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# The Modeling Effect of Depression and Behavioral Disorders and Problematic Smartphone Use on the Possibility of Suicide Attempt among Male Adolescents based on the Mediating Role of Coping Strategies

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A B S T R A C T

**Purpose**: Adolescent suicidal ideation is a challenging and concerning problem in mental health, often stemming from a variety of factors. This study aims to analyze how depression, behavioral disorders, and problematic smartphone use can impact the likelihood of suicide attempts in young males, taking into account the role of coping strategies as a mediator.

**Methodology:** The present study is a combination of descriptive-correlational and cross-sectional research methods, with the utilization of a structural model and path analysis. The statistical population for this study consists of all male adolescents in the 10th to 12th grades in Tehran from July to September of 2023. A sample of 165 adolescents was selected using multi-stage random cluster sampling. The research instruments employed were the Coping Strategies Questionnaire (CSQ), Mobile Phone Dependence Questionnaire (MPDQ), Child Behavior Checklist (CBCL), Beck Depression Inventory (BDI-II), and Suicidal Behaviors Questionnaire-Revised (SBQ-R). The data was analyzed using SPSS version 27 for descriptive statistics, and SmartPLS version 4 was used for path analysis and standard coefficients analysis. The P-value of the study was set at 0.05.

**Findings:** The findings of the study showed that problematic smartphone use was positively and significantly associated with suicidal attempts through the Cognitive evaluation variable. Additionally, depression was also found to have a positive and significant impact on suicidal attempts through the Cognitive evaluation variable.

**Conclusion:** The findings of this study indicate that depression, behavioral disorders, and problematic smartphone use can contribute to a higher risk of suicide attempts in young male adolescents, leading to a decrease in coping strategies. However, enhancing problem-solving skills and cognitive evaluation can help mitigate this risk. These results are valuable for professionals such as counselors, psychologists, parents, and educators who work closely with adolescents.

***Keywords:*** *Depression, Behavioral Disorders, Problematic Smartphone Use, Suicide Attempt, Adolescents, Coping Strategies*

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## 1. Introduction

Suicide is the second most common cause of death among adolescents aged 15-19 globally, with about 10% of adolescent's suicide attempt at some point in their lives (Boduszek et al., 2021). This behavior is particularly significant during adolescence, as it is the third most common cause of death in this age group, with around 67,000 adolescents dying by suicide each year (Felez-Nobrega et al., 2020). Factors that may predict suicidal behavior include a history of sexual assault, being a victim of bullying, depression, smoking, misuse of prescription painkillers, and use of illegal drugs (Baiden et al., 2020). Research has also shown that adolescents who have suicidal ideations, whether single or dual, are at a higher risk of actually committing suicide compared to those who do not have such thoughts (Vélez-Grau et al., 2022).

Globally, about every 40 seconds, an individual die by suicide, with depression being a significant factor in suicide cases, including various types such as disruptive mood dysregulation disorder, major depressive disorder, dysthymia, premenstrual dysphoric disorder, drug-induced depression, and depression caused by medical conditions (Obuobi-Donkor et al., 2021). It is believed that suicide stems from a complex interplay of biological, psychological, and environmental factors, with psychological factors like depression, cognitive factors like rumination, and personality traits like neuroticism being among the most researched (Vidal-Arenas et al., 2022). Research has indicated a heightened risk of suicide among individuals, particularly young people, experiencing severe depression (Boduszek et al., 2021). Additionally, a study found a higher risk of suicide in younger patients displaying depressive symptoms accompanied by psychosis (Barbeito et al., 2021).

According to the cognitive-motivational-relational theory of emotion, emotional issues can impact motivation and cognitive processes connected to suicide attempts. Adolescents with disruptive behavior disorders may have a higher risk of suicide, even without psychiatric symptoms, as much as 3 to 6 times (Chen et al., 2023). Aggression, disobedience, impulsivity, and rule-breaking are considered behavioral problems that can contribute to suicidal ideations and self-injurious behaviors (Ayer et al., 2024). Research suggests that emotional and behavioral disorders can influence suicidal behavior (de la Barrera et al., 2022). Loneliness, emotional problems, and behavioral disorders are closely related to suicidal ideations, according to a study (Chen et al., 2023).

In adolescents, suicide attempts are connected to various factors such as stress, vulnerability, family dynamics, and problematic smartphone use. Adolescents who exhibit problematic smartphone use are more likely to have irrational thoughts, including suicidal ideation (Zhao et al., 2024). Problematic smartphone use, characterized by excessive screen time, is associated with negative consequences similar to substance abuse, such as dysfunction and symptoms of dependency. The severity of smartphone addiction correlates with a range of issues, including stress, depression, poor sleep quality, and suicidal ideations (Zhao et al., 2021). A study found that suicidal ideations were significantly related to factors such as lack of social support, increased depressive symptoms, and more than 5 hours of smartphone use per day (Huang et al., 2022). Additionally, research by Arrivillaga et al. (2020) suggests that problematic internet and smartphone use is connected to suicidal ideations (Arrivillaga et al., 2020).

Adolescents' ability to effectively manage stress and negative emotions is crucial in reducing suicidal ideation and enhancing mental well-being. Utilizing coping strategies that assist adolescents in confronting stress, anxiety, and negative emotions positively can safeguard adolescents and potentially diminish suicidal ideations (Goodwill, 2022). Coping involves a concerted effort to alleviate stress and entails using various techniques to endure, alleviate, or minimize stressful situations; lacking coping and problem-solving skills can escalate suicidal ideation (Okechukwu et al., 2022). Research suggests that advocating coping strategies may enhance mental health and aid in reducing suicidal ideations and self-injury (John et al., 2021). Studies have indicated that coping strategies such as problem-

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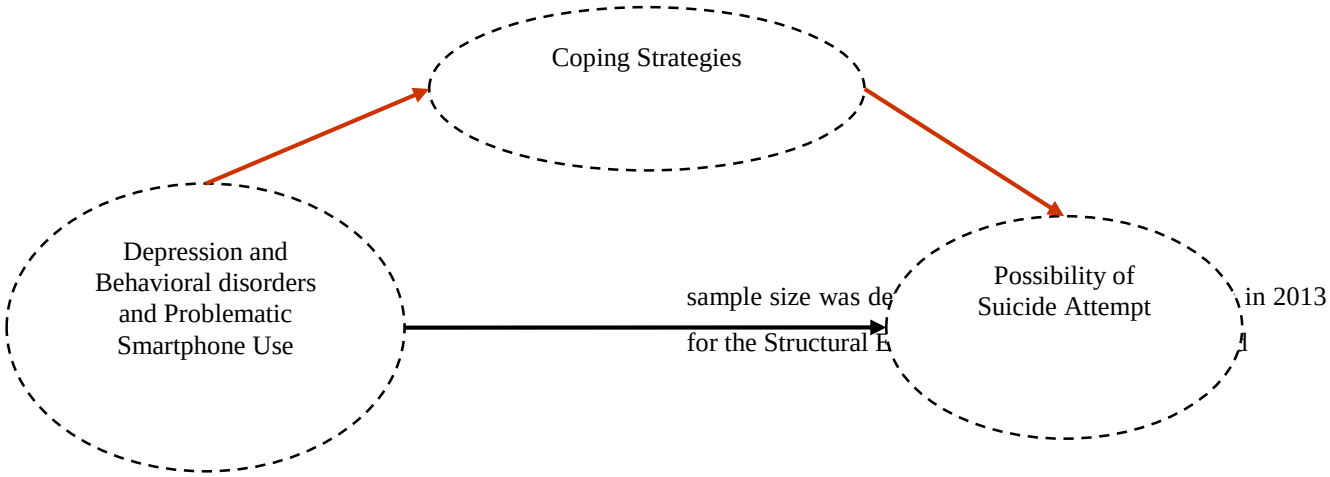
solving, cognitive evaluation, gaining social support, emotional control, problem avoidance, positive thinking, social withdrawal, and self-criticism are inversely related to suicidal ideation and behaviors (Gómez-Tabares et al., 2022).

Given the high prevalence of suicidal ideation, estimated at 30% over a lifetime (Boduszek et al., 2021), and the widespread use of smartphones with its psychological impact, it is crucial to study how this tool negatively affects adolescents. Recent studies have focused on the association between depression, behavioral disorders, and suicide risk, but little attention has been paid to examining how these factors interact with each other. Particularly, there is a lack of research on this topic among adolescent boys, who exhibit distinct behavior patterns and psychological challenges compared to girls. Despite the significance of this issue, there exists a research gap in this area, and this study represents one of the initial efforts to explore how depression, behavioral disorders, and problematic smartphone use impact the likelihood of suicide among male adolescents. The study also examines the mediating role of coping strategies in understanding the complex relationships that contribute to the increased risk of suicide among adolescents. Furthermore, the researcher has depicted the theoretical framework of the research in Figure 1.

**Figure 1**

*Research Model*




## 2. Methods and Materials

### *2.1. Study Design and Participants*

The current study is a combination of descriptive-correlational research and cross-sectional research methodology, and it utilized a structural model and path analysis. The independent variables in this study were depression, behavioral disorders, and problematic smartphone use, with the dependent variable being the likelihood of suicide and the mediating variable being coping strategies. The statistical population for this study consisted of male adolescents in grades 10 to 12 in Tehran from July to September 2023. A sample of 165 adolescents was selected using multi-stage random cluster sampling. The sample size was de in 2013 for the Structural E (Cohen, 2013). The calculation was based on an anticipated effect size of 0.3, a desired statistical power level of 0.8, 10 latent variables, 190 observed variables, and a probability level of 0.01, resulting in a minimum sample size of 190 individuals. The research sample was then chosen based on specific criteria, including residency in Tehran and providing informed consent to participate in the study.

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The criteria for exclusion from the study included failing to answer more than eight questions on the questionnaires and being under 14 years of age. The researcher obtained necessary permits from their university and divided Tehran into 22 urban areas. Three regions were randomly chosen from the urban clusters, followed by randomly selecting three boys' schools from each region. After obtaining permission from the school management, students in grades 10, 11, and 12 were divided into groups. A single class was chosen at random from each grade to participate in the research, and a specific number of students were selected randomly from each of these classes. The researcher informed the students about the research goals, permissions needed, and ethical guidelines to adhere to. "Inadequate collaboration led to the research process and in-person questionnaire completion taking three months. Out of 190 completed questionnaires, only 165 were deemed usable. The remaining 25 were excluded due to incomplete responses or intentional errors. The questionnaires were self-reported. To comply with ethical guidelines, individuals had to sign a consent form before answering the questionnaires, acknowledging that their involvement was optional and they had the right to withdraw at any point. It was made clear that personal identification was not necessary for the tests."

### *2.2. Measures*

#### *2.2.1. Coping Strategies Questionnaire (CSQ)*

In 1981, Billings and Moss created a questionnaire to assess people's coping strategies for dealing with problems (Billings & Moos, 1984). The survey includes 32 questions centered around five coping strategies: problem-solving, emotional control, cognitive evaluation, physical restraint, and gaining social support. Each question uses a four-point Likert scale to measure frequency from never to always. A research study in Iran found the retest reliability coefficient of the questionnaire to be 0.79 (Soltani et al., 2013). The researcher also calculated Cronbach's alpha coefficient for each component of the scale: Problem-Solving (0.885), Emotional Control (0.894), Cognitive Evaluation (0.782), Physical Restraint (0.802), and Gaining Social Support (0.701).

#### *2.2. ۲. Mobile Phone Dependence Questionnaire (MPDQ)*

Koo developed a mobile phone dependence questionnaire in 2009 (Koo, 2009), consisting of 20 questions categorized into three domains: withdrawal tolerance, life dysfunction, and compulsion-persistence. Each question has four options with corresponding scores of 1 to 5. Scores determine the level of phone addiction, with a score of 70 or higher indicating addiction, 63-70 indicating severe use, and less than 63 indicating moderate use. The questionnaire's reliability was assessed with Cronbach's alpha coefficient, resulting in a value of 0.92. The validity was verified by conducting a factor analysis and obtaining expert translations. In Iran, the questionnaire had reliability coefficients of 0.80 for withdrawal tolerance, 0.79 for life dysfunction, 0.79 for compulsion-persistence, and 0.88 for the total score of mobile phone dependence (Mohammadi et al., 2022). The questionnaire's Cronbach's alpha coefficient was calculated to be 0.811.

#### *2.2. ۳. Child Behavior Checklist (CBCL)*

The Achenbach Behavioral Questionnaire is a part of the Achenbach ASEBA parallel forms, designed to assess issues in children and adolescents (Achenbach et al., 1991). One aspect covered in this questionnaire is the analysis of externalizing problems. This evaluation includes 113 questions that target two aspects: rule-breaking (RB) and aggressive behavior (AG). The externalizing behavior problems scale incorporates items from the RB and AG subscales. Responses on the Achenbach scale are scored on a 3-point Likert scale, with "0" representing absence of behavior, "1" for occasional occurrence, and "2" for frequent or constant presence of behavior. In this study, the overall reliability of the Achenbach scale forms was determined to be 0.97 using Cronbach's alpha and 0.94 with test-retest reliability (Minaee, 2006). The current research found a Cronbach's alpha of 0.860 for Lawbreaking behavior and 0.735 for Aggressive behavior.

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*2.2.۴. Beck Depression Inventory (BDI-II)*

Beck and colleagues created a questionnaire in 1996 to assess depression and depressive symptoms in individuals (Beck et al., 1996). This questionnaire consists of 21 questions, each scored from 0 to 3, with scores ranging from 0 to 13 indicating mild depression, 14 to 19 indicating moderate depression, 20 to 28 indicating moderate depression, and 29 to 63 indicating severe depression. The total score of the questionnaire ranges from 0 to 63. Beck et al found a concurrent validity of 0.79 and a test-retest reliability of 0.67. In Iran, a study reported a Cronbach's alpha coefficient of 0.92 for this questionnaire (Hamidi et al., 2015). The researcher also obtained a Cronbach's alpha coefficient of 0.930 for the scale.

*2.2.۵. Suicidal Behaviors Questionnaire-Revised (SBQ-R)*

Osman et al. developed a questionnaire in 2001 to assess suicidal behaviors throughout an individual's lifetime, frequency of suicidal ideations over the past 12 months, threats of suicide attempt, and the evaluated self-reported likelihood of suicidal behavior in the future (Osman et al., 2001). The questionnaire consists of four questions, each with a rating scale of 1 to 5 points. The total score ranges from 4 to 20. In an Iranian study, the Cronbach's alpha coefficient was calculated to be 0.87 (Qaderi Bagajan et al., 2022). The researcher obtained a Cronbach's alpha coefficient for the scale of 0.884.

*2.۳. Data Analysis*

The researchers utilized SPSS version 27 for conducting descriptive statistics and SmartPLS version 4 for analyzing the relationships between variables and standard coefficients. Additionally, Sobel's test was employed to assess the importance of the mediator variable. The researchers utilized the Shapiro-Wilk test to assess the normality of the distribution of the study variables, which revealed a significant result indicating a non-normal distribution. "SmartPLS was chosen to be used in the subsequent analysis." The study established a significance level of 0.05.

## 3. Findings and Results

At first, the researcher analyzed the descriptive statistics associated with the study's variables. The adolescents were categorized into three different age groups: 14 to 15 years old (35.2%), 16 to 17 years old (33.3%), and 18 to 19 years old (31.5%). Similarly, they were also classified based on the amount of time spent using smartphones each day, with three groups identified: 1 to 3 hours (19.4%), 3 to 4 hours (49.7%), and more than 4 hours (30.9%). Furthermore, in terms of education level, the participants were divided into three categories: tenth, eleventh, and twelfth grade.

**Table 1**

*Description of the demographic variables*

| Variables | Groups | F | % | Sample size | Md |
|---|---|---|---|---|---|
| Age | 14-15 | 58 | 35.2 | 165 | 2 |
| | 16-17 | 55 | 33.3 | | |
| | 18-19 | 52 | 31.5 | | |
| Amount of Use Per Day | 1 to 3 hours | 32 | 19.4 | 165 | 2 |
| | 3 to 4 hours | 82 | 49.7 | | |
| | +4 hours | 51 | 30.9 | | |
| Education | Tenth | 50 | 30.3 | 165 | 3 |
| | Eleventh | 106 | 64.2 | | |

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| | | | |
|---|---|---|---|
| | Twelfth | 9 | 5.5 |

Table 2 displays the average and variability of the variables studied.

**Table 2**

*Description of the main research variables*

| Variables | N | M | SD | Min | Max | Skewness | Kurtosis | Shapiro-Wilk | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | W | p |
| Problematic Smartphone Use | 165 | 62.01 | 7.94 | 50 | 80 | 0.363 | -0.739 | 0.957 | p <0.001 |
| Suicidal Attempt | 165 | 8.25 | 3.18 | 4 | 16 | 0.853 | -0.377 | 0.882 | p <0.001 |
| Depression | 165 | 21.81 | 6.33 | 11 | 36 | 0.198 | -0.628 | 0.961 | p <0.001 |
| RB | 165 | 21.09 | 4.17 | 14 | 29 | 0.122 | -0.904 | 0.965 | p <0.001 |
| AG | 165 | 20.22 | 4.09 | 14 | 30 | 0.592 | -0.153 | 0.950 | p <0.001 |
| Problem Solving | 165 | 5.042 | 2.128 | 1 | 8 | -0.360 | -0.827 | 0.928 | p <0.001 |
| Emotional Control | 165 | 12.927 | 9.828 | 1 | 26 | 0.116 | -1.791 | 0.808 | p <0.001 |
| Cognitive Evaluation | 165 | 7.091 | 3.268 | 1 | 14 | -0.245 | -1.034 | 0.925 | p <0.001 |
| Physical Restraint | 165 | 14.006 | 2.254 | 11 | 18 | -0.053 | -1.009 | 0.871 | p <0.001 |
| Gaining Social Support | 165 | 7.115 | 3.643 | 1 | 11 | -0.404 | -1.452 | 0.827 | p <0.001 |

Table 3 displays the connection between the research variables using Pearson's correlation coefficient.

**Table 3**

*Pearson's correlation coefficient*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Suicidal Attempt | — | | | | | | | | | |
| Problematic Smartphone Use | 0.753 | — | | | | | | | | |
| Depression | 0.688 | 0.670 | — | | | | | | | |
| RB | 0.699 | 0.739 | 0.680 | — | | | | | | |
| AG | 0.683 | 0.687 | 0.573 | 0.652 | — | | | | | |
| Problem Solving | -0.585 | -0.508 | -0.506 | -0.436 | -0.471 | — | | | | |
| Emotional Control | -0.624 | -0.688 | -0.526 | -0.517 | -0.628 | 0.530 | — | | | |
| Cognitive Evaluation | -0.727 | -0.738 | -0.651 | -0.601 | -0.637 | 0.634 | 0.819 | — | | |
| Physical Restraint | -0.332 | -0.300 | -0.331 | -0.318 | -0.233 | 0.435 | 0.331 | 0.410 | — | |
| Gaining Social Support | -0.578 | -0.586 | -0.436 | -0.506 | -0.553 | 0.596 | 0.716 | 0.775 | 0.400 | — |

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Table 3 shows that there is a notable correlation between problematic smartphone use and depression, as well as between RB and AG, with a suicidal Attempt variable (P<0.001). In addition, coping strategies such as problem-solving, emotional Control, cognitive evaluation, physical restraint, and gaining social support are negatively associated with the suicidal Attempt variable (P<0.001).

The researcher proceeded to analyze the test assumptions in the following step: The Shapiro-Wilk test was utilized to assess the normality of the distribution of the variables under study. Since this test yielded significant results for the research variables, indicating that they do not follow a normal distribution, it is recommended to use SmartPLS software for implementing the structural equation model. The sample was chosen randomly, thus meeting this specific assumption. Adequate data was available for the analysis, with a sample size of 165 individuals. Post-model execution, the researcher examined the path coefficients and p-value between the variables in Table 4. In this study, a bootstrap value of 5000 was set by the researcher.

**Table 4**

*Standard research coefficients in general*

| Path Between Variables | Path | STDEV | P-value | T-value | Result |
|---|---|---|---|---|---|
| AG -> Gaining Social Support | -0.264 | 0.081 | 0.001 | 3.241 | confirmation |
| AG -> Cognitive Evaluation | -0.204 | 0.063 | 0.001 | 3.238 | confirmation |
| AG -> Emotional Control | -0.307 | 0.069 | 0.000 | 4.449 | confirmation |
| AG -> Physical Restraint | 0.030 | 0.094 | 0.746 | 0.324 | rejection |
| AG -> Problem Solving | -0.182 | 0.091 | 0.045 | 2.001 | confirmation |
| AG -> Suicidal Attempt | 0.168 | 0.075 | 0.026 | 2.230 | confirmation |
| Gaining Social Support -> Suicidal Attempt | 0.017 | 0.074 | 0.814 | 0.236 | rejection |
| Cognitive Evaluation -> Suicidal Attempt | -0.217 | 0.090 | 0.016 | 2.420 | confirmation |
| Depression -> Gaining Social Support | 0.001 | 0.086 | 0.990 | 0.012 | rejection |
| Depression -> Cognitive Evaluation | -0.259 | 0.065 | 0.000 | 3.956 | confirmation |
| Depression -> Emotional Control | -0.095 | 0.070 | 0.176 | 1.352 | rejection |
| Depression -> Physical Restraint | -0.194 | 0.109 | 0.075 | 1.779 | rejection |
| Depression -> Problem Solving | -0.275 | 0.092 | 0.003 | 3.002 | confirmation |
| Depression -> Suicidal Attempt | 0.147 | 0.064 | 0.022 | 2.296 | confirmation |
| Emotional Control -> Suicidal Attempt | 0.035 | 0.079 | 0.659 | 0.441 | rejection |
| RB -> Gaining Social Support | -0.077 | 0.098 | 0.428 | 0.792 | rejection |
| RB -> Cognitive Evaluation | 0.049 | 0.080 | 0.541 | 0.612 | rejection |
| RB -> Emotional Control | 0.118 | 0.091 | 0.196 | 1.292 | rejection |
| RB -> Physical Restraint | -0.142 | 0.126 | 0.259 | 1.129 | rejection |
| RB -> Problem Solving | 0.037 | 0.103 | 0.719 | 0.360 | rejection |
| RB -> Suicidal Attempt | 0.158 | 0.066 | 0.016 | 2.407 | confirmation |
| Physical Restraint -> Suicidal Attempt | 0.005 | 0.045 | 0.903 | 0.121 | rejection |
| Problem Solving -> Suicidal Attempt | -0.142 | 0.057 | 0.013 | 2.493 | confirmation |
| Problematic Smartphone Use -> Gaining Social Support | -0.349 | 0.101 | 0.001 | 3.462 | confirmation |

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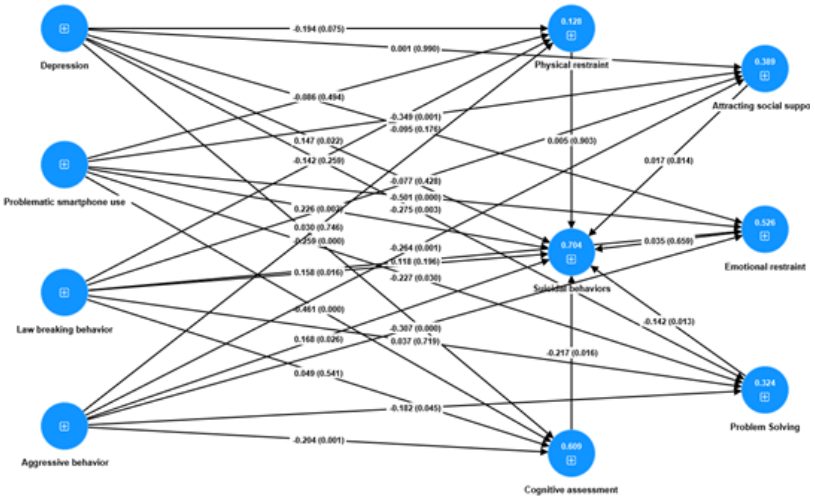
| | | | | | |
|---|---|---|---|---|---|
| Problematic Smartphone Use -> Cognitive Evaluation | -0.461 | 0.085 | 0.000 | 5.416 | confirmation |
| Problematic Smartphone Use -> Emotional Control | -0.501 | 0.086 | 0.000 | 5.840 | confirmation |
| Problematic Smartphone Use -> Physical Restraint | -0.086 | 0.126 | 0.494 | 0.684 | rejection |
| Problematic Smartphone Use -> Problem Solving | -0.227 | 0.105 | 0.030 | 2.166 | confirmation |
| Problematic Smartphone Use -> Suicidal Attempt | 0.226 | 0.072 | 0.002 | 3.141 | confirmation |

**Figure 2**

*Path coefficients between variables and significance level*




According to Table 4 and Figure 2, researchers discovered a strong correlation between excessive smartphone use and an increase in suicide attempts (β=0.226, p=0.002). Similarly, Problematic smartphone use also had a significant negative effect on Gaining social support (β=-0.349, p=0.001), Cognitive evaluation (β=-0.461, p=0.000), Emotional control (β=-0.501, p= 0.000), and Problem-Solving (β=-0.227, p=0.030). Additionally, Depression was found to have a significant positive impact on suicidal attempts (β=0.147, p=0.022) as well as a negative effect on Cognitive evaluation (β=-0.259, p=0.000) and Problem-Solving (β=-0.275, p=0.003). RB conduct was found to have a notable positive impact on suicidal attempts (β= 0.158, p= 0.016) but did not have a significant influence on coping strategies. The AG variable significantly affected suicidal attempts (β= 0.168, p= 0.026) and had a detrimental impact on Gaining social support (β=-0.264, p=0.001), cognitive evaluation (β=-0.204, p=0.001), emotional control (β=-0.307, p=0.000), and problem-solving abilities (β=-0.182, p=0.045). Moreover, it was discovered that both problem-solving (β=-0.142, p=0.013) and cognitive evaluation (β=-0.217, p=0.016) have a considerable adverse effect on suicidal attempts. However, Physical restraint, Emotional control, and Gaining social support did not significantly affect suicidal attempts. Finally, the researcher utilized the bootstrap method to examine the indirect impact of the variables under study.

**Table 5**

*Indirect effects between research variables*

| Path Between Bariables | Path Coefficient | SD | P-value | T-value | Result |
|---|---|---|---|---|---|
| Depression -> Gaining Social Support -> Suicidal Attempt | 0.000 | 0.007 | 0.998 | 0.003 | rejection |
| AG -> Physical Restraint -> Suicidal Attempt | 0.000 | 0.005 | 0.971 | 0.036 | rejection |
| Problematic Smartphone Use -> Problem Solving -> Suicidal Attempt | 0.032 | 0.021 | 0.134 | 1.499 | rejection |

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| | | | | | |
|---|---|---|---|---|---|
| RB -> Emotional Control -> Suicidal Attempt | 0.004 | 0.012 | 0.730 | 0.345 | rejection |
| AG -> Emotional Control -> Suicidal Attempt | -0.011 | 0.025 | 0.673 | 0.423 | rejection |
| Problematic Smartphone Use -> Cognitive Evaluation -> Suicidal Attempt | 0.100 | 0.047 | 0.032 | 2.148 | confirmation |
| Problematic Smartphone Use -> Physical Restraint -> Suicidal Attempt | -0.000 | 0.007 | 0.945 | 0.068 | rejection |
| Depression -> Emotional Control -> Suicidal Attempt | -0.003 | 0.010 | 0.744 | 0.327 | rejection |
| AG -> Gaining Social Support -> Suicidal Attempt | -0.005 | 0.020 | 0.819 | 0.229 | rejection |
| RB -> Gaining Social Support -> Suicidal Attempt | -0.001 | 0.010 | 0.892 | 0.136 | rejection |
| AG -> Cognitive Evaluation -> Suicidal Attempt | 0.044 | 0.023 | 0.057 | 1.903 | rejection |
| RB -> Cognitive Evaluation -> Suicidal Attempt | -0.011 | 0.019 | 0.582 | 0.550 | rejection |
| RB -> Physical Restraint -> Suicidal Attempt | -0.001 | 0.009 | 0.929 | 0.089 | rejection |
| Depression -> Problem Solving -> Suicidal Attempt | 0.039 | 0.020 | 0.052 | 1.946 | rejection |
| Problematic Smartphone Use -> Gaining Social Support -> Suicidal Attempt | -0.006 | 0.027 | 0.821 | 0.226 | rejection |
| Depression -> Cognitive Evaluation -> Suicidal Attempt | 0.056 | 0.027 | 0.041 | 2.044 | confirmation |
| Problematic Smartphone Use -> Emotional Control -> Suicidal Attempt | -0.017 | 0.040 | 0.664 | 0.435 | rejection |
| Depression -> Physical Restraint -> Suicidal Attempt | -0.001 | 0.010 | 0.919 | 0.102 | rejection |
| RB -> Problem Solving -> Suicidal Attempt | -0.005 | 0.016 | 0.739 | 0.334 | rejection |
| AG -> Problem Solving -> Suicidal Attempt | 0.026 | 0.016 | 0.113 | 1.583 | rejection |

Table 5 indicates that there was a meaningful and positive relationship between problematic smartphone usage and suicidal attempts through the cognitive evaluation factor (β=0.100, P=0.032). People with strong cognitive evaluation skills may be able to mitigate the impact of problematic smartphone use on suicidal attempts. Additionally, depression was found to have a significant and positive impact on suicidal attempts, also through the cognitive evaluation factor (β=0.056, P=0.041). Individuals with better cognitive evaluation abilities may be able to reduce the effect of depression on suicidal attempts. However, the study did not confirm the mediating role of other coping strategies. The researcher employed the Sobel test to evaluate the importance of the mediating factors in the study, which were determined using a particular formula.

$$\text{Z value} = \frac{|a \times b|}{\sqrt{(b^2 \times S_a^2) + (a^2 \times S_b^2) + (S_a^2 \times S_b^2)}}$$

a: the value of the path coefficient between the independent variable and the mediator

b: Path coefficient value between mediating and dependent variable

Sa: the standard error of the path between the independent variable and the mediator

Sb: standard error of the path between the mediator and dependent variable

In the Sobel test, if the Z value is more than 1.96, it indicates that the mediating effect of a variable is significant at the 95% confidence level. The Z value for Cognitive evaluation as a mediator between Problematic smartphone use and Suicidal attempts was 2.203202. For Cognitive evaluation as a mediator between Depression and Suicidal attempts, the Z value was 2.06285. Based on the results of the Sobel test, it can be inferred that the mediating variable in the study holds significance. The researcher also examined the determination coefficient of endogenous variables in the study.

**Table 6**

*Coefficient of determination of the model*

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| Variables | R-square | R-square adjusted |
|---|---|---|
| Gaining Social Support | 0.389 | 0.374 |
| Cognitive Evaluation | 0.609 | 0.599 |
| Emotional Control | 0.526 | 0.514 |
| Physical Restraint | 0.128 | 0.106 |
| Problem Solving | 0.324 | 0.307 |
| Suicidal Attempt | 0.704 | 0.687 |

The researcher confirmed the accuracy and dependability of the research model presented in Table 7.

**Table 7**

*Reliability and validity of the model*

| Variables | Cronbach's Alpha | Composite Reliability | AVE |
|---|---|---|---|
| Problematic Smartphone Use | 0.811 | 0.869 | 0.571 |
| Suicidal Attempt | 0.884 | 0.910 | 0.592 |
| Depression | 0.930 | 0.944 | 0.707 |
| RB | 0.860 | 0.895 | 0.588 |
| AG | 0.735 | 0.834 | 0.558 |
| Problem Solving | 0.885 | 0.905 | 0.75 |
| Emotional Control | 0.894 | 0.912 | 0.60 |
| Cognitive Evaluation | 0.782 | 0.872 | 0.69 |
| Physical Restraint | 0.802 | 0.843 | 0.54 |
| Gaining Social Support | 0.701 | 0.732 | 0.51 |

Table 7 provides clear evidence that the model has demonstrated reliability and validity. The Cronbach's alpha reliability coefficient for the variables is above 0.7. The combined reliability of these variables also exceeds 0.7. The model's validity was assessed using the Average Variance Extracted index, which surpasses 0.5 for the research variables, indicating confirmed validity. The model's fit was also evaluated, with all fit indices meeting the criteria. The SRMR, which measures the difference between observed correlations and the structural model's correlation matrix, was calculated to be 0.069 for the model. The researcher also used blindfolding to assess the model's reliability in predicting the research variable. $Q^2$ values above zero indicate that the data has been accurately reconstructed and that the model can make accurate predictions. Table 8 confirmed the accuracy of the model's fit.

**Table 8**

*Predictive communication $Q^2$*

| Variable | SSO | SSE | $Q^2$ (=1-SSE/SSO) |
|---|---|---|---|
| Gaining Social Support | 165.000 | 102.902 | 0.376 |
| Cognitive Evaluation | 165.000 | 66.601 | 0.596 |

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| | | | |
|---|---|---|---|
| Emotional Control | 165.000 | 80.391 | 0.513 |
| Physical Restraint | 165.000 | 149.925 | 0.091 |
| Problem Solving | 165.000 | 113.406 | 0.313 |
| Suicidal Attempt | 165.000 | 53.824 | 0.674 |

## 4. Discussion and Conclusion

The main goal of the current study was to analyze how depression, behavioral disorders, and problematic smartphone use influence the likelihood of suicide among young men, with coping strategies playing a mediating role. It was found that problematic smartphone use and aggressive behavior heightened suicidal attempts while lowering social support, cognitive evaluation, emotional control, and problem-solving abilities. Similarly, rule-breaking conduct and depression were connected to increased suicidal attempts, with depression also resulting in a decline in cognitive evaluation and problem-solving skills. On the other hand, problem-solving and cognitive evaluation helped decrease suicidal attempts. According to the study, individuals who have good cognitive evaluation skills were able to reduce the harmful impacts of problematic smartphone usage and depression.

The results of the current study indicate a connection between problematic smartphone use and aggressive behavior with increased suicidal attempts and decreased coping strategies, which is consistent with previous research (de la Barrera et al., 2022; Huang et al., 2022; Arrivillaga et al., 2020). Previous studies have found that suicidal ideations are connected to lower levels of social support, higher levels of depressive symptoms, and excessive use of smartphones for more than 5 hours (Huang et al., 2022). Additionally, Arrivillaga et al. (2020) found that problematic internet/smartphone use is connected to suicidal ideation (Arrivillaga et al., 2020). Furthermore, research suggests that emotional and behavioral disorders can impact suicidal attempt (de la Barrera et al., 2022).

Problematic smartphone use is often associated with negative outcomes, including dependence on online content, feelings of anxiety when separated from the device, and neglect of other activities. These dependencies hinder genuine social interactions, replacing meaningful in-person connections with superficial online relationships lacking emotional support. This can lead to feelings of isolation and loneliness, causing the individual to withdraw from their social circle (Zhao et al., 2021). Furthermore, spending too much time on smartphones can leave little room for health-promoting activities like exercise, adequate sleep, and engaging in social events, ultimately impacting mental well-being and prompting escapism into the virtual realm. This behavior may also erode problem-solving and emotional regulation skills, leaving individuals ill-equipped to handle life challenges. Without proper coping strategies, individuals may feel overwhelmed by stress and resort to extreme measures like suicide (Zhao et al., 2024).

Engaging in aggressive behaviors is correlated to an increase in stress levels and a decrease in an individual's ability to regulate their emotions. These aggressive behaviors often stem from difficulties in emotional control and managing challenges. Adolescents displaying aggressive behaviors are prone to participating in risky activities as they view these actions as an ineffective way to handle stress and negative emotions. Furthermore, these adolescents typically lack effective problem-solving skills and healthy coping strategies to navigate life's challenges. As a result, they are more susceptible to experiencing intense emotions like frustration and anger. Without adequate social support and a sense of failure, these factors can contribute to an increase in self-destructive thoughts and potentially even suicide (Ayer et al., 2024).

The finding that participating in RB and depression can result in more suicidal behaviors, while depression can hinder cognitive evaluation and problem-solving skills, supports findings from earlier studies (Boduszek et al., 2021; Barbeito et al., 2021; Chen et al., 2023; Kandeğer et al.,

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2021). A study found a strong connection between feelings of loneliness, emotional and behavioral disorders, and suicidal ideation (Chen et al., 2023). Boduszek and colleagues (2021) found that the risk of suicidal behavior is particularly high among young individuals with severe depression (Boduszek et al., 2021). Another study indicated that younger patients with depression and psychosis symptoms are at a higher risk of suicide (Barbeito et al., 2021). Research also suggests that using coping strategies and having strong social support are correlated to lower levels of depression (Kandeğer et al., 2021).

When explaining this discovery, it is important to note that individuals suffering from depression often experience heightened feelings of hopelessness and emptiness, leading to a diminished ability to handle difficulties. Conversely, engaging in rule-breaking behavior, typically connected to poor emotional control and impulsive decision-making, can result in exposure to riskier situations and a lack of social support. These actions tend to isolate individuals and evoke feelings of rejection from society due to legal entanglements or strained interpersonal relationships. Such isolation and emotional detachment can exacerbate feelings of worthlessness, which are significant risk factors for suicidal ideation (Obuobi-Donkor et al., 2021). Moreover, depression can impede cognitive evaluation and problem-solving skills, thus restricting a person's ability to handle everyday obstacles and stress. Impaired cognitive processing causes individuals with depression to perceive situations more negatively than they truly are.

This procedure can cause individuals to believe that issues are impossible to solve, leading them to adopt irrational perspectives on life, consequently diminishing their hope and drive to seek resolutions. As a result, even minor problems may seem more challenging (Vucenovic et al., 2023). Furthermore, depression can result in decreased focus, distractions, and an inability to concentrate on crucial details. These cognitive limitations not only impact the overall quality of life but, if not addressed, can also contribute to additional issues like feelings of hopelessness and a proclivity towards self-injury or suicidal ideation (Kandeğer et al., 2021).

"This research also suggests that problem-solving and cognitive evaluation can decrease suicidal attempts, and individuals with cognitive evaluation abilities may mitigate the effects of problematic smartphone use and depression, aligning with prior studies (Kandeğer et al., 2021; Gómez-Tabares et al., 2022). According to one study, enhancing coping strategies could enhance mental well-being and lessen suicidal ideations and self-injury tendencies (Kandeğer et al., 2021). Another study revealed a negative correlation between suicidal ideations and behaviors and coping strategies such as problem-solving, cognitive evaluation, social support, emotional control, avoidance of problems, positive thinking, withdrawal from social situations, and self-criticism (Gómez-Tabares et al., 2022)." This finding can be explained by stating that problem-solving enables individuals to discover logical and efficient solutions when dealing with challenges, thus reducing feelings of helplessness and hopelessness. Suicidal attempts often stem from an individual's inability to cope with life's difficulties or a sense of powerlessness in the face of problems, hence the importance of these skills in providing a more realistic perspective on situations and increasing a sense of control over one's life (Okechukwu et al., 2022). Moreover, cognitive evaluation can assist people in improving their comprehension of their emotions and thoughts while preventing cognitive distortions. By analyzing challenging situations and employing more effective coping strategies, this skill assists individuals in viewing problems as manageable rather than insurmountable, thereby reducing suicidal ideation and encouraging seeking professional support (Korkmaz et al., 2020). Adolescents possessing cognitive evaluation skills can rationally assess their thoughts, feelings, and actions, minimizing the adverse impacts of problematic smartphone use and depression by recognizing and altering negative thought patterns. These abilities enable them to adjust and moderate pessimistic thoughts when confronted with stress and emotions triggered by problematic smartphone use, like

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comparing themselves to others on social media or feelings of inadequacy. For instance, they can acknowledge that social media content does not necessarily reflect reality, aiding in averting feelings of hopelessness and depression (Lu et al., 2021).

The present research also faced some limitations, including the possibility that people may not be completely honest in sharing their feelings because of social judgment or the fear of being perceived negatively. Efforts were made to overcome this limitation by ensuring the confidentiality of information and creating a trusting environment for open communication. In certain instances, parents or guardians exhibited a lack of cooperation, suggesting that future research should include informational sessions for parents to highlight the significance of the study and its potential benefits. Furthermore, cultural attitudes could impact the relationship between smartphone usage and depression, indicating the need for similar studies in diverse cultural settings to compare findings. In addition, the unavailability of historical data on adolescent behavioral issues posed a challenge in the study, highlighting the importance of utilizing in-depth interviews in future research to supplement past data. Moreover, the research was concentrated on Iranian adolescent males, advising against making sweeping conclusions about other population groups based on the findings. Subsequent studies should encompass a variety of age ranges and genders, as well as larger sample sizes, to improve the applicability of the results.

The results of this study indicate that depression, behavioral disorders, and problematic smartphone use are connected to an increased risk of suicide attempts in male adolescents, as well as a decrease in coping strategies. However, strengthening problem-solving abilities and cognitive evaluation can help reduce this risk. These findings are valuable for counselors, psychologists, parents, and educators working with adolescents, as understanding the factors that contribute to suicide attempts can aid in prevention. The research suggests that conducting skill-building workshops in schools to enhance problem-solving skills, cognitive evaluation, and emotional control can be effective in reducing suicidal attempts. Additionally, guiding adolescents towards a balanced use of smartphones and engagement in sports and healthy hobbies can help prevent these behaviors. Providing counseling and psychological support for adolescents dealing with depression and behavioral disorders can also mitigate the severity of these problems. Encouraging adolescents to cultivate supportive relationships with friends and family is crucial in reducing suicidal attempts by offering emotional support.

### *Authors' Contributions*

*The first author conducted the interview and collected data, while the other authors analyzed the data and wrote the article.*

### *Declaration*

*We used ChatGPT to refine the academic writing in our paper.*

### *Transparency Statement*

*Data are available from the corresponding author upon reasonable request.*

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*Declaration of Interest*

***The authors declare no conflicts of interest.***

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*To ensure ethical practices, participants provided informed consent after being informed about the research goals and significance prior to the interview.*

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