Smartphone addiction and employee productivity: The role of self-control

Popoola, Olakunle Abiodun[1*], Atiri, Sylvester Ororume[2]

[1,2]Department of Psychology, University of Lagos

*corresponding author: oapopoola@unilag.edu.ng

ARTICLE INFORMATION

ABSTRACT

The benefits of responsible smartphone use have been recorded across cultures and occupations all over the globe. Though smartphones have a lot of positive benefits, addiction to these devices can be detrimental to various aspects of living. The aim of the study was to investigate the possible relationship between smartphone addiction and employee productivity and to examine the moderating effect of self-control on this relationship. Participants for the study were selected through convenience sampling and consisted of 157 participants (Male = 85, Female = 72) between the ages of 18-46 years and a mean age of 28.82. Participants completed a questionnaire which comprised of demographic information and three different psychological scales; Smartphone Addiction Scale, Self-Control Scale, and the Endicott Work Productivity Scale. Multiple regression analysis was used to analyze the relationship between these variables, and results revealed a significant negative relationship between smartphone addiction and employee productivity. However, the interaction between self-control and smartphone addiction had no significant effect on employee productivity. The findings established that addiction to smartphone use has detrimental effect on productivity at work. However, the introduction of self-control was able to reduce the negative impact of smartphone addiction on work productivity though this finding was not significant. The study recommends that therapy for clients with smartphone addiction should include techniques to enhance self-control like time management trainings.

Keywords: *Smartphone, Addiction, Employee Productivity, Job Productivity, Self-Control.*

Background to the Study

Smartphone is a mobile device, typically having a screen-touch feature that performs cellular function in addition to many other functions of a computer including internet/web browsing, gaming, music and video streaming, among others (Provazza, 2019). This device has transformed into an inevitable gadget in everyday life, with about two billion users globally (Miller, 2012). Adesugba (2017) reported the statistics of smartphone users in Nigeria as estimated by Ovum, a Tech Research company in the UK, to be around 95 million in 2019. A current estimate from another source forecasted that smartphone users in Nigeria will attain over 140 million by 2025 (O'Dea, 2020). While these devices are hugely productive tools that help facilitate numerous social and individual activities, their habitual use can interfere with work, school and relationships (Gökçearslan et al., 2016).

Overuse of smartphones has, arguably, the potential to result into an addictive behaviour, similar to gambling, which can interfere with our everyday life (van Deursen et al., 2015). Although, smartphone addiction has no widely accepted official diagnostic criteria, several researchers have proposed lists of indicators similar to classic addiction symptomatology, including loss of control and sense of time (Block, 2008; Lu, & Yeo, 2015), preoccupation with the smartphone (Tao et al., 2010), withdrawal (Grifiths, 2005) and negative effects on our social and work lives (Tao et al., 2010; Block, 2008). Lin et al (2014) suggested that smartphone addiction generally consists of four main components which include compulsive behaviour, tolerance, withdrawal and functional impairment.

Smartphone addicts have difficulty controlling their smartphone use and are likely to encounter adverse side effects (Aljomaa et al., 2016). For instance, addiction to smartphone use has been linked to several psychosocial disorders, including depression, social anxiety, impulsivity, sleeping disorders including insomnia, and physical problems, such as musculoskeletal disorders, migraine headaches, pain in the wrists and neck, blurred vision, stress, as well as various health disorders (Kee et al., 2016; Kim, 2013; Lee & Song, 2014; Thomée et al., 2011).Compelling evidences have shown that smartphone addiction may not only be related to smartphone itself, but smartphone may possibly be a medium through which an individual accesses other addictions, such as internet addiction, playing games, and social app usage (Duke & Montag, 2017). For instance, a study conducted by Jeong et al (2016) suggested

that social network use and game playing were found to be significant predictors of smartphone addiction.

Literature Review

Smartphone Addiction and Employee Productivity

Of interest to the current study is the effect smartphone addiction has on productivity at work. Smartphones can cause distraction to an extent where we are unable to attain a state of flow at work and this has the potential of negatively impacting productivity (Montag & Walla, 2016). Flow depicts a condition in which we are fully engrossed by an activity, losing consciousness of space and time, whilst being very productive (as cited in Cheron, 2016). For instance, an individual in a state of flow may be occupied with a particular task such as reading a novel being aware of the passage of time. Furthermore, the intermittent reinforcement received from smartphones may facilitate the development of a "checking habit" (Duke & Montag, 2017; Oulasvirta et al., 2012), which is a brief repeated scrutiny of the phone to check for new content.

Smartphone addiction and actively inspecting the phone impacts the ability to engage in consistently productive work both at home and workplace. However, the few empirical studies that have explored the impacts of smartphone dependency and addiction on work productivity have mostly concentrated on the positive impacts smartphone use has in increasing productivity and flexibility of carrying out assigned task (e.g. Middleton, 2007), staying up-to-date on new knowledge and development (e.g. Silver et al., 2019), communication efficiency and promoting teamwork among colleagues at work (e.g. Pitichat, 2013). One of the very few studies that have paid attention to the negative consequences of smartphone addiction on work productivity is the study carried out by Duke and Montag (2017). The authors examined the correlation between smartphone addiction and work productivity indexes such as hours lost to work as a result of smartphone use, negative effect of smartphone on work productivity among others using a sample drawn from German population. According to the result of their findings, there were significant correlations between smartphone addiction and work hours lost due to smartphone use and negative effect of smartphone use on productivity. Their study established that productivity at work is affected with increase in smartphone addiction.

Self control and Smartphone Addiction

Self-control is a construct that describes the capability of managing emotional reactions towards situations, things, events or people during interactions (Pour-Razavi et al., 2015). In other words, self-control is our ability to subdue our impulses, emotions and behaviours in order to achieve long-term goals. It could be considered as the result of internal conflict between rationale and lust, cognition and motive, and internal planning and internal executive (Shirinkam et al., 2016). In the context of smartphone addiction, self-control is the ability to subdue the impulse of excessive or compulsive use of smartphones in order to maximize productivity (a long-term goal). The ability to exert this action is a function of the pre-frontal cortex. To every impulse that arises such as compulsive smartphone use, the pre-frontal cortex allows plan, evaluate alternative actions and avoid actions that have adverse consequences, rather than giving immediate response.

Increasing number of studies has shown that within the process of most addictive behaviours, there is a lack of control on addictive or habituated actions. Aliverdinia and Hemmati (2013) conducted a study on tendency towards alcoholic drinks and self-control and results revealed that low levels of tendency towards alcoholic drinks were associated to high levels of self-control and vice versa. Similar study conducted by Azizi, *et al*., (2015) also revealed that self-control had significant inverse associations with history of cigarette consumption and substance abuse and tendency to abuse substance. Mehroof and Griffiths (2010) in another study attributed online gaming addiction to a number of personality traits including self-control.

Few studies have also shown the importance of the role of self-control on internet addiction, a closely related concept to smartphone addiction. For example, Pour-Razavi et al (2015) found that self-control has negative relation with internet via cell-phone use. A one unit increase in self-control was revealed to reduce internet use via cellphones by .78 times of among university students. This finding was supported by the work of Li et al (2014) that revealed that internet addiction was positively explained by low levels of self-control in individual. On the contrary, some studies (e.g. Khazaei & Ashournezhad, 2011) found no significant relation between internet use and self-control. In some other studies, self-control significantly moderated

the associations between social relations and problematic internet use (Park, *et al*., 2014) and loneliness and internet addiction (Özdemir et al., 2014).

According to the social cognitive learning theory (Bandura, 1993), an individual's self-regulatory mechanism influences the individual's level of self-control. Self-regulation is also defined as the one's ability to focus on predetermined goals without distraction (Gökçearslan et al., 2016). People's failure to self-regulate might lower their level of self-control and result in excessive smartphone usage. Consequently, this situation is likely to turn into an addiction to smartphone. The present study primarily investigated the relationship between smartphone addiction and employee productivity. Also, it examined the moderating effect of self-control on this relationship.

Research Hypotheses

Three hypotheses were tested in the study and these include the following:

1. There will be a significant negative relationship between self-control and smartphone addiction.
2. Smartphone addiction will significantly decrease employee productivity.
3. Self-control will significantly reduce the strength of the relationship between smartphone addiction and employee productivity.

Method

Participants

The study comprised of 157 participants recruited through convenience sampling technique. The sample constituted of male, aged 18-46 years (M = 28.36, SD = 7.77) and female, aged 18-46 years (M = 29.27, SD = 8.24). Participants were majorly employees from both private and public sectors in both Yaba and Ikeja area of Lagos State Lagos State. Participants were worker in key economic sectors such as education, media, health and finance. Participation was voluntary and participants did not receive any compensation for participation.

Instrument/Measures

Data were collected from participants by using a structured questionnaire composing of demographic data and standardized psychological scales which are outlined in the following sections:

Section A contains the demographic information such as age, gender, marital status and ethnic groups.

Section B has the Endicott Work Productivity Scale (EWPS; Endicott, & Nee, 1997).This scale (EWPS) is a brief self-report questionnaire developed to quantify the frequency of work performance and productivity attitudes and behaviors during the past week (e.g. 'Arrive at work late or leave work early', 'Have trouble organizing work or setting priorities'). The EWPS consists of 25 items, and each is rated on a 5-point scale (0=never; 4=almost always). The reliability and validity of EWPS has only been tested in patients with depression. The author reported a high internal consistency of 0.93 and 0.92 (Cronbach's α) with psychiatric sample and community sample respectively. A significant correlation of EWPS total score was also reported with Global Clinical Index of Severity, Symptom Checklist (SCL)-90 total scores and Zimmerman total scores in both psychiatric and community samples. The scale was subjected to a reliability test in the present study and was found to have acceptable internal consistency, with a Cronbach's alpha coefficient of 0.74.

Section C includes the Smartphone Addiction Scale-Short Version (SAS-SV; Kwon et al., 2013). The SAS-SV is a 10-item scale that identifies the level of smartphone addiction risk. Participants rated each item on a 6 point scale ranging from 1 (strongly disagree) to 6 (strongly agree). The author reported a Cronbach's alpha of 0.911 and a significant correlation with the original Smartphone Addiction Scale (SAS), Smartphone Addiction Proneness Scale (SAPS). The SAS-SV has also been reported to have acceptable psychometric properties in Nigerian population. Akpunne and Akinnawo (2018) carried out a validation study on the scale using a Nigerian sample and reported a Cronbach's alpha correlation coefficient of 0.82, item-total correlation range of .54 to .71 and a concurrent validity score of .509 and .558 when correlated with Internet addiction Test (IAT) and Bergen Facebook Addiction Scale (BFAS) respectively.

Section D has the Brief Self-Control Scale (BSCS; Tangney et al., 2004): BSCS, a 13-item abbreviation of the Self-Control Scale (SCS) developed to measure five domains of self-control-controlling thoughts, controlling emotions, controlling impulses, regulating behaviour/performance, and habit-breaking. Items on the scale were rated on a 5-point Likert scale, anchored at 1 (not at all like me) and 5 (very much like me). Items with negative wording (e.g., ''Sometimes I can't stop myself from doing something, even if I know it is wrong'', ''I have a hard time breaking bad habits'') were reverse-scored so that higher scores indicated greater self-control. Lindner et al (2015) reported the scale to possess high reliability coefficients (McDonald's ωh) of .81 and .86 in two different samples comprising of vocational training and university students. The current study found BSCS to have a good internal consistency with a correlation coefficient of 0.68 Cronbach's alpha.

Procedure

Having evaluated the possible ethical issues and met the necessary conditions involved in the study, permission and ethical approval to commence the study were obtained from the University Central Research Committee. Participants included in the study were selected through a non-probability sampling method, using the convenience sampling technique. By this process, selection was done based on availability and proximity of participants to the researchers. This sampling technique was employed because the researchers considered it as inexpensive and time-saving. Individuals from both private and public organizations were approached to seek their consent to participate in the survey and consented individuals who agreed to partake completed a self-report survey. Participants were provided with the standard instruction (as provided by the author of the standardized instruments) on how to complete each section of the questionnaire and were assured of the confidentiality of the information provided. The general testing conditions were satisfactory and the procedure was uniform all through. Participants were given 10 minutes to complete the questionnaire, after which their responses were scored and analyzed accordingly.

Design

The design used in the current study was a cross-sectional design because of the nature of data collection. That is, in the study, data was collected from a sample of varying demographic characteristics at the same point in time. The study was particularly interested in assessing

differences among individuals and some phenomena, so as to enable causal inferences to be made from the findings. As such, the cross-sectional study proved to be the most suitable design for this study.

Statistical analyses

The present study was interested in the relationship between smartphone addiction and employee productivity. To investigate this relationship, the study employed a bivariate correlation statistics. A linear regression was also carried to quantify the impact of smartphone addiction (independent variable) on employee productivity (dependent variable). Furthermore, the impact of self-control (moderator or third variable) on the relationship between smartphone addiction (independent variable) and employee productivity (dependent variable) was tested with a moderation analysis.

To check for multicollinearity problem in the moderation analysis (interaction terms between smartphone addiction and self-control), Variance Inflation Factor (VIF) was examined (Aiken & West, 1991). The variance inflation factor (VIF) is a test that measures the degree of interaction among the predictors (independent variables) in a model, thereby making it difficult to assess the contribution of predictors to a model. This phenomenon is regarded as multicollinearity problem. Hence VIF is a test done to check for the impact of this multicollinearity issues in regression models.

Results

This section highlighted the demographic representation of participants, descriptive statics of the variables used in the study, and the result of the hypotheses tested.

Table 1

Demographic profile of participants

Variables	Levels/coding	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	1= Male	85	54	54	54
	2= Female	72	46	46	100
Ethnic	1= Yoruba	113	72	72	72
	2= Hausa	2	1	1	73
	3= Igbo	24	15	15	89
	4= Other	18	11	11	100
Marital status	1= Single	68	43	43	43
	2= Married	89	57	57	100

Table 1 presents demographic characteristics of the study. Result in the table above shows that 157 individuals (female: 72; male: 85) that ranged between 18 and 46 years old answered the questionnaires. Data on gender representation shows that 46 % of participants were female and 54 % were male. Yoruba ethnic group were largely represented in the sample consisting of 72 % of total sample. In addition, 57 % of participants were married, whereas 43 % were unmarried.

Table 2

Descriptive statistics of variables in the study

	N	Minimum	Maximum	Mean	Std. Deviation
Smartphone Addiction	157	10	60	42.95	15.75
Employee Productivity	156	5	94	31.08	21.91
Self-control	155	13	65	32.09	17.32
Valid N (listwise)	154				

Result in the table above shows the mean scores of participants on smartphone addiction (M = 42.95, SD = 15.75), employee productivity (M = 31.08, SD = 21.91) and self control (M = 32.09, SD = 17.32). Result also showed that out of 157 cases recorded in the survey, only 156 cases were valid on employee productivity scale, 155 cases were valid on self control scale and 154 cases were valid in total.

Hypotheses testing

Hypothesis 1: There will be a significant negative relationship between self-control and smartphone addiction.

Table 3

Correlation between Self-control and Smartphone Addiction

	Self-control	Smartphone Addiction
Self-control	1	
Smartphone Addiction	-.663**	1

Result in the table above shows that there is a significant negative relationship between self-control and smartphone addiction (r = -.663, p < .01). Participants with higher self-control showed lower smartphone addictive behaviour as hypothesized, therefore hypothesis 1 is accepted.

Hypothesis 2: Smartphone addiction will significantly decrease employee productivity.

Table 4

Linear Regression between Smartphone Addiction and Employee Productivity

Variable	B	SE	Beta	*p*	VIF
Smartphone Addiction (SA)	-1.002	.08	-.711	<.01	1.001

$R^2 = .502$, F = 155.21, *p* < .01

Note. Dependent variable: Employee productivity, VIF = Variance Inflation Factor

The result of the regression model (Table 4) indicated that smartphone addiction negatively predicted employee productivity (b = -1.002, SE_b= .080, β = -.711, p < .01). In other words, smartphone addiction significantly reduced employee productivity. The findings also revealed

that for every 1 unit increase in smartphone addiction, there is an approximately 1 unit (b= -1.002) decrease in employee productivity. Hence, hypothesis 2 was accepted.

Hypothesis 3: Self-control will decrease the strength of the relationship between smartphone addiction and employee productivity.

Table 5

Moderation Analysis of Smartphone Addiction on Employee Productivity

Variables	B	SE	Beta	p	VIF
SA × Self-control (moderator)	-.009	.013	-.039	.501	1.001

$R^2 = .500$, F = 77.55, $p < .01$

Note. Dependent variable: Employee productivity, VIF = Variance Inflation Factor

Result of the regression model above (Table 5) showed that the interaction between smartphone addiction and self-control did not predict employee productivity (b = -.009, SE_b= .013, β = -.039, p = .501). This means that the introduction of self-control (moderator variable) reduced the strength of the existing significant relationship between smartphone addiction and employee productivity (Table 4) as predicted. Therefore, hypothesis 3 is accepted.

Further, multicollinearity problem was checked for by running Variance Inflation Factor (VIF) analysis and it was seen in the data set that VIF values were lower than 10; therefore, there was no problem of multicollinearity (Hair et al., 1984). Hence, the hypothesis was supported.

Discussion

One of the objectives of this study was to explore the relationship between self-control and smartphone addiction. Results revealed a significant negative relationship between self-control and smartphone addiction. Individuals with high self-control are less likely to be addicted to smartphone use. In line with this finding is the work of Gökçearslan et al. (2016) who asserted that students having higher self-regulation skills would show lower addictive smartphone behaviors. This finding was also supported by a similar study among Chinese students in which

internet addiction was positively explained by low levels of self-control in individuals (Li et al., 2014).

The second objective was to examine the relationship between smartphone addiction and employee productivity. Result of findings showed that higher smartphone addiction significantly predicted lower employee productivity among participants. This finding is supported by the recent work conducted by Duke and Montag (2017) who found a moderate but significant relationship between smartphone addiction and a self-reported decrease in productivity. In their study, the decrease in productivity was attributed to spending excessive amount of time on the smartphone during work, as well as with the number of work hours lost to smartphone use. This finding is unsurprising as it indirectly justifies one of the reasons behind the strict restriction of smartphone use in a number of companies today. Previous studies (e.g. Li & Lin, 2019) have found that although work-related smartphone use offers some benefits, dependence on smartphone use has been reported to produce serious negative consequences including addiction problems, distraction at work and decreased productivity.

The third objective was to investigate the moderating effect of self-control on the relationship between smartphone addiction and employee productivity. Findings showed that self-control weakened the relationship between these two variables, rendering it insignificant. Although no study has directly examined these variables, the moderating effect of self-control on the relationship between smartphone addiction and other psychological variables have been reported. A Chinese study conducted by Han et al (2017) reported that self-control moderated the link between shyness and mobile phone addiction. In their study, self-control was able to decrease mobile phone addiction among shy young adults. Self-control was also found to significantly moderate the indirect link (through self-esteem) between peer relationship and problematic internet use among South Korean middle and high school students (Kim & Shin, 2016). Özdemir et al (2014) likewise discovered that loneliness predicted internet addiction through low self-control in a sample of 648 Turkish youth.

Implications, Limitations, and Further Studies

Result of this study establishes that in order for smartphone addiction not to interfere with employee productivity, the development of self-control among workers is imperative. In other

words, smartphone addiction could be managed by strengthening self-control. Self-control serves as a protective factor against the negative effect of smartphone addiction on productivity. Hence, it is vital when developing smartphone addiction programs to consider self-control which showed moderating effect. In conclusion, the above findings suggest that countermeasures in addressing smartphone addiction may be centered on the need for better self-control, possibly relating to better time management or emotional regulation as suggested by Hormes et al (2014).

This study has several limitations which could serve as a basis for further studies. First, the study used sample only from Nigerian employees in Lagos State, future study should include sample from other geographical regions of the country. The study involved obtaining information from respondents using self-report questionnaires, hence it is limited by individuals' willingness and abilities to recall and report information accurately. Another obvious limitation to self-report measures is the social desirability bias. This occurs as participants are subject to fake responses in order to conform to a particular social standard. Finally, the present study did not differentiate the type of activities (such as gaming, internet surfing, apps running) participants were addicted to on their smartphone at this time period, future research should take account of the nature of activities that users engage in on smartphones and the amount of time spent on these activities.

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