



## The relationship between suicidality and self-harming behaviors with problematic smartphone use in adolescents admitted to a psychiatric hospital

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### Abstract

**Introduction:** Regarding the increasing rate of self-harming behaviors and suicidal ideations or attempts among adolescents, we assessed the relationship between suicidality, self-harming behaviors with problematic smartphone use in adolescents admitted to psychiatric hospital.

**Materials and Methods:** This cross-sectional study conducted on adolescents aged 12 to 18 years who were hospitalized in the Child and Adolescent Psychiatry Department of Ibn-e-Sina Hospital in Mashhad, Iran, during December 2022 to March 2023, who were selected through the convenient sampling method. Research instruments included a demographic checklist, Behavioral Features of Self-Harm Questionnaire, Beck Scale for Suicide Ideation, Self-Harm Inventory, and Cellphone Overuse Scale. We analyzed the data analysis using SPSS 16.0, descriptive indices, Chi-square test, t-test, and Pearson's correlation test.

**Results:** In this study, we assessed 158 adolescents (91 had a history of suicide and 67 had no history of suicide). The difference between the two groups in history of self-harm was significant ( $P < 0.001$ ). The risk of suicide was more in the suicide group and this group had problematic use of mobile phone more than the group without suicidal attempt ( $P < 0.001$ ). In the suicide group, the suicide risk was significantly associated with borderline personality disorder and problematic use of mobile phone ( $P < 0.001$ ). Also, mobile phone use was significantly associated with borderline personality disorder in all adolescents ( $P < 0.001$ ).

**Conclusion:** We revealed that the problematic use of mobile phone is associated with an increased risk of suicide attempt in adolescents.

**Keywords:** Adolescents, Borderline personality disorder, Smartphone addiction, Self-harming behavior, Suicide

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## Introduction

The prevalence rates of addiction to smartphones and social media have increased in the last decade, especially among adolescents and youth people (1,2).

Smartphone addiction and problematic use of social media impact on social interaction, although some studies suggest that adolescents with high level of addiction to social media, have greater interactions with their friends (3), but other studies indicated the association between excessive use of social media and adverse outcomes related to general health, such as poor sleep health, reduced physical activity (4-7), and psychiatric problems such as high levels of anxiety and depression, increased hopeless, maladaptive coping strategies, emotional dysregulation, risky behaviors, and behavioral problems (8-12). Adolescence period is related to excessive emotions, and vulnerability to problems in emotional regulation and coping to especial issues of this period (13). Although some evidences demonstrated the relationship between social media addiction and self-harming behaviors or suicidal attempts in adolescents (14-17), some of them suggested the positive aspects of social media use or no significant correlation between internet addiction and suicidal planning or suicidal attempts in adolescents (18,19).

So, regarding these controversies and high prevalence of problematic use of social media in developing countries, the present study aims to investigate the relationship between suicidality and self-harming behaviors with media habits in adolescents admitted to psychiatric hospital, regarding their demographic and environmental variables.

## Materials and Methods

This cross-sectional study conducted on adolescents aged 12 to 18 years who were hospitalized in the Child and Adolescent Psychiatry Department of Ibn-e-Sina Hospital in Mashhad, Iran, during December 2022 to March 2023. According to Shafi et al.'s study (20), the sample size was determined based on the percentage of self-harm in the two groups of social media users and non-users with a confidence level of 95% and a power of 80% (83 people) in each group.

Inclusion criteria included aged 12 to 18 years, having a history of suicide attempts or self-harming behaviors in the case group and without a history of suicide attempts in the

control group, and willingness to participate. Exclusion criteria included having IQ below 80, having another medical or neuropsychiatric disorder, and having epilepsy. The cases were selected through the convenience sampling method.

## Research instruments

*A) Demographic checklist:* It included age, gender, school grade, family status, parental education, and academic performance. Social environment conditions were assessed by having a friend with a history of self-harming behaviors, being bullied at school, seeing a self-harming behavior on social media in the past 12 months, and posting self-harming content on social media in the past 12 months.

*B) Behavioral Features of Self-Harm Questionnaire:* This questionnaire assesses five items: lifetime recurrence (5 or more times, 4 or fewer times), duration (2 or more years, 1 year or fewer), onset at age (6<sup>th</sup> grade or younger or above 7<sup>th</sup> grade), number of behaviors in the past 12 months (single or multiple), and severity (mild, moderate, severe).

*C) Beck Scale for Suicide Ideation (BSSI):* This scale was designed in 1988 by Beck et al. and contains 19 three-choice questions designed to reveal and measure attitudes and planning for suicide and its constituent factors such as death wish, active and passive suicidal tendencies, duration and frequency of suicidal thoughts, level of self-control, deterrent factors and the individual's readiness to commit suicide. The questions have three options: "none", "somewhat", and "very much". This scale consists of 19 questions, each question is scored from zero to two; therefore, the sum of the scores varies from zero to 38. The internal correlation of this test is 0.89 and its inter-rater reliability is 0.83 (21). The psychometric properties of the Persian version of this scale was acceptable in Iranian population (Cronbach's alpha > 0.80) (22).

*D) Self-Harm Inventory (SHI):* This self-report 22-item tool was developed by Sansone et al. in 1998 and assesses the history of self-harm in respondents. This questionnaire assesses behaviors that have been intentionally done to harm themselves, such as substance or alcohol abuse, self-harm, causing physical harm to oneself, and even intentionally losing a job. The self-harm questionnaire is scored on a yes/no basis. If you answer "yes" only to items that you have ever intentionally or intentionally

done to harm yourself, the "no" option will receive a score of zero and the "yes" option will receive a score of one. This inventory has good internal consistency in foreign (23) and Iranian studies (24).

*E) Cellphones Overuse Scale (COS):* Overuse of mobile phones is a condition characterized by excessive use and mental preoccupation with mobile phones. Among the scales developed for harmful use of mobile phones is the COS scale, which was designed by Genaro et al. (2007). Regarding the validity of the scale using the correlation method of subtests with the entire questionnaire and the internal consistency method, the results showed that all items of the above harmful use of mobile phones scale have good validity. Based on the results obtained, 21 questions from the questionnaire had good validity. The above results are consistent with the findings of Genaro et al., who reported an internal consistency coefficient of 0.87 on Spanish students. To determine the reliability of Persian version of COS, test-retest, split-half and Cronbach's alpha methods were used. The results indicated that this scale has good reliability of 0.903 (25).

Data analysis was performed using SPSS 16.0, descriptive indices (mean, standard deviation, frequency and frequency percentage), the Chi-square test, the t-test, and Pearson's correlation test.

## Results

We assessed 158 adolescents. Of these participants, 91 had a history of suicide and 67 had no history of suicide, which constituted the control group. The mean age of the suicide group was  $15.40 \pm 1.84$  and the control group was  $15.34 \pm 1.57$ , and no significant difference observed between the two groups ( $P= 0.840$ ). The group with a positive history of suicide included 41 (45.1%) boys and 50 (54.9%) girls,

and the control group included 35 (52.2%) boys and 32 (47.8%) girls. Comparison of gender between the two groups with and without a history of suicide showed no significant difference in gender distribution ( $P= 0.442$ ). The educational level of participants in the two groups with and without a history of suicide was significantly different ( $P= 0.029$ ), so that the group with a history of suicide mostly included people in middle school (53.9%) and high school (32.6%), while the control group mostly attended elementary school (30.2%) and middle school (49.2%).

In the control group, 2 people (3.5%) and in the group with a history of suicide, 5 people (0.6%) had dropped out of school. Also, the academic status of 29 people in the control group (50.9%) and 30 people in the group with a history of suicide (35.7%) was good. However, the study of academic performance did not show a significant difference between the two groups ( $P= 0.066$ ).

Comparing family status showed that in the control group, most individuals were in the moderate family status group, and in the suicide group, most were in the poor family status group. However, the distribution of family status did not show a significant difference between the two groups ( $P= 0.160$ ). Although university education was higher in the father (22% vs. 11.6%) and mother (18.7% vs. 9.3%) of the control group, comparison of parental education did not show significant differences between the two groups with and without a history of suicide. The subjects' environmental and social conditions were examined with four questions, the results of which are shown in Table 1. Based on the findings, there were significant differences between two groups in items of having a friend with a history of self-harm and seeing a self-harm behavior in the media in the past 12 months. Both items were more prevalent in the suicide group.

**Table 1.** The social conditions of the adolescents with and without suicidal attempt

Variable	Response	Suicide group (N=91)	Control group (N= 67)	P
Having a friend with a history of self-harm	No	32 (35.6%)	37 (56.1%)	0.011
	Yes	58 (54.4%)	29 (43.9%)	
Being bullied at school	No	42 (47.2%)	35 (53.8%)	0.415
	Yes	47 (52.8%)	30 (46.2%)	
Seeing a self-harm behavior in the media in the past 12 months	No	28 (32.6%)	40 (61.5%)	0.001
	Yes	58 (67.4%)	25 (38.5%)	
Posting self-harm content in the past 12 months	No	79 (91.9%)	57 (89.1%)	0.582
	Yes	7 (8.1%)	7 (10.9%)	

Borderline personality disorder was present in 100% of the case group and 96.7% of the group with a positive history of suicide. There was no significant difference between the two groups in terms of the self-harm scale ( $P= 0.264$ ). The results related to self-harm behavior and its variables are shown in Table 2. Thirty-four individuals (50.7%) of the control group and 80 participants (87.9%) of the suicide group had a

history of self-harm. The difference between the two groups in terms of history of self-harm was significant ( $P< 0.001$ ). There was no significant difference in the frequency of self-harm, the time of its occurrence, the academic year in which the self-harm behavior occurred, and the number of self-harm behaviors in people with a history of self-harm in the two groups.

**Table 2.** Comparing the self-harm behaviors in the adolescents with and without suicidal attempt

Variable		Suicide group N= 91	Control group N= 67	P
Self-harm history	No	11 (12.1%)	33 (49.3%)	< 0.001
	Yes	80 (87.9%)	34 (50.7%)	
Repeated self-harm	< 5	28 (35.0%)	6 (17.6%)	0.076
	≥ 5	52 (65.0%)	28 (82.4%)	
Duration of self-harm	< 2 years	55 (70.5%)	13 (50.0%)	0.094
	≥ 2 years	23 (29.5%)	13 (50.0%)	
Onset of self-harm	Elementary	17 (22.7%)	9 (42.9%)	0.094
	High school	58 (77.3%)	12 (57.1%)	
Prevalence of self-harming behavior	Single	24 (35.8%)	9 (56.3%)	0.161
	Multiple	43 (64.2%)	7 (43.7%)	
Severity of self-harming behavior	Mild	18 (22.5%)	12 (36.4%)	0.214
	Moderate	45 (56.3%)	13 (39.4%)	
	Severe	17 (21.3%)	8 (24.2%)	

Table 3 presents the risk of suicide and use of mobile phone in two groups. The results indicated that the risk of suicide was more in the group with suicidal attempt than the control group ( $P< 0.001$ ). Also, the group with suicidal attempt had problematic use of mobile phone more than the group without suicidal attempt

( $P< 0.001$ ). The results of the multivariate regression using variables that had significant differences between the two groups are shown in Table 4. The results showed that a positive history of self-harm and problematic use of mobile phone were independent risk factors for suicide.

**Table 3.** Comparing suicide risk and mobile phone use in groups with and without suicidal attempt

Variable	Level	Suicide group N= 91	Control group N= 67	P
Suicide risk	Low	3 (3.3%)	63 (94.0%)	< 0.001
	Moderate	54 (59.3%)	3 (4.5%)	
	High	34 (37.4%)	1 (1.5%)	
Problematic use of mobile phone	Low	10 (11.0%)	35 (52.2%)	< 0.001
	Moderate	73 (80.2%)	31 (46.3%)	
	High	8 (8.8%)	1 (1.5%)	

**Table 4.** Comparing multivariate of variables in groups with and without suicidal attempt

Variable	P	OR	95% CI
Self-harm history	0.002	4.47	11.52-1.73
Having a friend with a history of self-harm	0.294	1.54	3.44-0.69
Seeing a self-harm behavior in the media in the past 12 months	0.409	1.44	3.39-0.61
Middle degree versus elementary degree	0.387	1.58	4.51-0.56
High school degree versus elementary degree	0.062	3.11	10.25-0.95
Moderate problematic use versus low problematic use of mobile phone	0.019	3.40	9.41-1.23
High problematic use versus low problematic use of mobile phone	0.028	12.63	140.92-1.32

Table 5 presents the correlation between the variables. In the group with a history of suicide, the suicide risk was positively and significantly associated with borderline personality disorder ( $P < 0.001$ ,  $r = 0.496$ ) and problematic use of mobile phone ( $P = 0.002$ ,  $r = 0.315$ ). Also,

mobile phone use was positively and significantly associated with borderline personality disorder in both the control group ( $P = 0.027$ ,  $r = 0.272$ ) and the group with a history of suicide ( $P < 0.001$ ,  $r = 0.373$ ).

**Table 5.** The correlation between the variables in groups with and without suicidal attempt

Variable	Test	Suicide group N= 91	Control group N= 67
Problematic use of mobile phone-risk of suicide	Pearson correlation	0.315	0.150
	P	0.002	0.225
Problematic use of mobile phone-borderline personality disorder	Pearson correlation	0.373	0.272
	P	< 0.001	0.027
Borderline personality disorder-risk of suicide	Pearson correlation	0.496	0.181
	P	< 0.001	0.146

## Discussion

In this study, we assessed 158 adolescents. Of these participants, 91 had a history of suicide and 67 had no history of suicide (the control group). The difference between the two groups in terms of history of self-harm was significant. There was no significant difference in the frequency of self-harm, the time of its occurrence, the academic year in which the self-harm behavior occurred, and the number of self-harm behaviors in people with a history of self-harm in the two groups. The risk of suicide was more in the group with suicidal attempt than the control group. Also, the group with suicidal attempt had problematic use of mobile phone more than the group without suicidal attempt. In the group with a history of suicide, the suicide risk was positively and significantly associated with borderline personality disorder and problematic use of mobile phone. Also, mobile phone use was positively and significantly associated with borderline personality disorder in the control group and the group with a history of suicide.

In this line, the results of a meta-analysis (26 cross-sectional and 2 perspective studies) in China indicated that internet addiction is associated significantly with suicidal ideation, suicidal planning, suicidal attempt, and non-suicidal self-injury (26). This finding support our findings about the positive relationship between problematic use of mobile phone and

suicidal attempt. A cross-sectional study in Italy assessed 1365 adolescents (11-19 years) with the mean age of 15. They found the depressive symptoms in 23% of girls and 18% of boys. Also, 14% of the total sample reported suicidal ideation. There were significant relationships between social media use and depressive symptoms, as between social media use and suicidal ideation (27).

Also, another study assessed social media addiction and borderline personality in 300 adults in the United States using the McLean Screening Instrument for BPD and the Bergen Social Media Addiction Scale. The results revealed that 13.1% had BPD. Among individuals with BPD, social media addiction was common (28).

These findings support our result about the positive and significant relationship between mobile phone use and borderline personality disorder. The results of a study on 35 adolescents (mean age of 17) who died by suicide in Netherland revealed the negative impact of over social media use on psychological health and developing suicidal thoughts in this age group (29).

Bye et al. conducted a cohort study in England on 362 young people. 81% of them had a history of self-harm behavior. Also, the most of them had moderate to severe depression or anxiety.

More than 50% of these individuals use social media or smartphone after midnight and 48.9%

of them had problematic use of smartphone (30). In this line, Tørmoen et al. in Norway conducted a study on 268 adolescents. They reported the history of self-harming in 16.1% of these adolescents. Spending 3 hours or more on social media use was associated with the increasing risk of self-harming (31). This finding support our results. The association between problematic smartphone use and the risk of self-harming and suicide should be considered by parents, counselors, or psychologists especially in adolescents with psychological symptoms, or personality disorders. The main limitation was related to convenience sampling, the use of self-report instruments, and a cross-sectional design, which limit the generalizability of the results and the determination of causal relationships between study variables.

Future studies should use longitudinal methods and more representative samples. Another important limitation is the inability of this study to distinguish between types of Internet use, such as whether patients actively sought information or stumbled upon it accidentally, whether this information was harmful or helpful, how patients interpreted the content accessed, and the impact that finding this information had on them, which requires qualitative studies.

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## Conclusion

This study concluded that the problematic use of mobile phone is associated with an increased risk of suicide attempt in adolescents. This finding highlights the urgent need to address the growing public health crisis of suicide and self-harm among adolescents, especially in the context of their evolving digital lives.

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## Conflict of Interest

The authors declare no conflict of interest.

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## Ethical Considerations

This article was resulted from a medical dissertation and it approved by the ethical committee of Mashhad University of Medical Sciences. All participants filled the questionnaires voluntarily.

## Code of Ethics

IR MUMS REC.1401.248

## Authors Contributions

The first author: Designing the study, gathering data, and writing the manuscript, the second author: data analysis and revising the manuscript, the third author: gathering the data, the fourth author: designing the study, writing and revising the manuscript.

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