



The relationship between problematic smartphone use and psychiatric symptoms among adolescents who applied to psychiatry clinics



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ARTICLE INFO

Keywords:

Problematic smartphone use
Psychiatric symptoms
Emotion regulation problems
Adolescents

ABSTRACT

Problematic mobile phone use is an important problem which has increasing prevalence among adolescents. We should address risk factors to create intervention frameworks related to this problem. In this study, we aimed to determine the prevalence of problematic smartphone use among adolescents who were referred to clinics, its relationship to sociodemographic characteristics, psychiatric symptoms and emotion regulation problems. We included 150 adolescents aged 12–18 years who own smartphones. All participants filled out the Sociodemographic Information Form, Brief Symptom Inventory (BSI), Difficulties in Emotion Regulation Scale (DERS) and Problematic Mobile Phone Use Scale (PMPUS). Problematic smart phone use was detected in 50.6% of the sample. Adolescents with problematic use were found to be older than the others, with lower levels of maternal education and self-achievement. Regression analysis revealed that the factors predicting the risk of problematic smartphone use are somatization, interpersonal sensitivity and hostility symptoms. According to our results, we suggest psychiatrists consider the high prevalence of problematic smartphone use, address the relationship between hostility, somatic symptoms and interpersonal sensitivity (susceptibility) and the effects of this current problem on social-academic functioning while evaluating and treating adolescents.

1. Introduction

As a result of technological developments, mobile phones have become indispensable parts of daily life (Noyan et al., 2015). In the last decade, mobile phones have evolved into smartphones and these new generation phones have the advantage of advanced instant communication.

Failure to regulate mobile phone usage causing adverse consequences in daily life has been described as problematic mobile phone use (Billieux, 2012). Although this is a known problem since the early 2000s, the prevalence of smartphones has increased steadily over the past decade. Problematic smartphone use is a major problem, especially among adolescents (Roser et al., 2016; Smetaniuk, 2014). Recent studies have shown that 16% of middle school students in Korea (Lee et al., 2007) 26% of the young Tunisian population (Halayem et al., 2010), 28.2% of Chinese high school students (Tao et al., 2017) and 20% of Spanish high school students (Sánchez-Martínez and Otero, 2009) are affected by this problem.

When considering problematic smartphone use, it is necessary to examine etiological factors and negative effects on the lives of individuals. Studies demonstrated that this current problem has negative consequences on physical and mental health, general functionality, and sleep quality (Park and Lee, 2012; Tao et al., 2017). In addition, adolescents with problematic smartphone use showed low academic performance and high peer-family relationship problems (Yen et al., 2009). However, problematic smartphone use may be a result of psychiatric disorders or some personal characteristics. Recent studies demonstrated that it is related with being alone-shy, having low impulse control, depressive features, emotion regulation difficulties, high anxiety, low self-esteem, high aggression, behavior problems, high age and female gender (Aktaş and Yılmaz, 2015; Augner and Hacker, 2012; Billieux et al., 2008; De-Sola et al., 2017; Ha et al., 2008; Roser et al., 2016; Smetaniuk, 2014; Yang et al., 2010; Yen et al., 2009).

Problematic smartphone use, which is strongly related to psychiatric symptoms, is generally investigated with community-based studies or among high school students, but not in the clinical samples where

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risk is highest. In addition, the higher age in the studies mentioned above makes it difficult to generalize the results to adolescents aged 12–18 which is a riskier group for this problem.

In this study, we aimed to investigate the relationship between problematic smartphone use and psychiatric symptoms among adolescents who applied to psychiatry clinics, and aimed to reveal the features that might be risky. We determined our hypotheses as follows;

- There are differences in the socio-demographic characteristics, school adjustment and academic levels of adolescents with problematic smartphone use and non-problematic smartphone use.
- In adolescents with problematic smartphone use some psychiatric symptoms are significantly higher.
- There are relationships between problematic smartphone use and psychiatric symptoms.

And finally, we searched for the answer to the question: 'What are the features that could be risky for problematic smartphone use among adolescents?'

2. Material and method

The research was approved by the Ethics Committee of Ankara University School of Medicine. The inclusion criteria were being 12–18 years old, being referred to a psychiatry clinic, having their own smartphone and agreeing to participate in the study. Exclusion criteria were having autism spectrum disorder, chronic medical or neurological disease, mental retardation, not owning their own smartphone and not wanting to participate in the study. The study was carried out in Ankara University School of Medicine and Kahramanmaraş City Hospital Psychiatry or Child and Adolescent Psychiatry clinics. After first psychiatric evaluation, adolescents and parents who met the criteria were invited to participate in the study. One hundred sixty-two adolescents and their parents agreed to participate and both adolescents and their parents signed informed consent forms. The Demographic Information Form, Problematic Mobile Phone Usage Scale (PMPUS), Brief Symptom Inventory (BSI) and Difficulties in Emotion Regulation Scale (DERS) were given to the adolescents, but unfortunately, only 150 of them completed all the forms. We analyzed the data of these adolescents.

2.1. Measurements

2.1.1. Demographic information form

This form consisted of questions that were prepared by the authors to obtain information about demographic characteristics (age, school, academic achievement, parental age and education, monthly household income, marital status of parents).

2.1.2. Problematic Mobile Phone Usage Scale (PMPUS)

This scale was developed by Augner and Hacker (2012). The excessive use of mobile phones, relationship between mobile phone use and some mental health variables, and the negative effects that may arise from the long-term use of mobile phones can be measured with this tool. It consists of three parts; 'addiction' (9 questions), 'social relations' (7 questions), 'results' (10 questions). It is a Likert type scale that is scored between 0 (no) – 4 (very frequent) for the addiction and social relations section; and 0 to 4 points (0 = strongly disagree, 4 = strongly agree) for the results section. The total score for the entire scale ranges from 0–104 (Points above 30 are regarded as problematic use). A high score indicates that someone has more problematic and addictive mobile phone use. The Turkish validity and reliability study of the scale was completed by Tekin et al. (2014). For our sample the value of Cronbach α is = 0.94.

2.1.3. Brief Symptom Inventory (BSI)

The Brief Symptom Inventory was developed by Derogatis and

Savitz (1999) for the purpose of screening various psychological indications. It is the short form of SCL-90-R. Among the 90 items distributed over 9 factors of SCL-90-R, the short form was obtained by selecting 53 items with the highest load in each factor. It is a 4 point Likert type scale. High scores in total indicate the frequency of the individual's symptoms (Derogatis and Savitz, 1999). It has items for anxiety (13 items), depression (12 items), negative self (12 items), somatization (9 items) and anger / aggression (7 items). Turkish adaptation studies were completed by Sahin and Durak (1994). In three separate studies conducted by them (4), the Cronbach Alpha internal consistency coefficients obtained from the total score were found to be 0.96 and 0.95, and the coefficients obtained for the subscales ranged from 0.75 to 0.88 (Şahin and Durak, 1994).

2.1.4. Difficulties in Emotion Regulation Scale (DERS)

The Difficulties in Emotion Regulation Scale (DERS) was developed by Gratz & Roemer (2004) to determine difficulties in emotion regulation (Gratz and Roemer, 2004). DERS consists of 36 items that are evaluated using a five-point Likert scale. The scale was adapted to Turkish by Rugancı and Gençöz (2010) and consists of six dimensions: Awareness (Lack of emotional awareness), Clarity (Lack of emotional clarity), Non-acceptance (Non-acceptance of emotional responses), Strategies (Limited access to emotion regulation strategies), Impulse (Impulse control difficulties), and Goals (Difficulties engaging in goal directed behavior). The Turkish version of the scale has total Cronbach's Alpha reliability coefficient of 0.94 and subscales were between 0.75 and 0.90. Test-retest reliability was 0.83 and two half-test reliability was 0.95. For our sample the value of Cronbach α is = 0.86.

2.2. Statistical analysis

We used IBM SPSS Statistics for Windows 22.0 software for statistical analyses. We used Pearson Chi-square and Fisher's exact tests to compare the differences in the categorical variables; the Independent Sample T-Test or Mann Whitney U test to compare differences in scale/subscale scores and correlation analysis to examine the relationships between scale scores. Then we used univariate analysis to determine associations of variables with problematic smartphone use. The variables for which the unadjusted p value < 0.25 were identified as potential risk markers and included in the full multivariate model. Three models were created. In the first model, subscales of DERS were analyzed as independent variables. In the second model subscales of BSI were analyzed. In the third model, independent variables that are risk factors in both models and sociodemographic characteristics that could be risk factors were analyzed.

3. Results

The study was carried out with 150 adolescents (62 boys, 88 girls) aged between 12 and 18 (mean age: 15.28 ± 1.65) years. The mean maternal age was 41.04 ± 6.34 , the mean maternal education was 7.51 ± 3.23 , the mean paternal age was 45.84 ± 6.89 and the mean paternal education was 8.68 ± 3.28 . The mean monthly income of the sample was 2374 ± 1214 Turkish Lira (Table 1).

After clinical evaluations, 40 adolescents had depression, 25 adolescents had anxiety disorders, 27 had Obsessive-Compulsive Disorder, 37 had Attention Deficit Hyperactivity Disorder, and 7 had other diagnoses including bipolar disorder, tic disorders and eating disorders. All these diagnoses were higher among the problematic smartphone use group (Table 1)

Seventy-six of the adolescents (27 boys, 49 girls) had problematic smartphone use. The ratio of problematic smartphone use in our sample was 50.6%. There were no significant differences in terms of gender, maternal age, paternal age, paternal education, and monthly income between the problematic smartphone use and non-problematic smartphone adolescent groups. On the other hand, problematic smartphone

Table 1
Sociodemographic characteristics of the sample and groups.

| Characteristics of sample | | | | | |
|---------------------------------|-------------------|---------|-----------------------|--------|--------------------------------------|
| | n | % | | | |
| Gender | | | | | |
| • Boys | 62 | (41.3) | | | |
| • Girls | 88 | (58.7) | | | |
| | Mean | SS | | | |
| | (min-max) | | | | |
| Age (Year); | 15.2 | 1.65 | | | |
| | (12–18) | | | | |
| Monthly income (lira); | 2374 | 1214.41 | | | |
| | (0–5000) | | | | |
| Maternal education (year) | 7.5 | 3.13 | | | |
| | (3–15) | | | | |
| Paternal education (year) | 8.6 | 3.28 | | | |
| | (5–15) | | | | |
| Maternal age | 41.04 | 6.34 | | | |
| | (31–53) | | | | |
| Paternal age | 45.8 | 6.89 | | | |
| | (36–76) | | | | |
| Characteristics of groups | | | | | |
| | PSMPU (n = 76) | | Non-PSMPU (n = 74) | | P value and statistics |
| | n | % | n | % | |
| Gender | | | | | $\chi^2 = 2.142, df = 1, p = .143$ |
| • Boys | 27 | (35.5) | 35 | (47.3) | |
| • Girls | 49 | (64.5) | 39 | (52.7) | |
| Diagnosis | | | | | |
| • Depression | 32 | (80) | 8 | (20) | $\chi^2 = 9.829, df = 1, p = .143$ |
| • Anxiety disorders | 21 | (84) | 4 | (16) | $\chi^2 = 13.030, df = 1, p < .0001$ |
| • Obsessive-compulsive disorder | 21 | (77.8) | 6 | (22.2) | $\chi^2 = 9.829, df = 1, p = .001$ |
| • ADHD | 28 | (75.7) | 9 | (24.3) | $\chi^2 = 17.008, df = 1, p < .0001$ |
| • Others | 5 | (71.4) | 2 | (28.6) | $\chi^2 = 1.266, df = 1, p = .232$ |
| | Median | SS | Median | SD | |
| | (min-max) | | (min-max) | | |
| Age (Year); | 15 (14–18) | 1.45 | 15 (12–18) | 1.722 | $Z = -3.514 p < .0001$ |
| Monthly income (lira); | 2000 | 1251.6 | 2000 | 1160.9 | $Z = -0.888 p = .374$ |
| | (0–5000) | | (1300–5000) | | |
| Maternal education (year) | 5 (3–13) | 2.815 | 7 (5–15) | 3.327 | $Z = -2.017 p = .044$ |
| Paternal education (year) | 8 (5–15) | 3.435 | 9.5 (5–14) | 3.168 | $Z = -0.877 p = .380$ |
| Maternal age | 41.5 (31–53) | 6.879 | 38 (32–52) | 5.703 | $Z = -1.811 p = .070$ |
| Paternal age | 45 (36–76) | 7.549 | 43.5 (37–68) | 6.181 | $Z = -1.687 p = .092$ |

PSMPU:Problematic Smart Mobile Phone Usage; n:sample size; χ^2 : chi square mean; df: degrees of freedom; p:calculated probability; min: mininum; max: maximum; SD, standart deviation; Z, test statistics

use group adolescents were older and maternal education levels were lower than the others (Table 1). In terms of school and academic problems, there was no significant difference in class repetition, but receiving a disciplinary punishment and decreases in academic achievement rates were significantly higher in the problematic smartphone use group. Problematic smartphone use had a moderate impact on disciplinary punishment ($p = .001$ Cramer's $V = 0.290$) and high impact on decreases in academic achievement ($p = .001$ Cramer's $V = 0.461$).

We found significant differences in somatization, interpersonal sensitivity, depression, anxiety, obsessive-compulsive, phobic anxiety, hostility, paranoia, and psychoticism subscales of BSI between problematic smartphone use and non-problematic smartphone use groups. The scores in the problematic smartphone use group were significantly higher (Table 2). We also found significant differences in Clarity, Strategies, Impulsivity, and Goals subscales of DERS between groups. These problems were significantly higher in adolescents with problematic smartphone use too (Table 2).

When we explored the correlations, we found that significant and positive correlations exist between the total score of PMPUS and somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, phobic anxiety, hostility, paranoia, and psychoticism subscales of BSI when the effect of age was controlled (Table 3). We determined that there were also significant and positive relationships between the PMPUS total score and some of DERS subscales (Clarity, Strategies,

Impulsivity, Goals) when the probable effect of the age variable was controlled (Table 3).

Finally, we created three models to investigate the risk factors for problematic smartphone use. In Model 1, we took the problematic smartphone use as dependent variable and Clarity, Non-acceptance, Strategies and Impulsivity subscale scores as independent variables. We found that only the impulsiveness subscale had a significant effect on the problematic use of the smartphone. In Model 2, we took the problematic smartphone use as dependent variable and somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, phobic anxiety, hostility, paranoia, and psychoticism subscales of BSI as independent variables. We found that Depression and Anxiety scores have multiple correlations with other variables (all correlation coefficients were higher than 0.78 and the p -value < 0.001) and supporting these results, according to collinearity statistics, these two variables have high VIF (variance inflation factor) and low tolerance value than suggested (suggested value for VIF is lower than 10; suggested value for tolerance is higher than 0.2; for depression VIF: 12.19, tolerance: 0.08 and for anxiety VIF: 12.52, tolerance: 0.08). Due to these results, we extracted the Depression and Anxiety variables from the analysis. Then we analyzed the other variables again and we found that somatization, interpersonal sensitivity, hostility and paranoia scores had a significant effect on problematic smartphone use (Table 4). Then, in Model 3, independent variables which had a significant effect on problematic

Table 2
BSI and DERS subscale scores between groups.

| | PSMPU (n = 76) Median (min-max) | Non-PSMPU (n = 74) Median (min-max) | P and Z value |
|--|------------------------------------|--|----------------------|
| BSI Subscales | | | |
| • Somatization | 15(1–25) | 4(0–19) | Z = -7.24 p < .0001 |
| • Obsession-compulsion | 14(1–23) | 8.5(1–21) | Z = -5.122 p < .0001 |
| • Interpersonal sensitivity | 10(2–16) | 5(0–14) | Z = -5.931 p < .0001 |
| • Depression | 16(0–24) | 4(0–20) | Z = -6.427 p < .0001 |
| • Anxiety | 13.5(1–24) | 5.5(0–18) | Z = -6.303 p < .0001 |
| • Hostility | 13(3–20) | 6.5(0–18) | Z = -5.888 p < .0001 |
| • Phobic anxiety | 9(2–20) | 3.5(0–12) | Z = -6.018 p < .0001 |
| • Paranoid ideation | 13(1–19) | 5(0–16) | Z = -6.173 p < .0001 |
| • Psychoticism | 10(0–18) | 2(0–16) | Z = -6.275 p < .0001 |
| • Others | 9(0–15) | 4(0–14) | Z = -5.545 p < .0001 |
| DERS Subscales | | | |
| • Aware (Lack of emotional awareness) | 17(9–22) | 16(7–30) | Z = -0.097 p = .922 |
| • Clarity (Lack of emotional clarity) | 14(9–18) | 12(5–18) | Z = -2.730 p = .006 |
| • Nonaccept (Non-acceptance of emotional responses) | 12(6–24) | 11(6–21) | Z = -1.820 p = .069 |
| • Strategies (Limited access to emotion regulation strategies) | 26(12–40) | 15(8–29) | Z = -5.340 p < .0001 |
| • Impulse (Impulse control difficulties) | 21(9–26) | 13(6–25) | Z = -4.799 p < .0001 |
| • Goals (Difficulties engaging in goal directed behavior) | 19(8–22) | 13.5(5–21) | Z = -3.631 p < .0001 |

PSMPU:Problematic Smart Mobile Phone Usage; BSI: Brief Symptom Inventory; DERS: Difficulties in Emotion Regulation Scale n:sample size; p:calculated probability; min: minimum; max: maximum; Z, test statistics

Table 3
The correlations between PSMPU-BSI and DERS scores when the effect of age is controlled.

| Variables | PSMPU total score | |
|--|-------------------|---------|
| | r | p |
| BSI subscales | | |
| • Somatization | 0.575 | < .0001 |
| • Obsession-compulsion | 0.470 | < .0001 |
| • Interpersonal sensitivity | 0.383 | < .0001 |
| • Depression | 0.511 | < .0001 |
| • Anxiety | 0.487 | < .0001 |
| • Hostility | 0.580 | < .0001 |
| • Phobic anxiety | 0.441 | < .0001 |
| • Paranoid ideation | 0.528 | < .0001 |
| • Psychoticism | 0.483 | < .0001 |
| DERS Subscales | | |
| • Aware (Lack of emotional awareness) | -0.087 | .417 |
| • Clarity (Lack of emotional clarity) | 0.304 | .004 |
| • Nonaccept (Non-acceptance of emotional responses) | 0.136 | .205 |
| • Strategies (Limited Access to emotion regulation strategies) | 0.494 | < .0001 |
| • Impulse (Impulse control difficulties) | 0.631 | < .0001 |
| • Goals (Difficulties engaging in goal directed behavior) | 0.444 | < .0001 |

PSMPU:Problematic Smart Mobile Phone Usage; BSI: Brief Symptom Inventory; DERS: Difficulties in Emotion Regulation Scale r, Correlation coefficient; p, calculated probability

smartphone use in the first two models, the age of adolescent and maternal education levels were inserted into the model and analyzed. In this final model, we found that somatization, interpersonal sensitivity and hostility scores have a significant effect on problematic smartphone use (Table 4).

4. Discussion

Our research is one of the earliest studies about the relationship between problematic smartphone use and emotion regulation difficulties, psychiatric symptoms, and sociodemographic risk factors among adolescents in clinical practice.

In the discussion section, we will address our results in three main areas compared with the results of the studies from our country and from other societies:

- Problematic smartphone use prevalence,

Table 4
Multiple regression analyzes of variables that could predict PSMPU.

| Independent variables | PSMPU | p |
|-------------------------------|--------|---------|
| Model 1 | β | |
| DERS Aware | 0.035 | .723 |
| DERS Nonaccept | -0.086 | .395 |
| DERS Strategies | 0.046 | .782 |
| DERS Impulsivity | 0.482 | < .0001 |
| DERS Goals | 0.189 | .153 |
| Model 2 | | |
| BSI Somatization | 0.323 | .034 |
| BSI Obsession- Compulsion | 0.126 | .397 |
| BSI Interpersonal Sensitivity | -0.494 | .001 |
| BSI Hostility | 0.270 | .036 |
| BSI Phobic Anxiety | -0.022 | .875 |
| BSI Paranoid Ideation | 0.349 | .025 |
| BSI Psychoticism | 0.165 | .225 |
| Model 3 | | |
| BSI Somatization | 0.577 | .001 |
| BSI Interpersonal Sensitivity | -0.458 | .007 |
| BSI Hostility | 0.461 | .003 |
| BSI Paranoid Ideation | 0.010 | .948 |
| DERS Impulsivity | 0.136 | .334 |
| Age | -0.031 | .744 |
| Maternal Education | -0.145 | .11 |

BSI: Brief Symptom Inventory, DERS: Difficulties in Emotion Regulation Scale

- Relationship between problematic smartphone use and socio-demographic characteristics
- Relationship between problematic smartphone use and psychiatric symptoms

4.1. Problematic smartphone use prevalence

In our study, the rate of problematic smartphone use was 50.6%. This means that more than half of the sample have problematic smartphone use. Recent studies from other societies showed that 16% of Korean middle school students (Lee et al., 2007), 26% of the community sample in Tunisia (Halayem et al., 2010), 28.7% of university students in Spain and 10% of adolescents in England reported problematic smartphone use (De-Sola et al., 2017; Lopez-Fernandez et al., 2014). As noted, when compared to normal population-based samples, problematic smartphone use prevalence was 2–5 times higher in our adolescent sample. Our results demonstrated that the relationship

between problematic smartphone use and psychiatric symptoms among adolescents who are referred to psychiatry clinics is strong.

4.2. Relationship between problematic smartphone use, sociodemographic variables and academic functioning

The problematic smartphone use group were older than others. Our results are in accordance with recent studies indicating high problematic smartphone use risk with increasing age (Smetaniuk, 2014). This may be related to some factors: The first one is the loss of parental intervention as a result of individualization in later adolescence. The second one is the increased time of use due to having their own SP. Unfortunately, there is limited data providing conclusive evidence for a comprehensive categorization of ages among adolescents with problematic smartphone use.

In the problematic smartphone use group, the educational level of the mothers was significantly lower. There was no relationship between paternal education level and problematic smartphone use. The results of our study about maternal education are in accordance with other community-based studies. Although it is not possible to evaluate causality in a cross-sectional study like the present one, it can be speculated that mothers with high educational level are aware of their children's problematic smartphone use and so they can manage it more easily (Inyang et al., 2010; Roser et al., 2016). In a recent study of Korean adolescents, in the mobile phone addicted group, parents had more punitive attitudes. Similarly, there was a relationship between smartphone addiction and negative attitudes of parents in Chinese university students (Lian et al., 2016). In our clinical observations, we have observed that problematic smartphone use is not resolved by the punitive parental attitude, it even continues to increase. We did not find a study investigating punitive parental attitudes and parental educational levels among adolescents with problematic smartphone use. The results bring to mind two important questions: One of them is about the relationship between maternal education and approaches to problematic smartphone use. Could highly-educated mothers prevent adolescents from experiencing this behavioral problem with different approaches instead of punitive attitudes? The other important question is whether the relationship between parental education and problematic smartphone use in children varies based on cultural differences? In a recent study conducted in the United States, it was determined that one of the risk factors that predicted the problematic smartphone use problem in young adults was low paternal education level and maternal education level had no significant effect (Beison and Rademacher, 2016). The answer to these questions seems important in terms of developing protective factors for adolescents.

According to our results, there was no relationship between parental age and the child's problematic smartphone use. We determined that there was no relationship between parental age and child's problematic smartphone use in previous studies performed with different age groups (Lee et al., 2016; Terras and Ramsay, 2016).

In our study, problematic smartphone use had a significant effect on the adolescent's disciplinary punishment and course failure. It is stated that sleep quality may also be an important factor affecting on adolescents' academic problems and aggression (Rosen et al., 2016; Schweizer et al., 2017; Zschoche and Schlarb, 2015). Studies conducted over the last few years demonstrated that problematic smartphone use causes deterioration in sleep quality and related problems (Lemola et al., 2015; Randler et al., 2016; Tao et al., 2017). Psychoeducation about the consequences of using smartphones for a long time before sleeping will be helpful for adolescents.

4.3. Relationship between problematic smartphone use and psychiatric symptoms

In recent years, many studies have been conducted supporting the relationship between problematic smartphone use and psychiatric

problems. In our study, somatization, interpersonal sensitivity, depression, anxiety, obsession-compulsion, phobic anxiety, hostility, paranoia and psychoticism were high among adolescents with problematic smartphone use. Moreover, in this group, the scores for the clarity, strategies, impulsivity, and goals subscales of DERS were significantly higher. We used regression analysis to investigate the effects of psychiatric symptoms, emotion regulation problems, the age of the adolescent and maternal education on problematic smartphone use in different models. When the effect of age and maternal education is controlled, somatization, interpersonal sensitivity and hostility symptoms predict problematic smartphone use for the clinical adolescent sample. Until now many studies demonstrated the relationship between depression and problematic smartphone use (Augner and Hacker, 2012; Sánchez-Martínez and Otero, 2009). Also, the risk for problematic smartphone use was higher after controlling for the confounding effects of sex, age, and residential areas in depressed adolescents (Yen et al., 2009). In addition to depression, Babadi-Akashe et al. reported a relationship between obsessive-compulsive disorders and interpersonal sensitivity among individuals with mobile phone dependency (Babadi-Akashe et al., 2014). Similarly, it is emphasized that there is an association between problematic mobile phone use and anxiety (Bianchi and Phillips, 2005; Ha et al., 2008; Lepp et al., 2014; Lu et al., 2011). Tavakolizadeh et al. observed an association between somatization, anxiety and depression tendency and extreme mobile phone use (Tavakolizadeh et al., 2014). In a recent study impulsiveness, addiction and problematic mobile phone use relationships were highlighted (De-Sola et al., 2017). As seen, all these studies are in accordance with our results.

The most important contribution of our study to the field is to determine the three important predictors of problematic smartphone use in the clinical adolescent sample: hostility, somatization and interpersonal sensitivity. As is known, "impulsivity" is a risk factor for many behavioral addictions and substance abuse (Argyriou et al., 2017; Gutiérrez et al., 2016). Impulsivity is also important in the emergence of anger and hostility feelings (Ramírez and Andreu, 2006). Our results suggest that impulsivity is associated with problematic smartphone use, but this relationship could be derived from the association between impulsivity and hostility. We didn't explore the type or patterns of smartphone usage, and most importantly given the wide range of different smartphone use among adolescents nowadays, there could be many types of problematic use including the overuse of social media, digital games, instant messaging etc. As is known, one of the most popular social media sites is Facebook. In a recent study from Turkey which examined the effect of ADHD, impulsivity types, use motivations, internalizing and externalizing symptoms on Facebook (FB) overuse and FB addiction indicated that ADHD adolescents have more fake FB accounts, have their own accounts for a longer time, use FB for more motivation types and FB overuse is more frequent than in non-ADHD counterparts. According to the degree of FB use, it was shown that adolescents with FB overuse behavior have more externalizing symptoms and have higher ADHD and impulsivity scores than others (Gul et al., 2018). There could be a similar relationship between problematic smartphone use and ADHD-related problems including impulsivity, hostility and other externalizing symptoms and this possible relationship should be addressed in future studies. On the other hand in Gul et al.'s study, using FB from their own smartphone was not a predictor of FB overuse/ addiction. To our knowledge, the relationship between overuse of other commonly used SP applications' (Twitter, Instagram, WhatsApp etc.) and using them from their own SP has not been addressed among adolescents and should be examined in future studies too.

Our results also demonstrated that higher somatization and interpersonal sensitivity scores predict problematic smartphone use. These results bring to mind the following question: Do adolescents that are not accepted by their peers due to their somatic symptoms and/or extreme interpersonal sensitivities use smartphones in order to avoid real life

relationships, perhaps living in a virtual world through social media/digital games etc.? In a review, social media addiction and loneliness were found to be correlated with somatic symptoms in young people. Also, it was emphasized that mobile phone addiction may be a component of social media addiction and this relationship is age specific because the same relationship was not observed in a group of elderly people (Kuss and Griffiths, 2017). However, loneliness and interpersonal sensitivity is strongly associated with each other among adolescents (Zimmer-Gembeck et al., 2014). From this point of view, the possible relationship between social media addiction, loneliness, somatization symptoms, interpersonal sensitivity and problematic smartphone use could be important in terms of treatment outcomes and follow-up. Firstly, this relationship may result in avoidance of social relations and worsening of social functioning which may cause psychopathologies. Secondly, already problematic smartphone use is higher at older age and with lower self-achievement, if it is not addressed in treatment approaches, it could result in school dropouts and a decrease in self-sufficiency. A mobile e-health solution, which can control the use time, the applications used etc. could be an option for this population.

4.4. Limitations

The results of our study seem important to guide our clinical practice. However, we need to take into account the limitations when considering these results. Firstly, we used self-report scales, so we could not get information from parents and teachers. Some adolescents may have scored lower than they are in reality so the problematic smartphone use rate could be higher than detected. Another problem with the measurement tool is the difficulty in comparing the results due to the use of different tools in previous studies. This difficulty, unfortunately, is also seen as a common limitation of studies measuring social media overuse and addiction (Kuss and Griffiths, 2017). Secondly, although there was a valid statistical power analysis, the sample size is relatively small, and the study has a cross-sectional design so it is difficult to determine the sequence of cause effects—consequences and generalize the findings. In other words, finding such a high prevalence of problematic smartphone use in a clinical population makes us think about the possibility that this could be a consequence rather than the cause. Thirdly, it would be useful to address the diagnoses of adolescents (e.g. ADHD, depression, anxiety disorders, OCD etc.) rather than measuring psychiatric symptoms. We want to underline that large sample sizes and case-control studies are needed to determine relationships between cause-consequences and problematic smartphone use -psychopathologies. We hope that our study is the first step to increase clinicians' awareness of the issue and is a starting point for future studies. Finally, the features of parents including emotional availability, parenting styles and the features of adolescents including social support appraisal and degree of self-esteem could be important risk factors for problematic smartphone use and should be addressed.

5. Conclusion

In conclusion, one of the important questions about problematic smartphone use is: How our results can be applied in a real-world clinical setting? Should all adolescents with hostility, somatic symptoms and interpersonal sensitivity (susceptibility) symptoms be screened for this problem? According to our results, we demonstrated that there is a high-risk group among clinical adolescent samples. The features of this group include older age and lower maternal education-lower self-achievement. We suggest psychiatrists consider problematic smartphone use in this risky group.

Conflicts of interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2018.09.015.

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