

The Relationship between Mobile Phone Dependence and Mental Health among Adolescents: The Mediating Role of Academic Burnout and the Moderating Role of Coping Styles

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Abstract: To investigate the relationships between adolescent mental health and mobile phone dependence (MPD), academic burnout, and coping styles as well as the underlying mechanisms, this study surveyed 1191 adolescents, using the mobile phone dependence indicator scale, adolescent academic burnout questionnaire, simplified coping style questionnaire, and SCI-90 self-report mental symptom inventory. The analysis results by structural equation modeling techniques are that: (i) MPD is a significant negative predictor of adolescent mental health; (ii) Academic burnout partially mediates the relationship between MPD and adolescent mental health; (iii) Negative coping styles moderate the second half of the mediating path; the mediating effect was more significant among adolescents with higher levels of negative coping than those with lower levels of negative coping. The findings of this study offer implications for the protection and promotion of adolescent mental health in the mobile internet era.

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Introduction

Mobile phone dependence (MPD), also referred to as cellular phone addiction and the problematic mobile phone use, is the individuals' overindulgence in mobile phone-related activities which causes strong, persistent cravings for the use of them and consequently, significant impairment in users' social and psychological functions. The lowered level of mental health is one of the most salient negative ramifications brought by mobile phones to adolescents. The MPD-induced reclusiveness hinders the fulfilling of human needs for interpersonal communication, belonging, and self-actualization, which leads to detrimental emotions of adolescents such as senses of inferiority and loneliness.

Academic burnout is a prolonged, negative state of mind related to students' learning, represented by emotional exhaustion, academic apathy, and reduced sense of achievement. Previous studies also found that intense mobile phone users are more likely to be distracted, a mental status unfavorable to learning, and that students with high levels of MPD are more prone to academic procrastination and weariness. Hence, we posit that MPD can positively predict adolescent academic burnout.

In addition, academic burnout may be harmful to adolescent mental health. Academic burnout is a form of consumption and loss of mental resources in learning, and the lack of resources can lead to difficulties of adaptation. Teenager mental health is a typical issue of adaptation in adolescence. Therefore, the more severe the academic burnout, the lower the level of mental health of the teenager. We hypothesize that academic burnout may play a mediating role in the relationship between MPD and teenager mental health.

According to diathesis - stress theories, individuals' coping styles pose important influences on their mental health. Scholars discovered that in contexts of risks, protective coping responses could buffer the negative impact on mental health, while disengagement coping could intensify the negative influence on mental health. Thus, it is very likely that coping styles can moderate the effect of risk factors on adolescent mental health. Hence, a hypothesis is proposed that coping styles moderate the direct effect of MPD on adolescent mental health and the second half of the path of the indirect influence of MPD on teenager mental health mediated by academic burnout.

To sum up, based on relevant theories and existing empirical findings, the present study established a moderated mediation model to examine the effects of MPD, academic burnout, and coping responses on adolescent mental health. Data of the big sample of 1191 adolescents were employed to investigate the mediating and moderating mechanisms of the influence of MPD on teenager mental health, the mediating role of academic burnout, and the moderating role of coping styles in the chain of mediation, in an effort to provide evidence-based theoretical guidelines for the prevention of and intervention in adolescent mental problems in the mobile phone era.

Research Methods

Subjects

The survey was conducted on the cohort of 11- to 25-year-olds. Cluster random sampling was adopted to select entire classes of students from 8 colleges in Heilongjiang, Tianjin, Shandong, Henan, and Jiangxi Provinces on the principle of equivalence of liberal arts, sciences, and arts. Junior secondary students from two middle schools and senior secondary students from two high schools in Henan Province were also recruited in classes based on the social-natural sciences equivalence and grade balance. A total of 1300 teenagers participated in the questionnaire survey, and 1191 valid questionnaires (91.62% validity rate) were obtained with 602 ones from boys (50.5%) and 589 ones from girls (49.5%).

Research Tools

- The Mobile Phone Dependence Indicator Scale. It includes four dimensions: losing control, anxiety/craving, withdrawal/escape, and productivity loss, with a Cronbach's α coefficient of 0.88 in this study.
- The Self-report Mental Symptom Scale. It encompasses ten categories of symptoms such as somatization, obsessive-compulsive, over-sensitivity, depression, anxiety, hostility, phobia, paranoid, psychotic disorder, and others, with a Cronbach's α coefficient of 0.88 in this study. The higher the scores one obtained from this scale, the worse their mental state was.
- The Simplified Coping Style Questionnaire. This is a questionnaire adapted to the demographic characteristics of China, with Cronbach's α coefficient of 0.814 for the entire scale, 0.84 for the positive coping style (i.e. engagement coping) scale, and 0.74 for the negative coping style (i.e. disengagement coping) scale in this study.
- The Adolescent Academic Burnout Questionnaire. It includes three dimensions: physical and mental exhaustion, cynicism, and low self-efficacy, with a Cronbach's α coefficient of 0.73 in this study.

Data Processing

Data were evaluated by the common method bias test, descriptive statistical analysis, and other relevant analyses via software SPSS 20.0, and the structural equation model-based analysis was utilized to test the validity of the moderated mediation model through software Amos 23.0.

Research Results

The Common Method Bias Test

The common method bias test results showed that there were 13 factors with characteristic roots above 1, and that the first factor could explain 25.31% of the total variation, less than the 40% critical value, indicating there was not a significant common method bias.

Relations between Adolescent MPD, Academic Burnout, Coping Styles, and Mental Health

MPD were significantly and positively correlated with adolescent academic burnout, disengagement coping, and scores in mental health, but not related with engagement coping. Scores in mental health were positively correlated with academic burnout, disengagement coping, but negatively related to engagement coping. Academic burnout was negatively correlated with engagement coping, while positively related to disengagement coping.

The Test of the Moderated Mediating Effect with Disengagement Coping as the Moderator Variable

The test results of the moderated mediation model by structural equation modeling techniques showed that disengagement coping significantly moderated the relationship between adolescent academic burnout and mental health ($\beta = 0.07$, $p < 0.001$), but had no moderating effect on the relationship between MPD and adolescent mental health ($\beta = 0.03$, $p > 0.05$). For teenagers with high levels of disengagement coping, their scores from the mental health scale considerably increased with exacerbated academic burnout ($\beta = 0.48$, $t = 10.82$, $p < 0.001$); it was also true among teenagers with low levels of disengagement coping, but the speed of increase significantly slowed down ($\beta = 0.27$, $t = 5.99$, $p < 0.001$; $\beta = 0.48$ was decreased to $\beta = 0.27$).

The Test of the Moderated Mediating Effect with Engagement Coping as the Moderator Variable

Engagement coping did not show prominent moderating effects on the relationships between MPD, academic burnout, and mental health ($\beta = -0.03$, 0.00 , $p > 0.05$ both). That means engagement coping did not moderate the influence of MPD on adolescent mental health.

Discussion

The Mediating Role of Academic Burnout

This study discovered that MPD could positively predict academic burnout, which is consistent with the findings of previous research on academic burnout. At the same time, it was found that academic burnout could significantly predict teenager mental health, which supports resource conservation theories that contend one's adaptiveness is closely related to their possession of resources. More importantly, it was confirmed that academic burnout partially mediated the relationship between MPD and adolescent mental health; MPD could not only directly influence adolescent mental health, but also indirectly affect it via academic burnout. The introduction of the variable of academic

burnout helps explain the pathway through which addictive behaviors like MPD affect adolescent mental health.

The Moderating Role of Coping Styles

The moderated mediation model in this study was used to examine the moderating effects of coping styles on the mediation chain of “MPD→ academic burnout→ mental health”. It was found that disengagement coping had significant moderating effects on this mediation chain and that it can moderate the second half of the path of the influence of MPD on adolescent mental health through the mediation of academic burnout. Academic burnout can more effectively predict the mental health of adolescents with higher levels of disengagement coping than that of those with lower levels of disengagement coping. In other words, high levels of disengagement coping, can considerably aggravate the negative impact of academic burnout on adolescent mental health. It implies that teenagers with higher levels of academic burnout and disengagement coping are of high risk of mental problems. As opposed to the initial hypothesis, engagement coping did not exhibit any moderating effects.

There is an interactive relationship between academic burnout and coping styles. Academic burnout imposes a particularly strong influence on mental health and social adaptation of adolescents with higher levels of disengagement coping. Lower levels of disengagement coping have a more significant protective effect on teenagers with academic burnout. Although young mobile phone addicts are more prone to academic burnout, early intervention in childhood can effectively reduce the possibility of MPD and academic burnout. Moreover, coping skills of adolescents are somewhat malleable through intervention programs like group counseling. Teenagers are at a key phase of education. Compared with MPD, problems in education should be more serious risk factors; academic burnout can negatively affect any individual suffering from this problem, no matter how seldom they use disengagement coping strategies.

Conclusions

(i) Adolescent mental health is closely related to MPD, academic burnout, and coping styles. (ii) Both MPD and academic burnout can predict teenager mental health. In addition to its direct effect on teenager mental health, MPD can indirectly affect it through the mediation of academic burnout. (iii) The indirect effect of MPD on adolescent mental health via the mediation of academic burnout is significantly moderated by negative coping styles. The indirect effect of MPD is more prominent among adolescents with higher levels of disengagement coping than their peers with lower levels of disengagement coping.

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