Preplanned Studies

Association Between Family Upbringing Environment and Mobile Phone Dependence Syndrome in Middle School Students — Guangzhou City, Guangdong Province, China, 2023

Runquan Zhang[1]; Haiyuan Zhu[1]; Qiqi Wu[1]; Rong Lin[2]; Hui Liu[2]; Minying Sun[2]; Weiquan Lin[2]; Wenhao Li[3]; Bing Huang[4]; Jierong Zhao[4]; Yingyu Yang[5]; Ying Li[5]; Xiaomei Dong[1,#]; Chang Wang[2,#]

Summary

What is already known about this topic?

Smartphones have consistently served as the primary device for internet access among younger populations. Recent research demonstrates that more than 25% of Chinese adolescents experience smartphone addiction. This study aims to examine the association between family upbringing environment and Mobile Phone Dependence Syndrome (MPDS) among middle school students in Guangzhou.

What is added by this report?

This study demonstrates that middle school students whose fathers had educational attainment levels of junior high school [odds ratio (*OR*)=0.39, 95% confidence interval (95% *CI*): 0.17–0.90], senior high school, junior college, technical secondary school, or vocational university (*OR*=0.28, 95% *CI*: 0.12–0.67), or a bachelor's degree and above (*OR*=0.34, 95% *CI*: 0.12–0.92) may function as a protective factor against MPDS among adolescents. Additionally, students whose fathers employed an authoritarian parenting style (*OR*=1.98, 95% *CI*: 1.22–3.21) are also associated with middle school students' MPDS.

What are the implications for public health practice?

These findings indicate that democratic parenting approaches and higher educational attainment among fathers play essential roles in mitigating adolescent MPDS, providing valuable guidance for developing evidence-based strategies and interventions aimed at promoting adolescent physical and mental health.

ABSTRACT

Introduction: With the widespread adoption of smartphones, Mobile Phone Dependence Syndrome (MPDS) has emerged as a significant public health concern. However, the relationship between family upbringing environment and MPDS among middle school students remains unclear.

Methods: The study employed a multi-stage cluster random sampling method to conduct questionnaire and scale assessments among 1,928 students from eight middle schools in Guangzhou during April and May 2023. Propensity score matching was performed to control for confounding variables, including sex, grade, boarding status, and place of residence. used Multivariate logistic regression models were used to examine the associations between parental educational attainment, parenting styles, care levels, family economic conditions, and middle school students' MPDS.

Results: After adjusting for covariates, this study revealed that middle school students whose fathers had educational attainment levels of junior high school [odds ratio (*OR*)=0.39, 95% confidence interval (95% *CI*): 0.17–0.90], senior high school, junior college, technical secondary school, or vocational university (*OR*=0.28, 95% *CI*: 0.12–0.67), or a bachelor's degree and above (*OR*=0.34, 95% *CI*: 0.12–0.92) demonstrated significantly lower odds of MPDS compared to those whose fathers had only an elementary school education or below. Additionally, students whose fathers employed an authoritarian parenting style (*OR*=1.98, 95% *CI*: 1.22–3.21) showed significantly higher odds of MPDS compared to those whose fathers embraced a democratic parenting approach.

Conclusion: Promoting democratic parenting styles among fathers and enhancing fathers' educational levels may be beneficial in reducing adolescents' MPDS risk. This study provides valuable insights for developing scientifically informed strategies aimed at promoting adolescents' physical and mental well-being.

In recent years, the rapid advancement of China's industrial and information technology infrastructure has led to widespread smartphone adoption. However, excessive smartphone use, termed MPDS, can result in subjective distress, psychological symptoms, health complications, and social disruptions. Research indicates that more than 25% of Chinese adolescents experience smartphone addiction (*1*). The emergence of excessive smartphone use during adolescence correlates significantly with increased risks of depression, anxiety, loneliness, and sleep disorders. Therefore, addressing excessive smartphone use among teenagers represents a critical public health priority.

Adolescent MPDS is influenced by individual, school, and family factors, with the family upbringing environment playing a particularly crucial role. The family upbringing environment is shaped by parental educational attainment and the quality of care they provide. Building upon Baumrind's foundational parenting style theory, Maccoby and Martin further categorized parenting styles into four distinct types — democratic, authoritarian, indulgent, and spoiling — based on the dimensions of demandingness and responsiveness (*2*). Within China's sociocultural context, traditional Chinese parenting has been characterized by strict parental authority and child obedience. However, as China has experienced significant social and economic transformation during the past four decades, Chinese parents have become more educated and enjoy improved living standards, leading many to adopt more democratic parenting styles. This study aims to examine the association between family upbringing environment and MPDS occurrence among middle school students in Guangzhou City, thereby providing evidence-based strategies and measures for promoting adolescent physical and mental health development.

Data were collected from 1,928 students across 8 middle schools in Liwan and Nansha districts of Guangzhou City, Guangdong Province, China, between April and May 2023. Participants were selected using a multistage cluster random sampling method. Liwan District and Nansha District were selected to represent the central urban area and rural administrative region, respectively. 1 key middle school, 1 key high school, 1 ordinary middle school, and 1 ordinary high school were selected from each district (if there is no distinction, then randomly select). 1 ordinary class and 1 key class were selected from grades 7 to 12 from each district (if there is no distinction, then randomly select). All students in the selected classes were included in the investigation.

Based on an existing study (*3*), the prevalence of MPDS among middle school students was estimated at 15.0%. The α value was set at 0.05, while the d value was set at 0.15 p. To account for the multistage cluster sampling design, we increased this estimate by 50%. Assuming a 90% response rate, the final minimum required sample size was 1,613 students.

$$n = \frac{Z_{\alpha}^{2} p(1-p)}{d^{2}}$$

Participants were excluded if any of the following conditions occurred: 1) the middle school student MPDS scale was not completed, or contained 1 or more missing questions (n=14); 2) the questionnaire contained logical errors (n=31). Finally, 1,883 eligible participants were included in the final analysis.

The Mobile Phone Dependence Scale, developed by Wang Xiaohui (*4*), was employed to assess MPDS severity among middle school students. Scores exceeding 48 indicated MPDS. Parental parenting styles were categorized into four types: authoritarian, democratic, indulgent, and spoiling. The questionnaire provided explicit definitions for each parenting style, and students identified the approaches adopted by their respective parents. Due to the absence of self-reported household income data in the questionnaire, we used students' boarding status and monthly allowance as substitute variables to reflect their family economic status. A monthly allowance of less than 500 Chinese Yuan (CNY) for boarding students indicates low family economic status. A monthly allowance between 500 and 1,500 CNY for boarding students, or between 500 and 1,000 CNY for non-boarding students, is classified as average family economic status. When the monthly allowance exceeds 1,500 CNY for boarding students or 1,000 CNY for non-boarding students, the family is classified as having high economic status.

This study utilized propensity score matching (PSM) to control for potential confounding factors. Four baseline characteristics were matched: sex, grade, boarding status, and place of residence. We employed 1∶3 nearest-neighbor matching with a caliper width of 0.02. Following matching, 747 participants were included in two groups. A standardized mean difference (SMD) below 0.10 was considered acceptable for balance assessment.

Qualitative data are presented as frequencies and percentages (n, %), while quantitative data following

TABLE 1. Characteristics of participants (*N*=1,883).

Characteristics	*n*	%
Sex		
Male	1,035	54.97
Female	848	45.03
Grade		
Grade 7	290	15.40
Grade 8	285	15.14
Grade 9	295	15.67
Grade 10	353	18.75
Grade 11	318	16.89
Grade 12	342	18.16
Household registration		
Guangzhou	1,030	54.70
Other areas in China	853	45.30
Boarding status		
Yes	612	32.50
No	1,271	67.50
Only child		
Yes	1,373	72.92
No	510	27.08
Monthly allowances (CNY)		
<500	1,435	76.21
500–999	276	14.66
1,000–1,499	107	5.68
≥1,500	65	3.45
Personality trait		
Introverted	500	26.55
Extroverted	680	36.11
Neutral	703	37.33
Peer interaction		
Very easy	754	40.04
Average	1,008	53.53
Not easy	121	6.43
Peer social frequency		
Frequently	996	52.89
Occasionally	827	43.92
Rarely	60	3.19
Academic performance		
Top 25% in grade	603	32.02
26%–50% in grade	593	31.49
51%–75% in grade	484	25.70
76%–100% in grade	203	10.78
Place of residence		
Rural	722	38.34

Continued

Characteristics	*n*	%
Urban	1,161	61.66
Father's educational attainment		
Elementary school and below	100	5.31
Junior high school	670	35.58
Senior high school/Junior college/Technical secondary school/Vocational university	868	46.10
Bachelor's degree and above	245	13.01
Mother's educational attainment		
Elementary school and below	205	10.89
Junior high school	724	38.45
Senior high school/Junior college/Technical secondary school/Vocational university	753	39.99
Bachelor's degree and above	201	10.67
Father's parenting style		
Democratic	1,023	54.33
Authoritarian	396	21.03
Indulgent	447	23.74
Spoiling	17	0.90
Mother's parenting style		
Democratic	1,081	57.41
Authoritarian	374	19.86
Indulgent	405	21.51
Spoiling	23	1.22
Father's caring level		
Very caring	935	49.66
Average	807	42.86
Not caring	141	7.49
Mother's caring level		
Very caring	1,273	67.61
Average	541	28.73
Not caring	69	3.66
Family economic condition		
Low	1,435	76.21
Average	320	16.99
High	128	6.77
	Mean	SD
Age (year)	15.33	1.71
MPDS scores	35.74	10.61

Abbreviation: MPDS=mobile phone dependence syndrome; CNY=Chinese Yuan.

normal distribution are expressed as means and standard deviations. Univariate analyses were conducted on matched data to compare individual and family characteristics between MPDS and non-MPDS participants. Multivariate logistic regression models examined the association between family upbringing environment and middle school students' MPDS. Model 1 remained unadjusted; Model 2 adjusted for sex and grade; Model 3 incorporated all covariates. Database construction utilized Epidata software (version 3.1, Epidata Association, Odense, Denmark). Statistical analyses were performed using R software

TABLE 2. Matched variables of MPDS and non-MPDS groups before and after matching (N_1=1,883, N_2=747).

Variables	Unmatched population				Matched population			
	Non-MPDS (*n*=1,694)	MPDS (*n*=189)	SMD	*P*	Non-MPDS (*n*=558)	MPDS (*n*=189)	SMD	*P*
Sex			0.223	0.004*			0.017	0.608
Male	950 (56.08)	85 (44.97)			239 (42.83)	85 (44.97)		
Female	744 (43.92)	104 (55.03)			319 (57.17)	104 (55.03)		
Grade			0.304	0.005*			0.003	0.995
Grade 7	271 (16.0)	19 (10.05)			57 (10.22)	19 (10.05)		
Grade 8	263 (15.53)	22 (11.64)			63 (11.29)	22 (11.64)		
Grade 9	274 (16.17)	21 (11.11)			63 (11.29)	21 (11.11)		
Grade 10	314 (18.54)	39 (20.63)			125 (22.40)	39 (20.63)		
Grade 11	275 (16.23)	43 (22.75)			127 (22.76)	43 (22.75)		
Grade 12	297 (17.53)	45 (23.81)			123 (22.04)	45 (23.81)		
Boarding status			0.103	0.160			0.015	0.651
Yes	542 (32.00)	70 (37.03)			217 (38.89)	70 (37.04)		
No	1,152 (68.00)	119 (62.97)			341 (61.11)	119 (62.96)		
Place of residence			0.066	0.383			0.004	0.819
Rural	644 (38.02)	78 (41.27)			225 (40.32)	78 (41.27)		
Urban	1,050 (61.98)	111 (58.73)			333 (59.68)	111 (58.73)		

Abbreviation: MPDS=mobile phone dependence syndrome; SMD=standardized mean difference; N_1=number of unmatched population; N_2=number of matched population.
* P<0.01.

(version 4.3.1, R Foundation for Statistical Computing, Vienna, Austria) and SPSS software (version 26.0, IBM Corp., Armonk, NY, USA). Statistical significance was set at P<0.05, with all tests being two-tailed.

Among the 1,883 enrolled middle school students, 1,035 were male (54.97%) and 848 were female (45.03%). The mean MPDS scale score was 35.74±10.61, with 189 students (10.04%) classified as having MPDS (Table 1). Following propensity score matching, the analysis included 558 students (74.70%) in the non-MPDS group and 189 students (25.30%) in the MPDS group. The PSM procedure successfully balanced the distributions of sex, grade, boarding status, and place of residence across groups (P>0.05) (Table 2).

Univariate logistic regression analysis demonstrated that personality traits (P=0.026) and academic performance (P=0.007) among middle school students were significantly associated with MPDS variations. Within family upbringing environment factors, fathers' educational attainment (P=0.010), fathers' parenting style (P<0.001), and fathers' caring level (P=0.003) showed significant associations with MPDS among middle school students (Table 3).

After controlling for all relevant confounding factors in Model 3, fathers' educational attainment and parenting style remained significantly associated with MPDS scores among middle school students. Compared with students whose fathers had completed only elementary school or below, those whose fathers had completed junior high school [odds ratio (*OR*)=0.39, 95% confidence interval (95% *CI*): 0.17–0.90], senior high school/junior college/technical secondary school/vocational university (*OR*=0.28, 95% *CI*: 0.12–0.67), and bachelor's degree or above (*OR*=0.34, 95% *CI*: 0.12–0.92) demonstrated protective effects against MPDS. Students with authoritarian fathers showed a 98% higher odds of MPDS compared to those with democratic fathers (*OR*=1.98, 95% *CI*: 1.22–3.21) (Table 4). We also found that mothers with senior high school, junior college, technical secondary school, or vocational university degrees were associated with increased odds of middle school students' MPDS. However, this association did not attain statistical significance in the crude model. The parenting style of the mother, the caring level of the father, the caring level of the mother, and the family's economic condition were not statistically correlated with MPDS among middle school students.

TABLE 3. Baseline characteristics of MPDS and non-MPDS groups after matching (*N*=747).

Variables	Non-MPDS (*n*=558)	MPDS (*n*=189)	*P*
Household registration			0.773
Guangzhou	324 (58.06)	112 (59.26)	
Other areas in China	234 (41.94)	77 (40.74)	
Only child			0.689
Yes	150 (26.88)	48 (25.40)	
No	408 (73.12)	141 (74.60)	
Monthly allowances (CNY)			0.334
<500	424 (75.99)	132 (69.84)	
500–999	89 (15.95)	37 (19.58)	
1,000–1,499	31 (5.56)	12 ((6.35)	
≥1,500	14 (2.51)	8 (4.23)	
Personality trait			0.026*
Introverted	218 (39.07)	66 (34.92)	
Extroverted	196 (35.13)	55 (29.10)	
Neutral	144 (25.81)	68 (36.08)	
Peer interaction			0.103
Very easy	214 (38.35)	64 (33.86)	
Average	314 (56.27)	107 (56.61)	
Not easy	30 (5.38)	18 (9.52)	
Peer social frequency			0.065
Frequently	280 (50.18)	93 (49.21)	
Occasionally	263 (47.13)	84 (44.44)	
Rarely	15 (2.69)	12 (6.35)	
Academic performance			0.007**
Top 25% in grade	175 (31.36)	58 (30.69)	
26%–50% in grade	197 (35.30)	47 (24.87)	
51%–75% in grade	128 (22.94)	50 (26.46)	
76%–100% in grade	58 (10.39)	34 (17.99)	
Father's educational attainment			0.010*
Elementary school and below	17 (3.05)	16 (8.47)	
Junior high school	193 (34.59)	71 (37.56)	
Senior high school/Junior college/Technical secondary school/Vocational university	269 (48.21)	79 (41.80)	
Bachelor's degree and above	79 (14.16)	23 (12.17)	
Mother's educational attainment			0.342
Elementary school and below	63 (11.29)	19 (10.05)	
Junior high school	199 (35.67)	70 (37.04)	
Senior high school/Junior college/Technical secondary school/Vocational university	234 (41.94)	87 (46.03)	
Bachelor's degree and above	62 (11.11)	13 (6.88)	
Father's parenting style			<0.001**
Democratic	326 (58.42)	76 (40.21)	
Authoritarian	101 (18.10)	57 (30.16)	
Indulgent	125 (22.40)	54 (28.57)	

Continued

Variables	Non-MPDS (*n*=558)	MPDS (*n*=189)	*P*
Spoiling	6 (1.08)	2 (1.06)	
Mother's parenting style			0.109
Democratic	331 (59.32)	94 (49.74)	
Authoritarian	108 (19.35)	43 (22.75)	
Indulgent	115 (20.61)	49 (25.93)	
Spoiling	4 (0.72)	3 (1.59)	
Father's caring level			0.003**
Very caring	287 (51.43)	71 (37.57)	
Average	234 (41.94)	99 (52.38)	
Not caring	37 (6.63)	19 (10.05)	
Mother's caring level			0.279
Very caring	389 (69.71)	120 (63.49)	
Average	153 (27.42)	63 (33.33)	
Not caring	16 (2.87)	6 (3.17)	
Family economic condition			0.188
Low	424 (75.99)	132 (69.84)	
Average	105 (18.82)	42 (22.22)	
High	29 (5.20)	15 (7.94)	

Abbreviation: CNY=Chinese Yuan; MPDS=mobile phone dependence syndrome.
* $P<0.05$;
** $P<0.01$.

DISCUSSION

This study establishes a clear relationship between family upbringing environment and MPDS prevalence among middle school students. After controlling for covariates, we consistently identified authoritarian paternal parenting styles and lower paternal educational attainment as robust predictors of MPDS development in adolescents.

The study revealed a significant positive correlation between fathers' authoritarian parenting styles and MPDS. A similar conclusion was drawn from an Indonesian study that demonstrated authoritarian parenting styles were associated with increased likelihood of offspring developing MPDS (*5*). One study has shown that parenting styles serve as mediators in the relationship between family socioeconomic status and digital addiction in young children (*6*). Families provide essential emotional warmth and social support for adolescents. However, authoritarian parenting — characterized by high demands and low responsiveness — may elevate stress levels in children, prompting them to seek comfort through mobile phone use. The emotional bond between mothers and adolescents develops earlier in life. Although mothers may adopt authoritarian approaches in child-rearing, they frequently display positive and supportive attitudes that mitigate the potential negative effects of strict parenting (*7*). Consequently, children may demonstrate greater tolerance toward their mothers. In contrast, fathers typically focus on establishing rules and exercising behavioral control, often directly intervening in their children's autonomy and behavioral boundaries. Authoritarian fathers assume a dominant role in parent-child relationships. They strictly regulate their children's mobile phone usage while simultaneously suppressing their children's need for autonomy. This authoritarian approach may contribute to elevated stress levels in children, leading them to seek solace through mobile phone use. Adolescents often avoid communicating with their fathers to prevent potential conflicts, viewing mobile phones as relaxation tools and engaging more frequently in online activities for comfort (*8*). Support from fathers may facilitate more effective stress-coping strategies to meet everyday and long-term demands in ways that reduce addictive behaviors. Consequently, a democratic parenting style is recommended for fathers.

Notably, fathers' educational attainment

TABLE 4. Logistic regression analysis results after PSM (*N*=747).

Variables	Model 1†		Model 2††		Model 3†††	
	OR (95% *CI*)	*P*	*OR* (95% *CI*)	*P*	*OR* (95% *CI*)	*P*
Father's educational attainment						
Elementary school and below (reference)						
Junior high school	0.38 (0.17, 0.86)	0.020*	0.37 (0.17, 0.85)	0.018*	0.39 (0.17, 0.90)	0.026*
Senior high school/Junior college/Technical secondary school/Vocational university	0.27 (0.12, 0.63)	0.002**	0.27 (0.12, 0.62)	0.002**	0.28 (0.12, 0.67)	0.004**
Bachelor's degree and above	0.33 (0.13, 0.87)	0.025*	0.33 (0.12, 0.87)	0.025*	0.34 (0.12, 0.92)	0.034*
Mother's educational attainment						
Elementary school and below (reference)						
Junior high school	1.43 (0.75, 2.72)	0.273	1.48 (0.77, 2.85)	0.235	1.61 (0.82, 3.15)	0.169
Senior high school/Junior college/Technical secondary school/Vocational university	1.92 (0.99, 3.71)	0.053	1.97 (1.01, 3.83)	0.046*	2.06 (1.03, 4.15)	0.042*
Bachelor's degree and above	1.03 (0.42, 2.57)	0.947	1.04 (0.42, 2.62)	0.927	1.02 (0.39, 2.66)	0.967
Father's parenting style						
Democratic (reference)						
Authoritarian	1.90 (1.19, 3.04)	0.007**	1.90 (1.19, 3.03)	0.007**	1.98 (1.22, 3.21)	0.006**
Indulgent	1.46 (0.93, 2.29)	0.104	1.47 (0.93, 2.31)	0.096	1.49 (0.94, 2.38)	0.091
Spoiling	1.48 (0.28, 7.96)	0.648	1.43 (0.26, 7.88)	0.679	1.38 (0.24, 8.01)	0.719
Mother's parenting style						
Democratic (reference)						
Authoritarian	1.01 (0.63, 1.61)	0.964	1.04 (0.65, 1.67)	0.870	0.93 (0.58, 1.51)	0.776
Indulgent	1.24 (0.79, 1.93)	0.349	1.25 (0.80, 1.96)	0.323	1.19 (0.75, 1.89)	0.461
Spoiling	1.61 (0.31, 8.25)	0.571	1.56 (0.31, 7.98)	0.591	1.40 (0.25, 7.81)	0.701
Father's caring level						
Very caring (reference)						
Average	1.51 (0.98, 2.32)	0.062	1.52 (0.99, 2.35)	0.057	1.42 (0.91, 2.23)	0.125
Not caring	1.71 (0.83, 3.49)	0.144	1.72 (0.84, 3.53)	0.142	1.54 (0.73, 3.24)	0.259
Mother's caring level						
Very caring (reference)						
Average	0.94 (0.61, 1.45)	0.776	0.95 (0.61, 1.47)	0.803	1.00 (0.63, 1.57)	0.987
Not caring	0.72 (0.24, 2.18)	0.563	0.72 (0.23, 2.19)	0.556	0.70 (0.22, 2.25)	0.551
Family economic condition						
Low (reference)						
Average	1.28 (0.83, 1.96)	0.259	1.27 (0.82, 1.96)	0.279	0.98 (0.16, 5.92)	0.984
High	1.66 (0.84, 3.27)	0.143	1.64 (0.83, 3.26)	0.155	1.63 (0.61, 4.37)	0.333

Abbreviation: *OR*=odds ratio; *CI*=confidence interval; PSM=propensity score matching.
† Model 1 unadjusted;
†† Model 2 adjusted for sex and grade;
††† Model 3 adjusted for sex, grade, boarding status, place of residence, household registration, only child status, monthly allowances, personality trait, peer interaction, peer social frequency, and academic performance.
* $P<0.05$;
** $P<0.01$.

demonstrated a significant negative correlation with MPDS occurrence among middle school students. Previous research has shown that children from families with lower parental educational levels and reduced income tend to engage in more extensive mobile phone use compared to peers from higher socioeconomic backgrounds (*9*). The relationship between fathers' limited educational attainment and

adolescent addictive behaviors operates through inadequate supervision and the absence of clear household guidelines (*10*). Fathers with restricted education may lack essential skills to recognize and effectively address their children's addictive behaviors. Furthermore, implementing restrictive rules alone proves insufficient for managing addictive behaviors. In contrast, fathers with higher educational levels are more likely to proactively guide their children toward developing balanced and informed approaches to mobile phone use from an early age. Well-educated fathers typically employ more effective educational strategies and supervision techniques rather than relying solely on rigid time restrictions, fostering healthier usage patterns in their children. Conversely, fathers with limited educational backgrounds are more prone to excessive mobile phone use themselves, creating negative behavioral models for their children. In summary, low education among fathers may hinder effective parenting practices, weaken the quality of parent-child attachment, and reduce emotional support, which are critical protective factors against the development of MPDS.

Public health policies must expand beyond traditional individual-level interventions to address MPDS among middle school students. The family system should be recognized as a fundamental component within comprehensive frameworks for managing adolescent behavioral health and developing robust prevention and control systems. This study recommended that the prevention of MPDS among middle school students be integrated into existing public health prevention systems. This integration should include developing monitoring systems for MPDS that specifically assess family upbringing environment as key risk factors.

This study has several limitations that warrant consideration. First, because the research was conducted in only eight middle schools within Guangzhou City, the generalizability of the findings to regions with different cultural backgrounds or socioeconomic environments may be limited. Second, the cross-sectional design precludes the establishing longitudinal trends or causal relationships between family parenting styles and MPDS development among middle school students. Third, the reliance on self-reported data for assessing family parenting styles may introduce response bias, potentially compromising the accuracy and consistency of the findings.

These findings underscore the critical importance of fathers' democratic parenting approaches and higher educational attainment in mitigating adolescent MPDS. The family upbringing environment, particularly paternal influence on adolescent MPDS, represents a significant factor in promoting comprehensive physical and mental health development among students.

Ethical statement: Approved by the Ethics Committee of the Guangzhou Center for Disease Control and Prevention with the ethics approval number GZCDC-ECHR-2021P0063. All the participants provided written informed consent.

Conflicts of interest: No conflicts of interest.

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[#] Corresponding authors: Xiaomei Dong, tdongxm@jnu.edu.cn; Chang Wang, gzcdc_wangc@gz.gov.cn.

[1] Department of Public Health and Preventive Medicine, School of Medicine, Jinan University, Guangzhou City, Guangdong Province, China; [2] Guangzhou Center for Disease Control and Prevention (Guangzhou Health Supervision Institute), Guangzhou City, Guangdong Province, China; [3] The Affiliated Guangdong Second Provincial General Hospital of Jinan University, Guangzhou City, Guangdong Province, China; [4] Guangzhou Liwan District Center for Disease Control and Prevention, Guangzhou City, Guangdong Province, China; [5] Guangzhou Nansha District Center for Disease Control and Prevention, Guangzhou City, Guangdong Province, China.

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