Psychology Research and Behavior Management Dovepress

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Depression Severity Mediates the Relationships Between Parenting Styles, Peer-Victimization and Mobile Phone Dependence in Adolescents

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Purpose: Negative parenting styles, peer victimization, and mobile phone dependence (MPD) are prevalent public health problems among adolescents. Parenting styles and peer victimization were reported to affect MPD, but their interaction and the mechanism underlying this association still need to be explored. This study aimed to examine how these factors affect MPD in adolescents with depression.

Methods: Data was collected from 2324 participants diagnosed with depression aged 12–18 years in 11 provinces in China in the cross-sectional study. The scales of Mobile Phone Addiction Index, Patient Health Questionnaire-9, Parental Bonding Instrument, and Multidimensional Peer Victimization were adopted to measure the smartphone dependence, the severity of depressive symptoms, parenting styles, and multiple facets of peer victimization, respectively, for all adolescents. Hierarchical regressions were used to explore the main effect and interaction of parenting styles and peer-victimization on depression and MPD. A structural equation model was constructed to examine the direct and indirect effects of parenting styles and peer-victimization on MPD and the role of depression severity.

Results: After controlling for gender, age, education, parental education, the study found that parental overprotection and peer victimization significantly predict higher levels of depression and higher risk of MPD. Parental care significantly predicts lower levels of depression. Higher levels of depression were associated with a higher risk of MPD. Further, depression partially mediated the relationship between parental overprotection, peer victimization, and MPD, and fully mediated the relationship between parental care and MPD. These results showed the pathway how parenting styles and peer victimization affect MPD directly and indirectly.

Conclusion: Adolescents who experienced negative parenting styles and peer victimization were prone to develop serious depression, then leading to MPD, providing possible intervention directions by changing parenting styles and avoid peer victimization in depression adolescents with MPD.

Keywords: mobile phone dependence, adolescents with depression, parenting styles, peer victimization

Introduction

Prevalence and Risks of Mobile Phone Dependence

Mobile phone dependence (MPD) refers to the addictive state in which individuals excessively consume time and energy in the process of using mobile phones.[1] With the increasing popularity of mobile devices, smartphones have become an important part of the lives of children and teenagers, who are at high risk of MPD.[2] In recent years, the prevalence of MPD among Chinese adolescents has continued to rise, by June 2024, the number of Chinese Internet users was nearly 1.1 billion, an increase of 7.42 million from December 2023, with an Internet penetration rate of 78.0%. Among them, teenagers accounted for 49.0% of the new Internet users, of which 99.9% used mobile phones to access the Internet.[3] The frequent use of mobile phones can lead to a vicious cycle of exacerbated dependence behaviors, resulting in impaired

Received: 1 August 2024
Accepted: 29 November 2024
Published: 14 December 2024

physical, psychological health, and social functions, such as depression, anxiety, sleep problems, suicidal ideation, headaches, as well as reduced learning abilities, and placing a huge burden on families and society.[4,5] Therefore, it is urgent to explore the pathogenesis and influencing factors of MPD.

The Relationship Between Parenting Styles and Peer Victimisation and MPD

MPD in adolescence is the result of a complex interaction of multiple individual and social risk factors.[6] Research has shown that parenting styles can significantly affect MPD, and different parenting styles have different impacts on MPD, with positive parenting styles of care and warmth reducing MPD and negative parenting styles of overprotection and neglect promoting MPD.[7] As for the peer victimisation, defined as physical aggression, verbal aggression, property aggression, and relationship aggression, it reflects the quality of peer interactions to some extent, and is also an important influence on MPD in adolescents.[8] Studies have indicated there is a closed relationship between peer victimisation and Internet addiction or MPD, and students who are victimized by peers are at a higher risk of developing Internet addiction and MPD.[8,9] Another study showed that peer victimisation significantly predicted MPD 6 months later.[10] While, limited studies explored the interaction effect of parenting styles and peer victimisation on MPD.

The Mediating Role of Depression Leading to MPD

Depression may play an important role in the relationship between parenting rearing styles and peer victimization and MPD in adolescents. Studies have shown that adolescents with parental love and warmth are less likely to be depressed, while adolescents with over-interference, reduced intimacy, rejection, and family conflict are at increased risk for depressed mood and suicidal ideation.[11,12] Besides, positive parent–child interactions can contribute to the reduction of depressive symptoms in childhood.[13] School bullying and cyberbullying are becoming more prevalent, both of which have been linked to an increase in depression.[14] Adolescents who were exposed to peer victimization may experience psychological problems such as poor self-esteem, adjustment issues, and school phobia, anxiety, depression, and increased risk for suicide.[15] Two longitudinal studies showed that adolescents who experienced peer victimization and less supportive parenting, such as strict punishment, rejection, and excessive interference, tend to develop depression or have higher levels of depression.[16,17] It found that peer victimization and supportive parenting, such as parental warm and nurturing, had a longitudinal effect on depressive thoughts and symptoms in children and adolescents aged 8 to 14 years.[18] Some studies also reported a significant combined effect of supportive parent - child relationships, taking parental warmth, supervision, support, for example, and peer victimization on mental health problems in adolescents aged 11 to 19 years from German and South Korea.[16,19] In sum, negative parenting and peer relations can be a source of stress, which is closely linked to depression.

Furthermore, depression or depressive symptoms are closely associated with MPD. Some scholars believe that adolescents tend to overuse mobile phone to access the internet to alleviate depression.[20] One study with large number of Chinese students found a significant relationship between depression and MPD, with depression and stress being positive predictors of excessive mobile phone use.[21] Another study suggests that individuals with depression are prone to develop MPD.[22] Previous study with 1987 students from Chinese middle schools revealed that depression mediated the association between peer victimization and MPD among adolescents.[23] However, no research has directly investigated how depression levels mediated the association between parenting styles and MPD.

The Present Study

The present study aimed to explore the relationship between parenting styles, peer victimization, depression, and MPD in the adolescents through mediation analysis. Based on the previous literature, this study proposed the following hypotheses: (a) parenting styles, peer victimization, and their interaction may play a predictive role in MPD; (b) depression mediates the relationship between parenting styles or peer victimization and MPD.

Methods

Participants

A vast majority of adolescents with depression were recruited from 11 provinces in China between March 2021 and January 2022. It was a multicenter project conducted in 16 research centers including mental health centers and general hospitals. All patients met the following inclusive criteria: (1) experience depressive episodes of unipolar depression or bipolar disorders, diagnosed by at least two senior psychiatrists according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V); (2) the score of Patient Health Questionnaires-9 (PHQ-9) scale score was greater than or equal to 5; (3) aged 12–18 years; (4) junior high school education or higher with cognitive function to complete assessments. Exclusion criteria were: (1) combined with severe somatic diseases or immune system diseases; (2) history of serious neurological disease, or traumatic brain injury; (3) evidence of other mental disorders, such as schizophrenia and psychoactive substance use disorders. All participants completed the questionnaire in hospital with the help of a psychiatry or psychology graduate student or psychiatrist. All participants were guided to finish the questionnaire by a study member who had been trained in scale consistency.

A total of 2343 participants were recruited. After deleting the questions with missing values and random responding (Participants who gave the same answers for all items), a total of 2324 valid questionnaires were collected. The sample ranged from 12 to 18 years old (M = 14.98, SD = 1.64), with 514 males (22.1%) and 1810 females (77.9%). Years of education of participants ranged from 4 to 16 years (M = 9.16, SD = 1.69). The distribution of father's education level was as follows: Primary school or below (12.7%), junior high school (37.6%), high school/technical school/vocational high school (22.6%), junior college (11.7%), college (13.6%), master's degree (1.6%), and doctor's degree (0.2%). The distribution of mother's education level was as follows: Primary school or below (22.4%), junior high school (34.7%), high school/technical school/vocational high school (19.4%), junior college (12.1%), college (10.2%), master's degree (1.2%). This study was approved by the Ethics Committee of Shenzhen Kangning Hospital (no.: 2020-k021-02). All participants and their guardians signed an informed consent form.

Psychological Assessment Tools

Demographic characteristics including sex, age, education level of patients, and their parents were collected. The evaluation of parenting styles, peer victimization, and clinical features were measured using the following instruments.

Mobile Phone Addiction Index (MPAI)

The scale was developed by Leung & Louis (2008) at the Chinese University of Hong Kong.[24] It consists of 17 items, covering four dimensions: uncontrollability (1–7), avoidance (8–11), withdrawal (12–14), and ineffectiveness (15–17). The scale adopts Likert-5 scale score, with "1" meaning "never", "5" meaning "always", and the total score ranges from 17 to 85. The higher the score, the more serious the degree of MPD. Mobile phone dependence is defined as responding positively to 8 or more items, and an average score of more than 4 for each item is defined as severe mobile phone dependence. In this study, the reliability coefficients of the four dimensions were 0.829, 0.748, 0.647, and 0.683, respectively, the Cronbach's alpha of the overall scale was 0.890.

The Patient Health Questionnaire Scale (PHQ-9)

It is a simple and highly efficient self-rating tool to assess the patients' depression for the last 2 weeks, compiled by Kroenke et al in 2001.[25] The scale consists of 9 items, composed of two dimensions: emotional dimensions and physical symptoms. The total score of the scale is 27, using the Likert-4 scale level. The higher the score represents, the more severe depressive symptoms, 0 to 4 means no depression, 5 to 9 means mild depression, 10 to 14 means moderate depression, 15 to 19 means moderate to severe depression, and 20 to 27 means severe depression. In this study, Cronbach's alpha of this scale was 0.901. The participants in our study were diagnosed with depressive disorder, their average score of PHQ-9 was 16.86 (SD = 7.16).

The Parental Bonding Instrument (PBI)

The PBI is a widely used self-report measure assessment tool for measuring parent–child bonding developed by Parker et al in 1979.[26] Adolescents remember how their parents treat them during their first 16 years which consist of parenting behaviors in two dimensions: care and overprotection. Care consists of 12 items, including warmth, emotional closeness, and empathy, higher score indicates higher parental. Overprotection consists of 13 items, including control, intrusion, and the level of independence and autonomy, and higher score on the "overprotection" subscale indicates higher parental control. Each item was scored on a 4-point scale from 0 to 3. In this study, Cronbach's alpha for parental care and overprotection were 0.875 and 0.728, respectively.

Multidimensional Peer Victimization Scale (MPVS)

The scale is widely used to assess multiple facets of peer victimization experienced by adolescents.[27] It consists of four dimensions including physical aggression, verbal aggression, property aggression, and relationship aggression. The scale has 16 items which were scored adopting 0–3 point, in which 0 means "never", 1 means "rarely", 2 means "sometimes", and 3 means "often". Higher scores indicate more serious peer victimization participants experienced. In this study, Cronbach's alpha of the four dimensions was 0.825, 0.882, 0.627, and 0.827, respectively, and the reliability coefficient of the overall scale was 0.899.

Data Analysis

All data analysis was performed in the SPSS 22.0 and Amos 25.0 packages. Analysis procedures were as follows: (1) We used Harman's single factor test to examine the common method bias of the self-reported data. (2) Descriptive statistics and correlation analysis were used to preliminary understand the current situation and the bivariate correlations among study variables in participants. (3) Hierarchical regressions were used to examine the main effects and interactions of parenting styles and peer-victimization on depression and MPD. (4) We constructed a structural equation model to examine the direct and indirect effects of parenting styles and peer-victimization on MPD, exploring the mediating role of depression. To evaluate the overall model fit, we relied on the following fitting index: Comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). For TLI and CFI greater than 0.95, RMSEA and SRMR less than 0.05 indicate a good model fit.

Results

Descriptive Statistics and Correlations Among Study Variables

The descriptive statistics and correlations among study variables are shown in Table 1. As can be seen, *care* was negatively correlated with depression and MPD, indicating that the more care parents give, the lower the severity of depression and the less serious the MPD adolescents have. Overprotection, peer-victimization, depression, and MPD

Table 1 Means, Standard Deviations, and Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10
1. Sex	1									
2. Age	−0.148**	1								
3. Years of education	−0.121**	0.884**	1							
4. Father's education	−0.001	0.001	0.041	1						
5. Mother's education	0.000	−0.025	0.017	0.707**	1					
6. Care	−0.035	0.111**	0.100**	0.055**	0.060**	1				
7. Overprotection	0.036	−0.133**	−0.100**	−0.026	−0.041*	−0.485**	1			
8. Peer Victimization	0.036	−0.256**	−0.263**	−0.099**	−0.099**	−0.291**	0.296**	1		
9. Depression	0.124**	−0.119**	−0.082**	−0.008	0.001	−0.404**	0.295**	0.316**	1	
10. Mobile phone addiction	0.014	−0.066**	−0.048*	−0.021	−0.008	−0.191**	0.208**	0.258**	0.310**	1
M	0.78	14.98	9.16	2.82	2.56	1.46	1.37	0.71	16.86	2.61
SD	0.42	1.64	1.69	1.30	1.30	0.57	0.45	0.55	7.17	0.79
Skewness	−1.35	0.03	0.14	0.61	0.64	0.13	0.19	0.57	−0.56	0.37
Kurtosis	−0.19	−0.94	−0.73	−0.48	−0.50	0.14	0.00	−0.72	−0.52	−0.24

Notes: *p <0.05, **p <0.01, sex is dummy-coded variable (0 = male, 1= female).

were all significantly and positively correlated with each other, indicating that the more overprotection and peer victimization adolescents experienced, the more severe their depression and cell phone addiction were likely to be. In addition, gender, age, total years of education, father's education level, mother's education level were correlated with the study variables to varying degrees, and were included as covariates in the subsequent analysis.

Hierarchical Regression

Hierarchical regressions were used to explore the main effect and interaction of parenting style and peer-victimization on depression and MPD. In all regression models, sex, gender, age, total years of education, father's education level, mother's education level were entered as predictors in step 1. Care, overprotection, peer-victimization, and the interaction term of care, overprotection, and peer-victimization were entered as predictors in step 2. Depression and MPD were entered as dependent variables, respectively. The results are shown in Table 2. After the effects of sex, gender, age, total years of education, father's education level, mother's education level had been controlled, care negatively related to depression (β=−0.30, p<0.001), while overprotect (β=0.08, p<0.001) and peer-victimization (β=0.21, p<0.001) had positive relationship with depression. Care, overprotect, and peer-victimization explained 20.2% of the variance in adolescent depression. After the effects of sex, gender, age, total years of education, father's education level, mother's education level had been controlled, care had a negative relationship with MPD (β=−0.08, p<0.001), while overprotect (β=0.11, p<0.001) and peer-victimization (β=0.21, p<0.001) were positively related to MPD. Care, overprotect, and peer-victimization explained 8.7% of the variance in adolescent MPD. However, regression coefficients of all interaction term on depression and MPD were not statistically significant, which may indicate that there was no interaction between parenting style and peer-victimization on depression and MPD, and both of them may independently affect depression severity and MPD of adolescents.

Structural Equation Modeling

Structural equation model was used to examine the direct and indirect effects of care, overprotection, peer-victimization on MPD. In the structural equation model, gender, age, total years of education, father's education level, and mother's education level were treated as covariates. Care, overprotection, peer-victimization were the independent variables, depression was the mediating variable, and mobile phone addiction index was treated as the outcome variable. The initial model is a saturated model. After removing the insignificant correlation paths between covariates, the model had a good

Table 2 Hierarchical Regression Results of Parenting Style and Peer-Victimization on Depression and Mobile Phone Addiction

Predictors	Depression				Mobile Phone Addiction			
	Step1		Step2		Step1		Step2	
	β	t	β	t	β	t	β	t
Sex	0.11	5.19***	0.10	5.42***	0.00	0.21	0.00	0.05
Age	−0.20	−4.42***	−0.11	−2.86**	−0.11	−2.48*	−0.05	−1.20
Years of education	0.11	2.37*	0.12	3.11**	0.05	1.16	0.07	1.68
Father's education	−0.02	−0.52	0.00	0.08	−0.03	−0.98	−0.02	−0.63
Mother's education	0.01	0.16	0.04	1.41	0.01	0.29	0.03	1.13
Care			−0.30	−14.13***			−0.08	−3.41**
overprotection			0.08	3.88***			0.11	4.72***
Peer-Victimization			0.21	10.48***			0.21	9.63***
Care*Peer-Victimization			0.02	1.15			0.01	0.21
Overprotection*Peer-Victimization			−0.03	−1.56			−0.01	−0.55
F	13.41***		69.17***		2.53*		23.48***	
R^2	0.028		0.230		0.005		0.092	
ΔR^2	0.028		0.202		0.005		0.087	

Notes: *p <0.05, **p <0.01, ***p <0.001.

Table 3 Parameter Estimates of Mediation Model

Path			B	S.E.	C.R.	*p*	*β*
Care	→	Depression	−3.801	0.266	−14.269	<0.001	−0.303
Overprotection	→	Depression	1.315	0.340	3.862	<0.001	0.082
Peer-Victimization	→	Depression	2.705	0.263	10.283	<0.001	0.206
Depression	→	Mobile phone addiction	0.026	0.002	10.566	<0.001	0.232
Care	→	Mobile phone addiction	−0.013	0.032	−0.393	0.694	−0.009
Overprotection	→	Mobile phone addiction	0.158	0.040	3.972	<0.001	0.090
Peer-Victimization	→	Mobile phone addiction	0.233	0.031	7.424	<0.001	0.161
Sex	→	Depression	1.740	0.318	5.464	<0.001	0.101
Age	→	Depression	−0.514	0.172	−2.990	0.003	−0.118
Years of education	→	Depression	0.537	0.166	3.227	0.001	0.127
Father's education	→	Depression	0.000	0.142	−0.002	0.998	0.000
Mother's education	→	Depression	0.207	0.142	1.452	0.147	0.037
Sex	→	Mobile phone addiction	−0.042	0.037	−1.126	0.260	−0.022
Age	→	Mobile phone addiction	−0.012	0.020	−0.607	0.544	−0.025
Years of education	→	Mobile phone addiction	0.020	0.019	1.049	0.294	0.044
Father's education	→	Mobile phone addiction	−0.011	0.017	−0.672	0.502	−0.018
Mother's education	→	Mobile phone addiction	0.014	0.017	0.853	0.394	0.023

model fit, $\chi^2 = 19.29$, df = 5, χ^2/df = 3.86, TLI = 0.982, CFI = 0.998, RMSEA = 0.035, SRMR = 0.006. The parameters of the model are shown in Table 3, and the standardized path coefficients of the mediation model are shown in Figure 1.

The results showed that care had a significant and negative relationship with depression (β=0.30, $p < 0.001$), while overprotection had a significant and positive relationship with depression (β=0.08, $p < 0.001$). Depression was positively linked with mobile phone addiction (β=0.23, $p < 0.001$). In addition, the direct effect of overprotection on mobile phone addiction was significant (β=0.09, $p < 0.001$), while direct effect of care on MPD was not significant. Thus, depression fully mediated the relationship between care and MPD (indirect effect a_1b=−.070, SE = 0.008, 95% CI [−.085, −0.057]) and played a partial mediating role in the relationship between overprotection and MPD (indirect effect a_2b=0.019, SE = 0.005, 95% CI [0.011, 0.029]). These results indicated that care primarily indirectly reduces MPD in adolescents by weakening depression, while overprotection not only directly increases MPD, but also indirectly increases MPD through more severe depression. From the comparison of the direct effect and the indirect effect of care and overprotection on MPD, the mediating effect of depression is greater than the direct effect of care on MPD and smaller than the direct effect of overprotection on MPD. This may indicate that even after controlling for depression levels, the effect of

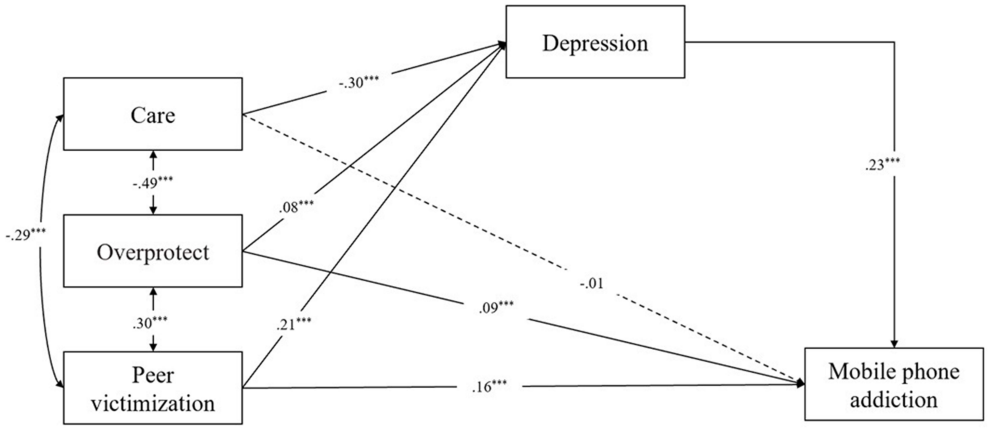

Figure 1 Mediation model of depression with standardized estimates.
Note: ***$p < 0.001$, control variables are not presented for clarity.

overprotection on MPD is still not negligible, and reducing the level of parental overprotection for children may effectively reduce the situation of MPD of adolescents.

Peer-victimization has a significant and positive direct effect on MPD (β=0.16, p<0.001) and depression (β=0.21, p<0.001). Combined with the positive relationship between depression and MPD in the model, depression plays a partial mediating role in the relationship between peer-victimization and MPD. The indirect effect size was 0.048, SE = 0.007, 95% CI [0.038,0.060]. Thus, peer-victimization could either directly lead to MPD or indirectly increase MPD through more severe depression. Similarly, the mediating effect of depression is smaller than the direct effect of peer-victimization on MPD. This may indicate that even after controlling for depression levels, peer-victimization is still a significant positive predictor of MPD among adolescents.

Discussion

The cross-sectional study groundbreaking explored the effect and interaction effect of parenting styles and peer victimization on MPD, and the mediation role of depression severity in the relationship between negative parenting and peer victimization and MPD in adolescents with depression. First, care could significantly negatively predict depression, but could not significantly predict MPD, suggesting that care indirectly reduced MPD in adolescents primarily by attenuating depression. Depression fully mediated the relationship between care and MPD. Second, over-protection and peer victimization could significantly positively predict depression and MPD, and depression positively predicted MPD, suggesting that overprotection and peer victimization not only directly promoted MPD but also indirectly increased MPD through depression. Depression partially mediated the relationship between overprotection, peer victimization, and MPD. While, all interaction items of care, overprotection, and peer victimization had no predictive effect on depression and MPD.

The Relationship Between Parenting Styles and Peer Victimization and MPD

The study found that there was a significantly negative correlation between parenting of care and MPD and a significantly positive correlation between overprotection and MPD in adolescents with depression, which is consistent with previous studies.[28,29] The more care children and adolescents receive, the easier it is for their psychological needs to be met and the richer their inner world becomes. Thus, they do not need to seek spiritual fulfilment from the virtual world, which reduces the possibility of MPD. Similarly, parenting of overprotection may place more restrictions on adolescents, making them more vulnerable to negative emotional and behavioral problems and more inclined to use mobile phones for comfort and support.[7,29] One study concluded that parental overprotection discouraged adolescents from seeking independence to rebuild their self-identity making them tend to avoid communicating with their parents instead of relying on the mobile phone. Parental care and understanding give adolescents the freedom and courage to refine their self-identity and develop closer relationships with their parents, thus reducing the likelihood of MPD.[30]

In addition, the study indicated a direct effect of peer victimization on MPD, the more victimization they got from peers, the more likely they are to indulge in mobile phones, which was in accordance with past studies showing that adolescents who are victimized by peers have higher possibility to get MPD.[8,9] Previous research suggests that adolescents who are victimized by their peers may feel isolated and psychologically insecure, which may contribute to an over-reliance on the internet to satisfy their need for relationships.[31] As a result, they seek compensatory satisfaction in the online world so that they may receive emotional support or see it as a way to escape from real-life stress or sadness, which may drive them to become addicted to the online world and eventually develop MPD.[32,33]

The Mediating Role of Depression Leading to MPD

The present study found depression could promote MPD, acting as a mediating role in the relationship between negative parenting styles and MPD in adolescents. Studies reported that care and supportive family relationships are protective factors for depression, while parenting styles such as excessive control, intrusion, and violence in the family are facilitators of depression in adolescents.[34] Family warmth, emotional closeness, and empathy could provide children with adequate support, encouragement, and trust, which are the children's spiritual support and strength in stressful

situations, and can give them the courage and confidence to face challenges, reduce the risk of depression, and then reduce the excessive dependence on mobile phones. In contrast, adolescents who receive overprotection from their parents may feel more negative emotions and pressure, lack the courage and confidence to face difficulties, which increases the risk of depression, and then lead to MPD.[35]

Our study also demonstrated the indirect effect of peer victimization on MPD through depression, which was in agreement with previous studies that the peer victimization increased the risk of depressive symptoms, then in turn, increased the risk of MPD.[9,23] Victimized by peers may contribute to depressive symptoms by promoting negative cognitive styles about themselves, the world, and the future, feeling of despair, and learned helplessness in adolescents.[36] Teenagers who have the above experience may have difficulties in making friends in the real world and seek an effective and convenient way by indulging in the Internet or smartphone to relieve their depressive symptoms.[37] Moreover, depression can lead to deficits in social behaviors and social helplessness, causing harm to their later peer interactions and peer relations, leading to more serious depression.[38] On the other hand, the Internet also provides a relatively safe cyber world for social interaction significantly different from the real world, in which these adolescents are not overly concerned about what others think of them, and do not need the social skills they feel pressed in the process of interpersonal communications.[33]

Taken together, adolescents who suffered from problematic parenting styles such as less parental care, and parental control were more likely to experience depression.[39] Adolescents who were victimized are insecure and may develop a strong sense of threat, which may make them feel depressed and fear of going to school.[40] While, those adolescents with the above experience may feel safer and more comfortable, and enjoy pleasant experiences when immersed in the Internet.[41] As a study noted, adolescents have a limited ability to regulate their emotions, and when depressed, they are more inclined to seek solace through the Internet; therefore, they may be overly reliant on mobile phone use to alleviate or escape depression, and spend excessive time on the internet, which may develop into MPD in the long run.[42] However, the study did not find an interaction effect of parental care, overprotection, and peer victimization on either MPD or depression, which needs to be further explored.

Limitations

It has to be admitted that this study also has some limitations. First, self-reported data only from adolescents with depression may cause variable bias, and collecting data from multiple sources like their parents, close relatives, and teachers is a direction for future research. All investigators participating in the study were trained with a standardized procedure d to reduce the bias when collecting data. Second, the present study was a cross-sectional investigation, which prevented us from verifying causality among variables, and further longitudinal studies are being collected to validate these findings. Third, the statistics in the study are based on correlation and the time–series relationship between variables needs to be explored, and tracking studies can be used in the future. Last but not least, the cultural particularity of the included samples may introduce the analytical bias, and a cross-cultural sample needs to be included to confirm these findings.

Conclusions

This cross-sectional study with a large sample innovatively explored the effect and interaction effect of parenting styles and peer victimization on MPD in Chinese adolescents with depression.

The results provided evidence that parental care, overprotection, and peer victimization had both direct and indirect effect on MPD. Our study directly states for the first time that overprotective parenting styles and peer victimization could either directly increase the risk of MPD or indirectly by increasing the severity of depression in adolescents with depression, whereas care parenting styles could only reduce the risk of MPD by reducing the severity of depression oppositely. These results showed the pathway how parenting styles and peer victimization affect MPD, which provide directions for effective intervention and treatment strategies to reduce the severity of depression and the risk of MPD. The combined efforts of caregivers and school are essential to reducing the risk of MPD in adolescents, including increasing positive parenting styles, reducing negative parenting styles, and avoiding peer victimization.

Data Sharing Statement

Data may be obtained upon reasonable request with the consent of the corresponding author.

Ethical Approval

This study was in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Shenzhen Kangning Hospital (no.: 2020-k021-02).

Acknowledgments

We would like to express our sincere gratitude to all participants who made contribution to the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This study was supported by Science and Technology Development Fund of Shanghai Pudong New Area (PKJ2023-Y21); STI2030-Major Projects (2021ZD0202000); Shanghai Key Medical Discipline Construction Fund (No. 2024ZDXK0011), Sanming Project of Medicine in Shenzhen (No.SZSM202011014), Shenzhen Fund for Guangdong Provincial High-level Clinical Key Specialties (No.SZGSP013), Shenzhen Key Medical Discipline Construction Fund (No.SZXK072), STI2030-Major Projects, 2021ZD0202000; Shanghai Key Medical Discipline Construction Fund (No. 2024ZDXK0011).

Disclosure

The authors declare no conflicts of interest.

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