ORIGINAL RESEARCH

Modeling Emotion Regulation and Subjective Happiness: Smartphone Addiction as a Mediator

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Main Points

- Reappraisal was negatively linked to smartphone addiction.
- Suppression was positively linked to smartphone addiction.
- Smartphone addiction was associated with less subjective happiness level.
- The emotion regulation has an indirect effect on subjective happiness via smartphone addiction.

Abstract

This study aimed to investigate the mediational role of smartphone addiction in the relationship between emotion regulation and subjective happiness. Participants were 320 university student volunteers (167 women and 153 men) from two state universities in Turkey. They completed a self-report questionnaire about emotion regulation, smartphone addiction, and subjective happiness. Structural equation modeling (SEM) and bootstrapping were applied to test the mediational role of smartphone addiction in the relationship between emotion regulation and subjective happiness. The results indicated that reappraisal predicted lower smartphone addiction scores and higher subjective happiness scores. On the contrary, suppression predicted higher smartphone addiction scores and lower subjective happiness scores. In addition, smartphone addiction proved to be a partial mediator between emotion regulation strategies and subjective happiness. Therefore, the results of this study support the evidence for the impact of emotion regulation on subjective happiness through smartphone addiction.

Keywords: Smartphone addiction, emotion regulation, subjective happiness, structural equation modelling, bootstrapping

Introduction

According to newly published results from the World Happiness Report 2020, Turkey ranks 93rd among 153 countries in happiness ranking. In addition, for positive affect experiences on a city basis, İstanbul, Ankara, and İzmir are the last three among 183 cities (Helliwell, Layard, Sachs, & De Neve, 2020). According to these findings, Turkey may either be considered a very unhappy country, or there may be a possibility of the concept of happiness being construed in a different manner. We believe that in Turkey, the definition of happiness varies. In fact, happiness is a culturally constructed concept; therefore, it is culturally limited as well as defined, internalized, and socialized accordingly (Moghnie &

Kazarian, 2012). In this context, the importance of subjective happiness is notable. Subjective happiness involves a subjective assessment of whether a person is happy or unhappy (Lyubomirsky & Lepper, 1998). This is because some individuals may feel happy despite living in adverse conditions, whereas others may feel unhappy even with good living conditions (Lyubomirsky, 2001). Moreover, some people may gain a sense of excessive happiness from small things, whereas some may not derive happiness even from large things (Lyubomirsky & Lepper, 1999). Given how happiness may mean different things to different people, it is believed that conducting research on the basis of subjective happiness in our country may be more effective. Researchers have

emphasized the need to define subjective happiness from the perspective of the person and indicate that subjective happiness is an inseparable part of mental and physical health (Lyubomirsky, Sheldon, & Schkade, 2005).

Individuals have the ability to report degrees of happiness or unhappiness, and this decision is not equivalent to the simple sum of emotional responses in recent times (Extremera & Fernandez-Berrocal, 2014). Operationally, happiness is defined as a more permanent and chronic state than a momentary or daily mood (Lyubomirsky et al., 2005). Therefore, happiness is a subjective experience, which is the final goal for many people (Sato et al., 2015), and it is important to reveal the variables that play a role in increasing or reducing it. In this context, it is understood that emotion regulation will significantly contribute to shaping subjective happiness.

Emotion regulation is described as the ability to monitor, assess, change, and affect the experiences and expression of emotions (McRae et al., 2010). With emotion regulation, systematic changes are observed in active emotions, and it is proposed as one of the most important proofs for understanding the emotions (Southam-Gerow, 2013). Through emotion regulation, an individual can control and direct emotions in line with their goals (Ecirli & Ogelman, 2015). Emotion regulation theories show that individuals can sustain, increase, or reduce the emotions through regulation (Gross, 1998; Parrott, 1993). In this process, emotion regulation works on two foundations: cognitive reappraisal and suppression. Cognitive reappraisal is a way to change the form of perception of the event causing the emotion, and this changes the emotional effect of a situation (John & Gross, 2004). Reappraisal occurs early as a pioneer strategy before emotional response tendencies. Reappraisal generally causes one to experience more positive feelings and less negative feelings (Gross & John, 2003). As a result, it is assessed as a factor that will increase subjective happiness. In fact, reappraisal is frequently encountered in the research documenting the increases in well-being (Ranney, Bruehlman-Senecal, & Ayduk, 2017; Wang, Chen, & Han, 2017).

Response focused emotion regulation is another strategy of suppression which prevents ongoing emotion-expression behavior (Gross, 1998). The response-focused strategy of emotion suppression changes the behavioral aspect of emotion response tendencies. Suppression does not provide subjective relief from the experience of negative emotions and involves significant costs in cognition, physiology, and relational functioning (Gross, 2002) because suppression has a limiting effect on the expression of positive emotions. In addition, suppression may not assist in reducing negative emotional experiences; the negative emotions remain unresolved and continue to accumulate. In this context, suppression is conceptualized as a maladaptive regulation strategy (Gross & John, 2003). Moreover, suppression may leave individuals feeling inadequate about themselves and may increase negative emotions and depressive symptoms (Nyklicek, Vingerhoets, & Zeelenberg, 2011). Therefore, it is considered that suppression may have a role in lowering subjective happiness.

Mediating Role of Smartphone Addiction

With increasing popularity every day, smartphones appear to have advantages in terms of the easy accessibility they offer.

Especially with the rapid increase in technology, the rate of selection has increased in terms of ability to access social media, emails, news, searches, camera, games, and personal diaries. In fact, the number of smartphone users, with a rapidly increasing trend around the world, rose to 2.17 billion in 2019 (Statista, 2019). This number should not be underestimated in Turkey, where the number of smartphone users crossed 31 million, reaching 38% of the total population (TRT News, 2019).

Dramatic outcomes have been observed, such as addiction, with the increase in smartphone use. In the literature, concepts such as *smartphone addiction*, *problematic mobile phone use*, *mobile phone addiction*, and *excessive use of smartphones*, are used interchangeably (Kim et al., 2016). During this study, the concept *smartphone addiction* was chosen. Smartphone addiction may be defined as an individual using their smartphone excessively or impulsively without control, which in turn leads to negative effects in their lives because of the inability to control this behavior (Liu, Yang, & Zhou, 2017). In addition, smartphone addiction can be described as a compulsive use causing disruption of daily functions in terms of productivity, social relations, and physical or emotional health (Horwood & Anglim, 2018).

Thus far, no study has investigated the connection between emotion regulation, smartphone addiction, and subjective happiness. However, the association between emotion regulation and smartphone addiction has been investigated previously. In the recent past, the relationship with the suppression strategy of emotion regulation was dealt with in general, and the reappraisal strategy was ignored. Elhai et al. (2018) indicated that the excessive use of the expression regulation strategy of suppression predicted more smartphone use. Rozgonjuk and Elhai (2019) emphasized that suppression was a dysfunctional emotion regulation strategy and a fragility factor for a variety of psychopathologies and identified that it increased smartphone addiction because suppression is used as a coping method against addictions (Gross, 2007). In fact, those with a smartphone addiction may not regulate negative emotions sufficiently, and they may focus on smartphones in an attempt to avoid these feelings. Furthermore, Elhai, Levine, Dvorak, and Hall (2016) stated that suppression was related to high levels of smartphone addiction, whereas cognitive reappraisal was related to smartphone use frequency. Individuals with more adaptive methods to regulate emotions have less motivation to become smartphone addicts. In this context, individuals with increasing suppression and reducing reappraisal may assess the increasing smartphone addiction as a compensatory behavior.

In addition to the correlation between emotion regulation and smartphone addiction, literature related to the correlation of smartphone addiction and subjective happiness exists. Previous research has consistently found that smartphone addiction has negative correlations with a variety of well-being markers including subjective happiness (Horwood & Anglim, 2019; Longobardi, Settanni, Fabris, & Marengo, 2020; Nie, Ma, & Sousa-Poza, 2020; Özteke-Kozan, Kavaklı, Ak, & Kesici, 2019). Furthermore, it was reported that smartphone addiction is associated with higher anxiety rates, increased severity of depressive symptoms, and reduced mental well-being and subjective happiness (Guo et al., 2020). Considering all these theoretical explanations and research results, the relationship network between emotion regula-

tion, smartphone addiction, and subjective happiness is revealed. When the adaptive emotion regulation strategy of reappraisal increases, smartphone addiction reduces; as a result of this reduction, it is predicted that subjective happiness will increase. On the contrary, with the increase in the maladjusted emotion regulation of suppression, smartphone addiction will increase, and with this increase, it is hypothesized that subjective happiness levels will reduce. Therefore, in this research, the aim was to investigate the mediating model of smartphone addiction in the relationship between emotion regulation and subjective happiness.

Methods

Participants

Participants in the research comprised 320 university student volunteers attending two state universities in the Marmara and Eastern Black Sea regions. This group comprised 167 (52.2%) women and 153 (47.8%) men. With ages varying from 18 to 26 years, the mean age was 21.06 years, and the standard deviation (SD) was 1.76. The distribution of the study group according to class level was as follows: 76 (23.8%) were in first year, 88 (27.5%) were in second year, 81 (25.3%) were in third year, and 75 (23.4%) were in fourth year of university. All the study participants had smartphones. The mean duration of daily smartphone use among participants was 4.29 hours (SD=195).

Data in the research were obtained from paper-pencil forms by the student volunteers in class environments. It was emphasized that data would only be collected from student volunteers, and participants provided informed consent on the scale sets. The study was approved by Artvin Çoruh University Scientific Research and Ethical Review Board (REF=E.2703).

Data Collection Tools

Subjective Happiness Scale

The Subjective Happiness Scale (SHS) was developed by Lyubomirsky and Lepper (1999) and comprises a total of 4 items with 7-point Likert grading. Possible points that can be obtained from the SHS vary from 4 to 28, with increasing points indicating increasing subjective happiness levels. Adaptation study for the SHS to Turkish culture was completed by Akın and Satıcı (2011). The confirmatory factor analysis results from the adaptation study confirmed the unidimensional structure of the SHS among the university students (relative fit index [RFI]=0.98, goodness of fit [GFI]=1.00, adjusted goodness of fit [AGFI]=0.99, comparative fit index [CFI]=1.00, and standardized root mean square residual [SRMR]=0.015). In addition, the Cronbach alpha reliability coefficient (α=0.86) and test-repeat test reliability coefficient (0.73) for the SHS were found to have acceptable levels (Akın & Satıcı, 2011).

Smartphone Addiction Scale-Short Version

The Smartphone Addiction Scale (SAS) was developed by Kwon et al. (2013) and comprises 10 items with 6-point Likert grading. Possible points that can be obtained from the SAS vary from 10 to 60, with increasing points indicating increasing smartphone addiction levels. The adaptation study for the SAS to Turkish culture was completed by Noyan, Enez-Darcin, Nurmedov, Yilmaz, and Dilba (2015). The exploratory factor analysis results from the adaptation study confirmed the unidimensional structure of

the SAS among the university students. Moreover, the Cronbach alpha reliability coefficient (α=0.87) and test-repeat test reliability coefficient (0.93) for the SAS were found to have acceptable levels (Noyan et al., 2015).

Emotion Regulation Questionnaire

The Emotion Regulation Questionnaire (ERQ) was developed by Gross and John (2003) and comprises 10 items with 7-point Likert grading. ERQ has two dimensions: reappraisal and suppression. The adaptation study for ERQ to Turkish culture was completed by Eldeleklioğlu and Eroğlu (2015). The confirmatory factor analysis results from the adaptation study confirmed the two-dimensional structure of the ERQ among the university students (χ^2/df=1.94, CFI=0.98, root mean square error of approximation [RMSEA]=0.046, and GFI=0.99). In addition, the Cronbach alpha reliability coefficient (α=0.78 and 0.73, respectively) and test-repeat test reliability coefficient (0.74 and 0.72, respectively) for the ERQ were found to have acceptable levels (Eldeleklioğlu & Eroğlu, 2015).

Personal Information Form

The personal information form prepared by the researchers included questions about the ages, gender, class, and daily smartphone use durations of the participants.

Data Analysis

This study aims to reveal the relationship network between subjective happiness, smartphone addiction, and emotion regulation in university students. First, correlation analysis and descriptive statistics were completed. Then, SEM was completed. The study used two-stage SEM in line with the recommendations by Kline (2015). In the first stage, the creation of observed variables for latent variables and the measurement model dealing with the relationships between these latent variables were tested for confirmation. After confirming the measurement model, the hypothetical structural model was tested.

In order to assess the SEM results, the fit indices recommended by Hu and Bentler (1999) were used. Within this scope, in addition to the chi-square (χ^2) and degrees of freedom, the CFI), normed fit index (NFI), Tucker Lewis Index (TLI), SRMR, and RMSEA values were calculated. As critical values, the degree of freedom ratio with χ^2 should be smaller than 5; CFI, NFI, and TLI values should be higher than 0.90; and SRMR and RMSEA values should be lower than 0.08 (Hu & Bentler 1999; MacCallum, Browne, & Sugawara, 1996). In addition to the chi-square test difference to choose which of the several models in the SEM was the best model, the Akaike's information criterion (AIC) and expected cross validation index (ECVI) values were investigated. The model with smaller AIC and ECVI values is accepted as being the best model (Akaike, 1987; Browne & Cudeck, 1993).

In this study, in addition to SEM, the bootstrapping procedure was used, which is gaining popularity at the moment and provides additional support for mediation (Preacher & Hayes, 2008). With the bootstrapping procedure, the sample number is elevated to 5000, and the bootstrap value and confidence intervals (CIs) are created. If zero is not included in the CI, it is concluded that the tested mediation is significant.

Results

Preliminary Analyses

Descriptive statistics (mean, SD, and skewness and kurtosis values) belonging to correlations and variables are presented in Table 1. The skewness (-0.472 to 0.188) and kurtosis (-0.487 to 0.543) values of variables appear to be within the ±2 normality criteria as stated by George and Mallery (2010). Both Cronbach alpha (α=0.721 to 0.897) and McDonald's omega (ω=0.734 to 0.898) reliability coefficients were found to be above 0.70 as stated by Nunally and Bernstein (1994).

The data in Table 1 indicates that subjective happiness has a positive significant correlation with reappraisal (r=0.28, p<0.01). Subjective happiness has negative significant correlations with smartphone addiction (r=-0.28, p<0.01) and suppression (r=-0.30, p<0.01). Smartphone addiction has a negative significant correlation with reappraisal (r=-0.15, p<0.01) and a positive significant correlation with suppression (r=0.15, p<0.01).

Before investigating the direct and indirect effects in the structural model, assumptions in line with the recommendations by Field (2016) were investigated. The results of the analysis indicate that no value had Mahalanobis distance greater than 15. variance inflation factor (VIF) values varied from 1.03 to 1.04; in other words, none of the VIF values were above 2. In addition, the tolerance value varied from 0.96 to 0.97, which is above 0.2. The results for the common method bias (CMB) completed using Harman's single factor score identified that the single factor explained 40% of the variance, and considering the recommendation by Roni (2014), there was no CMB problem. In light of all these results, it was decided that SEM could be performed for data.

Structural Equation Modeling

Measurement Model

The measurement model included four latent variables (subjective happiness, smartphone addiction, reappraisal, and suppression) along with two observed variables for each latent variable. According to the results, the measurement model had good fit; $\chi^2_{(14, N=320)}$=26.67, p<0.001; CFI=0.98; NFI=0.96; TLI=0.96; SRMR=0.0316; RMSEA=0.053 CI: [0.020, 0.084]. Factor loadings

varied from 0.42 to 0.91, and in light of these values, the observed variables can be said to significantly represent the latent variables.

Structural Model

First, in the structural model, the full mediation model for smartphone addiction between emotion regulation and subjective happiness was tested. In the full mediation model, there is no direct path between the dimensions of emotion regulation and subjective happiness. When the goodness-of-fit indices for the full mediation model of smartphone addiction were investigated, apart from SRMR (0.081) and RMSEA (0.089), all other fit indices were at acceptable levels; $\chi^2_{(16, N=320)}$=56.57, p<0.001; CFI=0.94; NFI=0.92; TLI=0.90; AIC=96.57; and ECVI=0.303. In order to reveal the best model, the partial mediating model of smartphone addiction was investigated. Stated differently, direct paths between the sub-dimensions of emotion regulation and subjective happiness were added to the model. After the analyses, it was seen that the goodness-of-fit indices for the model with smartphone addiction as partial mediator were at acceptable levels; $\chi^2_{(14, N=320)}$=26.67, p<0.001; CFI=0.98; NFI=0.96; TLI=0.96; SRMR=0.0316; RMSEA=0.053; AIC=70.67; and ECVI=0.22. All the path coefficients in both models were found to be significant.

Chi-square difference test results were used to choose whether partial mediating role of smartphone addiction is superior to full mediating role of smartphone addiction.. The direct path added between emotion regulation and subjective happiness significantly contributed to the model ($\Delta\chi^2$=29.90, df=1, p<0.001). In addition, the AIC and ECVI values for the partial mediation model appeared to be smaller than the AIC and ECVI values for the full mediation model. In line with all these results, a model with smartphone addiction in a partial mediating role between emotion regulation and subjective happiness of university students was chosen. The path coefficients related to this model are given in Figure 1.

Bootstrapping Procedure

The coefficients related to the direct and indirect paths and the CIs for these coefficients found from the bootstrapping procedure are included in Table 2.

Table 1.
Correlations among the Study Variables

Variable	1	2	3	4
1. Subjective happiness	-			
2. Smartphone addiction	-0.28**	-		
3. Reappraisal	0.22**	-0.15**	-	
4. Suppression	-0.30**	0.15**	-0.13*	-
Mean	18.09	30.46	29.10	14.25
SD	5.25	10.63	5.06	4.64
Skewness	-0.273	0.188	-0.472	0.181
Kurtosis	-0.210	-0.487	0.543	-0.016
Cronbach α	0.878	0.897	0.741	0.721
McDonald ω	0.886	0.898	0.755	0.734

SD: standard deviation.
**p<0.01.

Table 2.
Standardized Bootstrapping Coefficients for the Final Model

Model pathways	Coefficient*	95% CI	
		Lower	Upper
Direct effect			
Reappraisal → Smartphone addiction	-0.213	-0.392	-0.081
Reappraisal → Subjective happiness	0.172	0.012	0.345
Suppression → Smartphone addiction	0.214	0.039	0.357
Suppression → Subjective happiness	-0.329	-0.485	-0.154
Smartphone addiction → Subjective happiness	-0.194	-0.346	0.001
Indirect effect			
Reappraisal → Smartphone addiction → Subjective happiness	0.041	0.005	0.100
Suppression → Smartphone addiction → Subjective happiness	-0.041	-0.099	-0.006

*Because the CIs do not cover zero, all the coefficients are significant; CI: confidence interval.
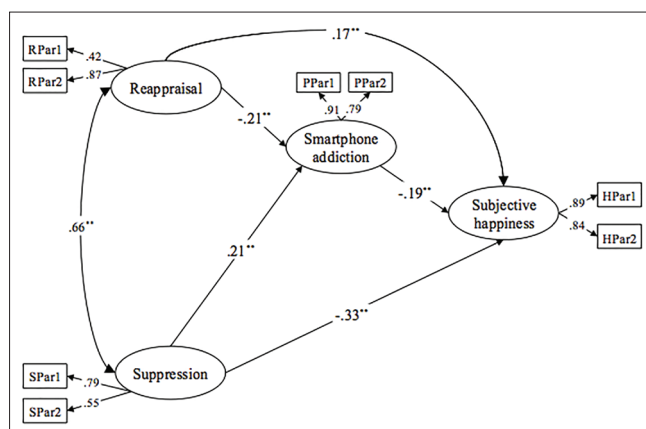

Figure 1. Standardized factor loadings for the final structural model. Note. N=320; ** p<0.01

Coefficients for all the direct paths were found to be significant after the bootstrapping procedure. Similarly, the indirect path coefficients for both reappraisal (bootstrap estimate=0.041, 95% CI=0.005 – 0.10) and suppression (bootstrap estimate=-0.041, 95% CI=-0.099 to -0.006) were significant. When all these results are considered, smartphone addiction can be said to have a partial mediating role between emotion regulation and subjective happiness among university students.

Discussion

This research aimed to investigate the associations between subjective happiness, smartphone addiction, and emotion regulation among university students. In line with this, a structural model investigating the mediating role of smartphone addiction in the relationship between emotion regulation and subjective happiness was tested. According to the model results, the reappraisal strategy of emotion regulation negatively and directly predicted smartphone addiction and positively and directly predicted subjective happiness. On the contrary, the suppression strategy positively and directly predicted smartphone addiction and negatively and directly predicted subjective happiness. Moreover, smartphone addiction partially mediated between emotion regulation and subjective happiness. The obtained results are discussed below in the context of the literature.

According to the first finding in the study, smartphone addiction was negatively predicted by reappraisal and positively predicted by suppression. The adaptive emotion regulation strategy of cognitive reappraisal assists in changing the form of perception of events and may lighten these effects (John & Gross, 2004). Furthermore, individuals who can reappraise situations deal less with smartphones and use more realistic coping methods. In the relevant literature, reappraisal was a positive finding with the frequency of smartphone use, which supports the results of this study. However, suppression was identified to directly increase smartphone addiction. The maladaptive emotion regulation strategy of suppression is a fragile coping method against psychopathology and addictions (Gross, 2007; Rozgonjuk & Elhai, 2019). Suppression may not reduce negative emotional experiences, and individuals may accumulate negative emotions and use smartphones more as compensation. Therefore, it is logical that suppression is a factor increasing smartphone addiction. In fact, these results appear to be consistent with the literature (Elhai et al., 2018; Elhai et al., 2016; Rozgonjuk & Elhai, 2019).

The study additionally identified that smartphone addiction directly and negatively predicted subjective happiness. Researchers have indicated that individuals who use smartphones addictively may be exposed to more dangerous or negative effects (Elhai, Dvorak, Levine, & Hall, 2017). As smartphone addicts compulsively interact with their smartphones, they will miss the positivity and good things in their surroundings. They enter a virtual world; however, over time, their tolerance levels will increase, and this virtual world will no longer be sufficient. Similarly, it appears that smartphone addiction is correlated with mental disorders such as depression, anxiety, and worries, which lower happiness (Elhai et al., 2017; Gou et al., 2020). This is because smartphone use may excessively change daily routines, habits, and social behavior. As a result, when smartphones are used addictively, happiness may decrease.

Finally, in this study, smartphone addiction was determined to partially mediate between emotion regulation and subjective happiness. Stated differently, the increase in reappraisal and reduction in suppression in individuals reduce smartphone addiction, and owing to this reduction, subjective happiness is strengthened. This finding may be debated from several angles.

Individuals using cognitive reappraisal are less likely to develop addictive habits. Individuals with less behavioral addiction will experience more positive feelings (Gross & John, 2003). Smartphone use increases in individuals with cognitive reappraisal (Elhai et al., 2016); with this increase, face-to-face interaction of the individuals reduces. In addition, smartphones lower the quality of face-to-face interactions (Rotondi, Stanca, & Tomasuolo, 2017). As a result, smartphone addiction has an adverse effect on the satisfaction obtained from social relationships and weakens the feelings of happiness. On the contrary, suppression changes the direction of this relationship. Suppression does not aid in reducing the negative emotions and causes accumulation of these emotions without resolution. In line with this, smartphones may become a refuge to avoid these emotions. Thus, suppression increases smartphone addiction (Elhai et al., 2018) and lowers subjective happiness. The findings identified for the connections between suppression, smartphone addiction, and subjective happiness can therefore be said to be logical.

Limitations and Directions

Some limitations should be noted while interpreting the results of this study. The first limitation is related to obtaining the study data through self-report scale tools. As a result, the information about concepts is limited to the scope of these scales. In addition, the concepts may be investigated with multiple assessment methods. Thus, more detailed information about concepts can be accessed. The other limitation is related to participants. Although data were obtained from two state universities located in two different regions, care should be taken when generalizing the findings to the Turkish university students. Moreover, care should be taken about causality among the study variables because even in studies with cross-sectional design, even with SEM performed, direct cause-outcome connections cannot be formed. Therefore, future studies should have a longitudinal design to reveal the ranked effects of the variables.

In addition to these limitations, the study results should not be ignored. Frequently on the agenda today, smartphone addiction was revealed to play a role in the relationship between emotion regulation and subjective happiness. If psychological counselors perform interventions to develop adaptive emotion regulation strategies and lower the maladaptive emotion regulation strategies, it will assist with smartphone addiction, which in turn will strengthen subjective happiness.

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