat to the validity of a survey that uses single respondents for both the independent and dependent data (Podsakoff et al., 2003). We addressed this issue with the following methods. First, we collected the data online via Qualtrics using a multi-wave approach (e.g., Turel and Qahri-Saremi, 2016). Specifically, our participants filled out a survey measuring their demographic information, music listening habits, music playing and creating habits, and music preferences. Two days later, we sent them another survey that measured their social desirability, physical activity participation, self-control, and smartphone addiction. Second, we informed participants of the importance of the study and provided them with an explanation of some terminologies that could be confusing. Third, we used the marker variable technique (Malhotra et al., 2006) by incorporating physical activity participation questionnaires (Prochaska et al., 2001) in the survey. The analysis showed that the average correlation between participants' physical activity participation and the main variables was 0.07. It also indicated that the adjusted correlations between the main variables remained significant after including the marker variable in the partial least squares structural equation modeling (PLS-SEM). Thus, we are confident that the common method bias was not an issue in the current study.

4.3. Measures

Appendix A displays the items of measures used in our study. We used the 10-item multidimensional scale (i.e., daily-life disturbance, withdrawal, cyberspace-oriented relationship, overuse, and tolerance) developed by Kwon et al. (2013) to measure smartphone addiction. Example items are "Missing planned work due to smartphone use" and "Using my smartphone longer than I had intended". This scale is rated on a 6-point Likert scale from 1 "Strongly disagree" to 6 "Strongly agree". The internal consistency reliability coefficient of the scale is 0.91.

Self-control was measured with the 8-item two-factor scale (i.e., restraint and impulsivity) by Maloney et al. (2012). Example items of the scale are: "I have a hard time breaking bad habits" and "Pleasure and fun sometimes keep me from getting work done". These items are rated on a 5-point Likert scale ranging from 1 "Not at all like me" to 5 "Very much like me". The internal consistency reliability coefficients are 0.72 for restraint and 0.73 for impulsivity.

International Journal of Business and Social Science Research

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

We measured music listening habits, music playing and creating habits, and music preferences with relevant items by Vanstone et al. (2016). The selection and modification of the items for these variables were made through consultation with a music expert. For example, we selected "I listen to music while I perform chores or boring tasks" for the music-listening habit, "I play a musical instrument for pleasure" and "I create my music" for the music-playing and creating habit. To increase the content validity, we added "such as classical, rock, and/or country" to the original item and "I show specific preferences for certain types of music" for musical preference. This scale is rated on a 5-point Likert scale that ranges from 1 "Not at all" to "Very much". The internal consistency reliability coefficient of the scale is 0.92.

As mentioned previously, we also measured the social desirability bias with the short form of the Marlowe-Crowne social desirability scale (Reynolds, 1982). The scale has 13 items including statements such as "It is sometimes hard for me to go on with my work if I am not encouraged". Each item is rated as "True" or "False". The "True" is assigned one point and the "False" is assigned zero points. A high total score of the 13 items indicates a social desirability response tendency. The internal reliability of the scale is 0.76.

4.4. Data Analyses

We first examined the means, standard deviations, and Pearson correlations as the preliminary analyses for the main variables previously in our study. Then we conducted a partial least squares (PLS) estimation with SmartPLS 4.0. to test both the measurement model and structural model by Ringle et al. (2022). In terms of the measurement model, we initially treated all the constructs with reflective indicators and then examined the composite reliability (internal consistency), convergent validity, and discriminant validity of the reflective model. As displayed in our research model in Figure 1, (1) music playing and creating habits and (2) music listening habits are the independent variables, and smartphone addiction is the dependent variable in the structural model. Besides, self-control serves as the mediator of the associations between them, and music preference is the moderator of the association between music listening habits and self-control. To evaluate the structural model, we used coefficients of determination (R2) and significance of path coefficients, while statistically controlling for the impact of age, gender, and social desirability on both self-control and smartphone addiction.

5. Results

5.1. Assessment of Measurement Model

As mentioned above, we assessed the psychometric quality of the measures with three criteria: (1) composite reliability, (2) convergent validity, and (3) discriminant validity. When the composite reliability value is greater than 0.70, a measure is considered internally reliable (Nunnally and Bernstein 1994). Table 1 shows that all the values of the composite reliability exceed 0.70, which indicates that all the constructs were reliable. When the AVE for each construct exceeds 0.50 and when indicator items have higher loadings on their focal construct and lower ones on the alternative constructs within the model, convergent validity is supported (Chin, 1998; Gefen & Straub, 2005). As displayed in Table 1, after the removal of some items (i.e., items 3 and 6 of self-control), all the AVE values in the model were equal to or greater than 0.50, which indicated that each construct accounted for the majority of the variance in its items. Table 2 also shows that each of the measurement items loaded significantly higher on their focal construct than on other constructs. Based on these results, the convergent validity is evident. When a construct has its square root of the AVE that exceeds the inter-construct correlations, it is discriminant valid (Chin, 1998; Fornell & Larcker, 1981). As indicated in Table 1, the square root of the AVE of each construct exceeded the correlations between the focal construct and other constructs. With the above results, our measurement model concurs the reliability, convergent validity, and discriminant validity. Besides, the variance inflation factors (VIF) between variables range from 1.028 to 1.071, which indicates no collinearity.

Table 1: Summary Statistics

Construct	Mean	SD	AVE	CR	1	2	3	4	5	6	7	8
1. Age	22.14	3.41										
2. Gender	1.58	0.50										
3. Social desirability	6.55	2.78	1.00	1.00	0.19**	-0.02						
4. Smartphone addiction	2.61	0.95	0.50	0.89	-0.21**	0.19**	-0.17**	**0.71**				
5. Self-control	3.30	0.77	0.50	0.83	0.11	0.04	0.20**	0.33**	**0.71**			
6. Music listening habit	4.15	0.96	0.74	0.89	-0.10	0.12*	0.02	0.08	-0.07	**0.87**		
7. Music playing & creating habit	1.78	1.05	0.76	0.86	0.01	-0.11	0.12*	-0.03	-0.15*	0.17**	**0.87**	
8. Music Preference	4.03	0.90	0.88	0.94	-0.00	0.11	-0.07	0.07	-0.04	0.18**	0.00	**0.75**

Note: *p < 0.05; **p < 0.01.
SD=standard deviation; AVE=average variance explained; CR=composite reliability.
Square root of the AVE on the diagonal.

Table 2: Loadings and Cross Loadings

Construct		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Smartphone addiction (SA)	SA1	**0.64**	-0.35	0.06	0.02	0.06
	SA2	**0.72**	-0.35	0.18	-0.02	0.13
	SA3	**0.60**	-0.24	0.08	0.11	0.08
	SA4	**0.66**	-0.18	0.04	-0.04	0.00
	SA5	**0.79**	-0.26	0.04	-0.04	-0.03
	SA6	**0.75**	-0.20	0.05	-0.05	-0.00
	SA7	**0.63**	-0.23	-0.06	-0.04	-0.09
	SA8	**0.67**	-0.18	0.10	-0.01	0.04
	SA9	**0.63**	-0.24	0.14	-0.11	0.09
	SA10	**0.64**	-0.21	0.07	0.01	-0.04
Self-control (SC)	SC1	-0.29	**0.70**	-0.05	-0.05	0.13
	SC2	-0.26	**0.70**	-0.04	-0.11	0.03
	SC4	-0.14	**0.63**	-0.01	-0.01	0.16
	SC5	-0.12	**0.60**	0.04	-0.11	0.10
	SC7	-0.33	**0.78**	0.03	-0.09	0.11
	SC8	-0.28	**0.66**	0.02	-0.10	0.04
Music listening habit (ML)	ML1	0.10	-0.01	**0.91**	0.16	0.16
	ML2	0.10	-0.00	**0.85**	0.14	0.17
	ML3	0.03	-0.00	**0.72**	0.16	0.16
Music playing & creating habit (MPC)	MPC1	-0.08	-0.10	0.13	**0.84**	-0.08
	MPC2	-0.01	-0.11	0.17	**0.90**	0.11
Music Preference (MP)	MP1	0.06	-0.10	0.19	0.02	**0.95**
	MP2	0.05	-0.08	0.17	-0.01	**0.93**

International Journal of Business and Social Science Research

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

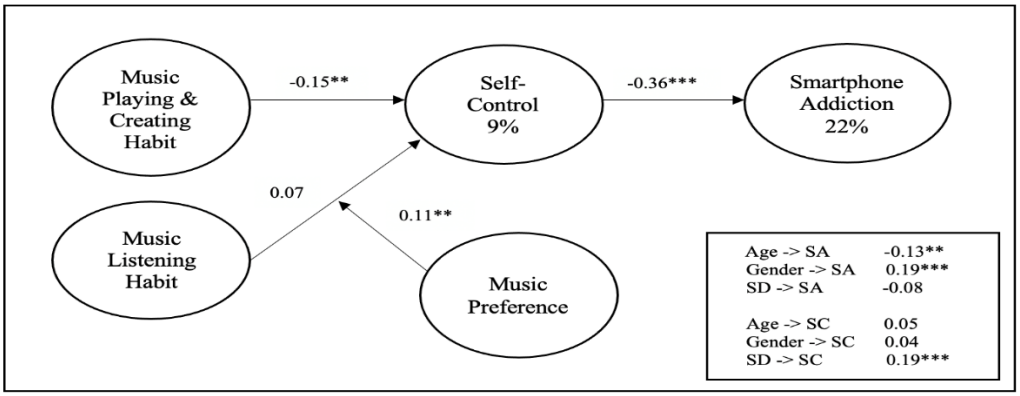
5.2. Assessment of Structural Model

In our study, we conducted a structural model that was estimated based on 290 responses and 5000 bootstrapping (Chin, 2010). To evaluate the structural models, we used the size and significance of the path coefficient, coefficient of determination (R2), f2, and q2 (Götz et al., 2010). As displayed in Figure 2, Model 1 explores the mediating effect of self-control on the relationships between musical habits and smartphone addiction, and the moderating effect of music preference on the relationship between music listening habits and self-control. In the model, age, gender, and social desirability were statistically controlled.

Model 1 in Figure 2 indicates that self-control mediated the impact of music playing and creating habits on smartphone addiction. Specifically, music-playing and creating habits (β = -0.15, $p < 0.01$, t = 2.45, f2 = 0.02, q2 = 0.02) hurt self-control, and self-control (β = -0.36, $p < 0.001$, t = 6.77, f2 = 0.16, q2 = 0.03) negatively affected smartphone addiction. As expected, music listening habits ($\beta = 0.07$, $p > 0.05$, t = 0.77, f2 = 0.00) were not a significant predictor of self-control, but the interaction ($\beta = 0.11$, $p < 0.05$, t = 1.71, f2 = 0.02) between music listening and music preference significantly influenced self-control.

Figure 2: Model 1

FIGURE 2
MODEL 1



Notes: *p < .05; **p < .01; ***p < .001.
SD = social desirability; SC = self-control; SA = smartphone addiction.
Age, Gender, and SD are control variables.

6. Discussions

This current study investigates the relationships between musical habits and smartphone addiction, with a primary focus on the mediating effect of self-control. We drew on the dual-systems theories and empirical results of habit and self-control to examine how two types of musical habits (i.e., music listening and music playing and creating habits) would influence college students' smartphone addiction. Our study reveals that musical habits do not directly predict college students' smartphone addiction. Gender also does not appear to be related to smartphone addiction. The study also finds that music listening habits interact with music preference, which is positively associated with self-control. Our results also show that our respondents did not consider themselves to have significant music-playing and creating habits; this habit is found to be negatively correlated with self-control. The study finally shows that self-control negatively predicts college students' smartphone addiction.

6.1. Theoretical Contributions

This study extends the technology adoption research in three ways. First, this study extends the understanding of the antecedents of technology addiction, an emerging research stream. So far, prior research has focused on how technology use habits affect technology addiction (e.g., Turel and Qahri-Saremi, 2016). Our study advances the current literature by suggesting that musical habits, an increasingly popular practice, can indirectly influence technology addiction.

Second, our study supports the validity of dual-systems theories (Evans, 2008). Specifically, our results are consistent with dual-systems theories by revealing that musical habits directly or indirectly affected self-control, which then influenced smartphone addiction. According to the literature on implicit goal models of habits, the directional impact of habits on self-control depends on whether the habit generates positive or negative effects (Wood and Rünger, 2016). The results in our study support prior literature by showing that music playing and creating habits were negatively associated with self-control because they usually induce negative effects. It also shows that the interaction between musical listening habits and musical preference was positively associated with self-control because they generally generate positive effects. Particularly, it implies that as musical preference increases, the relationship between music-listening habits and self-control becomes stronger, regardless of whether the music-listening habit is good or bad.

Third, the current study provides a roadmap to advance the music-IT interdisciplinary research. For music scholars, most of their research has focused on how music itself, or music interventions, change people's affect (e.g., Roy et al., 2016; Swaminathan and Schellenberg, 2015). Our study complements the music literature by indicating that music can also have an impact on self-control and smartphone addiction. These findings offer an opportunity for IS and music scholars to collaborate on using IT or designing IT artifacts to enhance people's positive affect and self-control when they listen to or play and create music. IS and music scholars can also investigate under what situations musical habits can directly prevent or reduce smartphone addiction.

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

Finally, they can also explore how to use IT to foster the formation of good musical habits.

6.2. Practical Implications

Our findings show that musical habits are associated with smartphone addiction when they increase or decrease self-control. As more college students rely on smartphones daily, we might want to look at the potential benefits of using music in combination with IT and other treatments to treat or reduce smartphone addiction. For college students who like to listen to music, we should guide them to choose songs that induce positive emotions and educate them on how to appreciate songs that express negative emotions. For example, smartphone apps can be used to increase their music literature which affects their choice and appreciation of the songs. For those who like to play and create music, we need to provide various types of interventions to improve their mood and emotions. For example, goal setting and goal striving can be used to regulate their emotion (Tamir et al. 2020). We can use goal setting or tracking apps to help them achieve the short-term goals of music playing and creating, which will promote their positive affect and self-control.

6.3. Limitations and Future Research Directions

Of course, the present study has several limitations that need to be addressed in future research. First, our study only used regular college students as its sample, which limits the generalization of its results to other populations, such as college students majoring in music. Second, our study only used a self-report survey to measure smartphone addiction. In the future, using diagnostic interviews or objective measures such as smartphone apps to measure smartphone addiction should provide more reliable findings. Third, the current study only employs a cross-sectional design. Accordingly, longitudinal designs should be used to not only distinguish cause from effect but also to establish the reciprocal relationships between musical habits and smartphone addiction. For example, researchers can track how much time college students spend daily on music and examine how it is associated with the increase or decrease of smartphone addiction. Fourth, experimental research should be conducted. For instance, the impact of IT-based mindfulness interventions on self-control (e.g., Charoensukmongkol, 2016) with or without personalized music can be compared. Finally, the musical habits associated with smartphone use such as listening to streaming music and producing music with music apps are not examined in the current study. Thus, other mechanisms under which musical habits influence smartphone addiction should be explored. For example, future research should examine if people's musical habits fostered by mobile apps indirectly or directly influence smartphone addiction. Finally, the moderating effect of mobile app features on such relationships is worth investigating.

References

Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: how and why people fail at self-regulation*. Academic Press.

Baumeister, R. F. (2002). Yielding to Temptation: Self-Control Failure, Impulsive Purchasing, and Consumer Behavior. *Journal of Consumer Research*, *28*(4), 670–676. https://doi.org/10.1086/338209

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The Strength Model of Self-Control. *Current Directions in Psychological Science*, *16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x

Bautch, K. A. (2020). Personal Music Listening for Regulating Emotions: A Survey Study. *Pacific Journal of Health*, *2*(1). https://doi.org/10.56031/2576-215x.1004

Bowman, W. (2004). Cognition and the Body: Perspectives from Music Education [Review of *Cognition and the Body: Perspectives from Music Education*]. In L. Bresler (Ed.), *Knowing bodies, moving minds: towards embodied teaching and learning* (pp. 29–50). Kluwer Academic Publishers.

Carden, L., & Wood, W. (2018). Habit formation and change. *Current Opinion in Behavioral Sciences*, *20*, 117–122. https://doi.org/10.1016/j.cobeha.2017.12.009

Chafin, S., Roy, M., Gerin, W., & Christenfeld, N. (2004). Music can facilitate blood pressure recovery from stress. *British Journal of Health Psychology*, *9*(3), 393–403. https://doi.org/10.1348/1359107041557020

Chandrasekaran, V., Kumar, V., & Brahadeeswari, H. (2019). Prevalence of smartphone addiction and its effects on sleep quality: A cross-sectional study among medical students. *Industrial Psychiatry Journal*, *28*(1), 82. https://doi.org/10.4103/ipj.ipj_56_19

Charoensukmongkol, P. (2016). Exploring personal characteristics associated with selfie-liking. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *10*(2). https://doi.org/10.5817/cp2016-2-7

Chen, C., Zhang, K. Z. K., Gong, X., & Lee, M. (2019). Dual mechanisms of reinforcement reward and habit in driving smartphone addiction. *Internet Research*, *29*(6), 1551–1570. https://doi.org/10.1108/intr-11-2018-0489

Chidambaram, V., Shanmugam, K., & Parayitam, S. (2022). Parental neglect and emotional wellbeing among adolescent students from India: social network addiction as a mediator and gender as a moderator. *Behaviour & Information Technology*, 1–19. https://doi.org/10.1080/0144929x.2022.2046164

Chin, W. W. (1998). Commentary: Issues and Opinion on Structural Equation Modeling. *MIS Quarterly*, *22*, vii–xvi.

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

Chin, W. W. (2010). How to write up and report PLS analyses. In V. V. Esposito, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 655–690). Springer.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Evans, J. St. B. T. (2008). Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition. *Annual Review of Psychology*, *59*(1), 255–278. https://doi.org/10.1146/annurev.psych.59.103006.093629

Everitt, B. J., Belin, D., Economidou, D., Pelloux, Y., Dalley, J. W., & Robbins, T. W. (2008). Neural mechanisms underlying the vulnerability to develop compulsive drug-seeking habits and addiction. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363*(1507), 3125–3135. https://doi.org/10.1098/rstb.2008.0089

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.2307/3151312

Gefen, D., & Straub, D. (2005). A Practical Guide To Factorial Validity Using PLS-Graph: Tutorial And Annotated Example. *Communications of the Association for Information Systems*, *16*. https://doi.org/10.17705/1cais.01605

Geng, Y., Gu, J., Wang, J., & Zhang, R. (2021). Smartphone addiction and depression, anxiety: The role of bedtime procrastination and self-control. *Journal of Affective Disorders*, *293*, 415–421. https://doi.org/10.1016/j.jad.2021.06.062

Getz, L. M., Chamorro-Premuzic, T., Roy, M. M., & Devroop, K. (2011). The relationship between affect, uses of music, and music preferences in a sample of South African adolescents. *Psychology of Music*, *40*(2), 164–178. https://doi.org/10.1177/0305735610381818

Getz, L. M., Marks, S., & Roy, M. (2012). The influence of stress, optimism, and music training on music uses and preferences. *Psychology of Music*, *42*(1), 71–85. https://doi.org/10.1177/0305735612456727

Gong, X., Zhang, K. Z. K., Cheung, C. M. K., Chen, C., & Lee, M. K. O. (2019). Alone or together? Exploring the role of desire for online group gaming in players' social game addiction. *Information & Management*, *56*(6), 103139. https://doi.org/10.1016/j.im.2019.01.001

Götz, O., Liehr-Gobbers, K. & Krafft, M. (2010). Evaluation of Structural Equation Models using the Partial Least Squares (PLS) Approach. In V. V. Esposito, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 691–711). Springer.

Hooper, V., & Zhou, Y. (2007, June). Addictive, Dependent, Compulsive? A Study of Mobile Phone Usage. In *Proceedings of the 20th Bled eConference e-Mergence: Merging and Emerging Technologies, Processes, and Institutions*.

Huron, D. (2008). *Sweet Anticipation: Music and the Psychology of Expectation*. MIT Press.

Jeong, S.-H., Kim, H., Yum, J.-Y., & Hwang, Y. (2016). What type of content are smartphone users addicted to?: SNS vs. games. *Computers in Human Behavior*, *54*, 10–17. https://doi.org/10.1016/j.chb.2015.07.035

Jones, M. E., Roy, M. M., & Verkuilen, J. (2014). The relationship between reflective rumination and musical ability. *Psychology of Aesthetics, Creativity, and the Arts*, *8*(2), 219–226. https://doi.org/10.1037/a0035634

Juslin, P. N., & Sloboda, J. A. (2001). *Music and emotion: theory and research*. Oxford University Press.

Kahneman, D. (2003). Maps of Bounded Rationality: Psychology for Behavioral Economics. *American Economic Review*, *93*(5), 1449–1475. https://doi.org/10.1257/000282803322655392

Kawakami, A., Furukawa, K., Katahira, K., & Okanoya, K. (2013). Sad music induces pleasant emotion. *Frontiers in Psychology*, *4*. https://doi.org/10.3389/fpsyg.2013.00311

Kayis, A. R., Satici, B., Deniz, M. E., Satici, S. A., & Griffiths, M. D. (2021). Fear of COVID-19, loneliness, smartphone addiction, and mental wellbeing among the Turkish general population: a serial mediation model. *Behaviour & Information Technology*, 1–13. https://doi.org/10.1080/0144929x.2021.1933181

Kim, Y., Jeong, J.-E., Cho, H., Jung, D.-J., Kwak, M., Rho, M. J., Yu, H., Kim, D.-J., & Choi, I. Y. (2016). Personality Factors Predicting Smartphone Addiction Predisposition: Behavioral Inhibition and Activation Systems, Impulsivity, and Self-Control. *PLOS ONE*, *11*(8), e0159788. https://doi.org/10.1371/journal.pone.0159788

Koelsch, S. (2013). *Brain and music*. Wiley-Blackwell.

Kwon, M., Kim, D.-J., Cho, H., & Yang, S. (2013). The Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents. *PLoS ONE*, *8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Lin, F., Zhou, Y., Du, Y., Qin, L., Zhao, Z., Xu, J., & Lei, H. (2012). Abnormal White Matter Integrity in Adolescents with Internet Addiction Disorder: A Tract-Based Spatial Statistics Study. *PLoS ONE*, *7*(1), e30253. https://doi.org/10.1371/journal.pone.0030253

Lin, Y.-H., Pan, Y.-C., Lin, S.-H., & Chen, S.-H. (2016). Development of short-form and screening cutoff point of the Smartphone Addiction Inventory (SPAI-SF). *International Journal of Methods in Psychiatric Research*, *26*(2), e1525. https://doi.org/10.1002/mpr.1525

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

Liu, C.-H., Lin, S.-H., Pan, Y.-C., & Lin, Y.-H. (2016). Smartphone gaming and frequent use pattern associated with smartphone addiction. *Medicine*, *95*(28), e4068. https://doi.org/10.1097/md.0000000000004068

Mahapatra, S. (2019). Smartphone addiction and associated consequences: role of loneliness and self-regulation. *Behaviour & Information Technology*, *38*(8), 833–844. https://doi.org/10.1080/0144929x.2018.1560499

Maloney, P. W., Grawitch, M. J., & 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*(1), 111–115. https://doi.org/10.1016/j.jrp.2011.10.001

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common Method Variance in IS Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research. *Management Science*, *52*(12), 1865–1883. https://doi.org/10.1287/mnsc.1060.0597

Millgram, Y., Joormann, J., Huppert, J. D., & Tamir, M. (2015). Sad as a Matter of Choice? Emotion-Regulation Goals in Depression. *Psychological Science*, *26*(8), 1216–1228. https://doi.org/10.1177/0956797615583295

Mitterschiffthaler, M. T., Fu, C. H. Y., Dalton, J. A., Andrew, C. M., & Williams, S. C. R. (2007). A functional MRI study of happy and sad affective states induced by classical music. *Human Brain Mapping*, *28*(11), 1150–1162. https://doi.org/10.1002/hbm.20337

Montag, C., Wegmann, E., Sariyska, R., Demetrovics, Z., & Brand, M. (2021). How to overcome taxonomical problems in the study of Internet use disorders and what to do with "smartphone addiction"?. *Journal of Behavioral Addictions*, *9*(4), 908–914. https://doi.org/10.1556/2006.8.2019.59

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*(2), 247–259. https://doi.org/10.1037/0033-2909.126.2.247

Music Production Software Market Analysis Highlights the Impact of COVID-19 2020-2024 | Adoption of DJ Software to Boost the Market Growth | Technavio. (2020, July 15). Www.businesswire.com. https://www.businesswire.com/news/home/20200715005761/en/Music-Production-Software-Market-Analysis-Highlights-Impact/

Ning, W., Davis, F. D., & Riedl, R. (2021). Musical consumption, self-control and smartphone addiction: a dual-systems theory perspective and evidence from a survey study. *Internet Research*. https://doi.org/10.1108/intr-07-2020-0365

Ning, W., Davis, F., & Taraban, R. (2018). Smartphone Addiction and Cognitive Performance of College Students. In *Proceeding of Advances in Management Information Systems Research, Americas Conference on Information Systems*.

Nongpong, S., & Charoensukmongkol, P. (2016). I Don't Care Much as Long as I Am Also on Facebook. *The Family Journal*, *24*(4), 351–358. https://doi.org/10.1177/1066480716663199

(2019). *Observatory of Digital Uses* . Https://Www.orange.com/Sites/Orangecom/Files/2020-11/UK_brochure_ObservatoireDesUsages. (accessed 18 May 2020).

Osatuyi, B., & Turel, O. (2018). Tug of war between social self-regulation and habit: Explaining the experience of momentary social media addiction symptoms. *Computers in Human Behavior*, *85*, 95–105. https://doi.org/10.1016/j.chb.2018.03.037

Pallesen, K. J., Brattico, E., Bailey, C., Korvenoja, A., Koivisto, J., Gjedde, A., & Carlson, S. (2005). Emotion Processing of Major, Minor, and Dissonant Chords: A Functional Magnetic Resonance Imaging Study. *Annals of the New York Academy of Sciences*, *1060*(1), 450–453. https://doi.org/10.1196/annals.1360.047

Perez, S. (2020, February 27). *Streaming services accounted for nearly 80% of all music revenue in 2019*. TechCrunch. https://techcrunch.com/2020/02/26/streaming-services-accounted-for-nearly-80-of-all-music-revenue-in-2019/

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Prochaska, J. J., Sallis, J. F., & Long, B. (2001). A Physical Activity Screening Measure for use with Adolescents in Primary Care. *Archives of Pediatrics & Adolescent Medicine*, *155*(5), 554. https://doi.org/10.1001/archpedi.155.5.554

Reynolds, W. M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne social desirability scale. *Journal of Clinical Psychology*, *38*(1), 119–125. https://doi.org/10.1002/1097-4679(198201)38:1%3C119::aid-jclp2270380118%3E3.0.co;2-i

Ringle, C.M., Wende, S., & Becker, J-M. (2022). SmartPLS 4. Oststeinbek: SmartPLS. Retrieved from https://www.smartpls.com

Roy, M. M., Radzevick, J., & Getz, L. (2016). The Manifestation of Stress and Rumination in Musicians. *Muziki*, *13*(1), 100–112. https://doi.org/10.1080/18125980.2016.1182385

Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music*, *35*(1), 88–109. https://doi.org/10.1177/0305735607068889

Shahjehan, A., Shah, S. I., Qureshi, J. A., & Wajid, A. (2021). A meta-analysis of smartphone addiction and behavioral outcomes. International Journal of Management Studies, 28(2), 103-125.

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

Soror, A. A., Hammer, B. I., Steelman, Z. R., Davis, F. D., & Limayem, M. M. (2015). Good habits gone bad: Explaining negative consequences associated with the use of mobile phones from a dual-systems perspective. *Information Systems Journal*, *25*(4), 403-427.

Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, *23*(5), 645–665.

Statista. 2019a. "U.S. Music - Statistics & Facts," (available online at https://www.statista.com/topics/1639/music/).

Statista. 2019b. "Musical Instruments," (available online at https://www.statista.com/outlook/19020000/109/musical-instruments/united-states).

Statista. 2022. "Smartphones - Statistics & Facts," (available online at https://www.statista.com/topics/840/smartphones/#topicHeader__wrapper).

Swaminathan, S., & Schellenberg, E. G. (2015). Current Emotion Research in Music Psychology. *Emotion Review*, *7*(2), 189–197. https://doi.org/10.1177/1754073914558282

Tayhan Kartal, F., & Yabancı Ayhan, N. (2020). Relationship between eating disorders and internet and smartphone addiction in college students. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, 1853-1862. https://doi.org/10.1007/s40519-020-01027-x

Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, *43*(3), 379–384. https://doi.org/10.1016/j.jesp.2006.05.007

Turel, O., Serenko, A., & Giles, P. (2011). Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users. *MIS Quarterly*, *35*(4), 1043. https://doi.org/10.2307/41409972

Turel, O., & Bechara, A. (2016). A Triadic Reflective-Impulsive-Interoceptive Awareness Model of General and Impulsive Information System Use: Behavioral Tests of Neuro-Cognitive Theory. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.00601

Turel, O., & Qahri-Saremi, H. (2016). Problematic Use of Social Networking Sites: Antecedents and Consequence from a Dual-System Theory Perspective. *Journal of Management Information Systems*, *33*(4), 1087–1116. https://doi.org/10.1080/07421222.2016.1267529

Upadhyay, D. K., Shukla, R., Tripathi, V. N., & Agrawal, M. (2017). Exploring the nature of music engagement and its relation to personality among young adults. *International Journal of Adolescence and Youth*, *22*(4), 484–496. https://doi.org/10.1080/02673843.2016.1245150

van Deursen, A. J. A. M., Bolle, C. L., Hegner, S. M., & Kommers, P. A. M. (2015). Modeling habitual and addictive smartphone behavior. *Computers in Human Behavior*, *45*, 411–420. https://doi.org/10.1016/j.chb.2014.12.039

Vanstone, A. D., Wolf, M., Poon, T., & Cuddy, L. L. (2015). Measuring engagement with music: Development of an informant-report questionnaire. *Aging & Mental Health*, *20*(5), 474–484. https://doi.org/10.1080/13607863.2015.1021750

Verplanken, B., Aarts, H., & Van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology*, *27*(5), 539–560. https://doi.org/10.1002/(sici)1099-0992(199709/10)27:5%3C539::aid-ejsp831%3E3.0.co;2-a

Wang, C., & Lee, M. K. O. (2020). Why We Cannot Resist Our Smartphones: Investigating Compulsive Use of Mobile SNS from a Stimulus-Response-Reinforcement Perspective. *Journal of the Association for Information Systems*, 175–200. https://doi.org/10.17705/1jais.00596

Wöllner, C., Ginsborg, J., & Williamon, A. (2011). Music researchers' musical engagement. *Psychology of Music*, *39*(3), 364–382. https://doi.org/10.1177/0305735610381592

Wood, W., & Rünger, D. (2016). Psychology of Habit. *Annual review of psychology*, *67*, 289-314. https://doi.org/10.1146/annurev-psych-122414-033417

Yang, L., Mubayi, P., Terry, H.P, Bellini, H. 2020. "Music in the Air - 2020"; https://www.goldmansachs.com/insights/pages/infographics/music-in-the-air-2020/report.pdf

Yang, S.-Y., Wang, Y.-C., Lee, Y.-C., Lin, Y.-L., Hsieh, P.-L., & Lin, P.-H. (2022). Does Smartphone Addiction, Social Media Addiction, and/or Internet Game Addiction Affect Adolescents' Interpersonal Interactions? *Healthcare*, *10*(5), 963. https://doi.org/10.3390/healthcare10050963

Karaoglan Yilmaz, F. G., Ustun, A. B., Zhang, K., & Yilmaz, R. (2023). Smartphone addiction, nomophobia, depression, and social appearance anxiety among college students: a correlational study. Journal of Rational-Emotive & Cognitive-Behavior Therapy. https://doi.org/10.1007/s10942-023-00516-z

Yoon, S., Verona, E., Schlauch, R., Schneider, S., & Rottenberg, J. (2019). Why do depressed people prefer sad music? *Emotion (Washington, D.C.)*, *20*(4), 10.1037/emo0000573. https:// doi.org/10.1037/emo0000573

Vol: 5, Issue: 4
March/2024
DOI: http://dx.doi.org/10.47742/ijbssr.v5n4p2
https://ijbssrnet.com/index.php/ijbssr

Young, L. N., Winner, E., & Cordes, S. (2013). Heightened incidence of depressive symptoms in adolescents involved in the arts. *Psychology of Aesthetics, Creativity, and the Arts*, *7*(2), 197–202. https://doi.org/10.1037/a0030468

Zhang, M., & Xiang, Y. (2022). Influence of Benign/Malicious Envy on Mobile Phone Addiction: Mediating Role of Loneliness and Self-Control. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-022-00845-7

Zhong, W., Wang, Y., & Zhang, G. (2020). The Impact of Physical Activity on College Students' Mobile Phone Dependence: The Mediating Role of Self-Control. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-020-00308-x

Zhao, R., Li, Y., & Craig, B. (2021). The Relationship between Smartphone Use and Musculoskeletal Symptoms among University Students under the Influence of COVID-19. In *IIE Annual Conference, Proceedings* (pp. 992–997).

Zhou, Y., Lin, F., Du, Y., Qin, L., Zhao, Z., Xu, J., & Lei, H. (2011). Gray matter abnormalities in Internet addiction: A voxel-based morphometry study. *European Journal Radiology*, *79*(1), 92–95. https://doi.org/10.1016/j.ejrad.2009.10.025

Appendix A

Variables	Items		Sources
Social Desirability (SD)	SD1	It is sometimes hard for me to go on with my work if I am not encouraged	Reynolds, 1982
	SD2	I sometimes feel resentful when I don't get my way	
	SD3	On a few occasions, I have given up doing something because I thought too little of my ability	
	SD4	There have been times when I felt like rebelling against people in authority even though I knew they were right	
	SD5	No matter who I'm talking to, I'm always a good listener	
	SD6	There have been occasions when I took advantage of someone	
	SD7	I'm always willing to admit it when I make a mistake	
	SD8	I sometimes try to get even, rather than forgive and forget	
	SD9	I am always courteous, even to people who are disagreeable	
	SD10	I have never resent being asked to return a favor	
	SD11	There have been times when I was quite jealous of the good fortune of others	
	SD12	I am sometimes irritated by people who ask favors of me	
	SD13	I have never deliberately said something that hurt someone's feelings	
Smartphone Addiction (SA)	SA1	Missing planned work due to smartphone use	Kwon et al., 2013
	SA2	Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	
	SA3	Feeling pain in the wrists or at the back of the neck while using a smartphone	
	SA4	Won't be able to stand not having a smartphone	
	SA5	Feeling impatient and fretful when I am not holding my smartphone	
	SA6	Having my smartphone in my mind even when I am not using it	
	SA7	I will never give up using my smartphone even when my daily life is already greatly affected by it.	
	SA8	Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	
	SA9	Using my smartphone longer than I had intended	
	SA10	The people around me tell me that I use my smartphone too much.	
Self-Control (SC)	SC1	I have a hard time breaking bad habits	Maloney et al., 2012
	SC2	I wish I had more self-discipline	
	SC3	I refuse things that are bad for me, even if they are fun	
	SC4	I'm good at resisting temptation	
	SC5	People would say that I have very strong self-discipline	
	SC6	Pleasure and fun sometimes keep me from getting work done	
	SC7	Sometimes I can't stop myself from doing something, even if I know it is wrong	
	SC8	I often act without thinking through all the alternatives	
Music Listening Habit (ML)	ML1	I listen to music while I perform chores or boring tasks	Vanstone et al., 2016
	ML2	If I am bored, I listen to music to pass the time	
	ML3	I always listen to music when doing certain tasks (e.g. cooking or cleaning)	
Music Playing & Creating Habit (MPC)	MPC1	I play a musical instrument for pleasure	Vanstone et al., 2016
	MPC2	I create my own music (e.g. by making up my own tunes or by changing the words to existing songs)	
Music Preference (MP)	MP1	I show specific preferences for certain types of music such as classical, rock, and/or country	Vanstone et al., 2016
	MP2	I like particular styles of music such as rock music played with specific instruments, production techniques, and/or music ideas	