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Mobile Phone Dependence of College Students: Basis for A Course of Action

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Abstract. This research investigates Mobile Phone Dependence (MPD) among university students at X University, revealing a 100% smartphone ownership rate, with 33.4% experiencing MPD. Factors contributing to MPD include social allure, negative consumer culture, chaotic online practices, and the absence of real-world support. School-related factors include outdated teaching methods, inadequate guidance, while family factors implicate parental influence and neglect. Personal factors involve weak self-discipline, unclear goals, loneliness, psychological needs, and addiction psychology. MPD impacts academics, social skills, physical and mental health, economics, consumer mindset, and behavior. Demographic variables exhibit significant variations in MPD. The study recommends multifaceted interventions, emphasizing social governance, higher education, family education, and self-education, supported by collaborative governance. Future research should deepen fundamental theories, expand survey scope, strengthen empirical research, and employ action research for effective implementation of intervention strategies. Action research involves forming a multidisciplinary team, engaging stakeholders, assessing the current scenario, designing targeted interventions, and continuously adapting strategies based on real-time data. This research provides a comprehensive understanding of MPD and offers a strategic framework for addressing this issue among college students.

Keywords: College Students, Mobile Phone Dependence, Questionnaire, Statistical Differences, Strategies

1. Introduction

With the rapid advancement of mobile internet and smartphones, society has entered a new media era, significantly altering learning, work, and leisure activities. By June 2021, China had reached over 1.007 billion mobile internet users, with 99.6% accessing the web via smartphones, including 26.9% who are students. Smartphones have evolved into a central medium for media consumption, facilitating communication, socializing, shopping, travel, entertainment, and learning. However, this technological growth has led to Mobile Phone Dependence (MPD), particularly among college students, negatively impacting their physical health, mental well-being, social interactions, and academic performance. Research indicates that excessive smartphone usage contributes to health issues like cervical spondylosis, visual impairment, and sleep disorders, as well as psychological challenges such as increased loneliness, decreased attention span, and anxiety.

Recognizing that college students are vital to social progress, it is essential to understand the current state of MPD, analyze its causes, and develop effective strategies for intervention. This descriptive study focuses on mobile phone dependence among university students at X University, employing surveys and interviews for both quantitative and qualitative analysis. The research examines demographic differences in MPD and investigates its variations concerning academic year, major, workload, phone usage duration, monthly spending, and social interactions. It further explores the adverse effects of MPD on students and proposes systematic, comprehensive, and feasible strategies to promote healthier smartphone usage.

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The study categorizes MPD into four distinct factors—social, school, family, and personal—using a proprietary instrument to highlight the complex nature of mobile phone dependencies within an educational setting. By addressing these various dimensions, the research aims to provide valuable insights and interventions for mitigating MPD among college students.

2. Methodology

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to explore mobile phone dependence (MPD) among undergraduate students at X University in Hefei, Anhui Province, China. This methodology allowed for a comprehensive investigation of the phenomenon by combining the strengths of each method.

2.1. Sampling Procedure

The study was conducted at X University, a prestigious comprehensive institution with a diverse student population. The choice of this university as the research site was strategic, as its student body represented a broad spectrum of academic disciplines and socioeconomic backgrounds, making it a valuable setting to generalize findings about mobile phone dependence among Chinese university students.

2.2. Respondents

The study employed a convenience sampling method, which allowed the researcher to gather data from students who were readily available and willing to participate. Though practical, the researchers acknowledged that this non-probability sampling method might introduce bias and limit the generalizability of the findings. However, this method still provided valuable insights into the patterns of mobile phone dependence within the specific university context.

2.2.1 Research Site

The research was conducted at X University in Hefei, Anhui Province, China, chosen for its prestigious reputation and diverse range of undergraduate programs. This variety allows for an extensive examination of mobile phone dependence across different student demographics, capturing a wide spectrum of behaviors, lifestyles, and academic demands. The university's diverse student population, which includes variations in socioeconomic backgrounds, geographic origins, and academic performance levels, ensures a representative sample for studying mobile phone use. Additionally, X University boasts modern technological infrastructure that supports significant mobile device usage for academic and social purposes, providing a relevant context for the investigation. Hefei's status as a growing urban area with high mobile phone penetration rates further influences students' behavior and reliance on technology for communication and daily activities.

Table 1 Distribution of Respondents

	Type of Respondents	Sample	Percentage (%)
1.	Freshmen	182	30.7%
2.	Sophomore	169	28.5%
3.	Junior	126	21.2%
4.	Senior	116	19.6%
	Total:	593	100%

Convenience sampling was selected for its practicality and ease of data collection, enabling the researcher to gather data from readily available participants. While this method may introduce some bias and may not fully

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represent the entire population, it can still yield valuable insights into the phenomenon being studied, especially when time and resources are limited. X University provided a strong research site due to its combination of academic, social, and technological factors, creating a rich context for examining mobile phone dependence among undergraduate students.

3. Results and Discussion

3.1. Demographic Profile

In this study, a total of 600 questionnaires were distributed to university students, with 593 valid questionnaires returned. The classification of population characteristics is summarized in the table below.

Table 2

Demographic profile of respondents

Demographic Variables	Classification	*N*	Constituent Ratio
Gender	Male	264	44.5%
	Female	329	55.5%
Single-child	Yes	171	28.8%
	No	422	71.2%
Birthplace	Town	212	35.8%
	Village	381	64.2%
Major	Literature and History	333	56.2%
	Science and Engineering	260	43.8%
Grade	Freshman	182	30.7%
	Sophomore	169	28.5%
	Junior	126	21.2%
	Senior	116	19.6%
Phone years of use	<2 years	248	41.8%
	2~4 years	157	26.5%
	>4 years	188	31.7%
Mobile phone usage time	<3 hours	67	11.3%
	3~5 hours	76	12.8%
	5~7 hours	102	17.2%
	>7 hours	348	58.7%
Monthly living expenses	<1000 yuan	166	28.0%
	1000~2000 yuan	404	68.1%
	>2000 yuan	23	3.9%
School Performance	Above Average	163	27.5%
	Average	343	57.8%
	Lower Average	87	14.7%

The demographic profile of the respondents reveals a diverse composition among university students. The gender distribution reflects a nearly equal representation, with 44.5% males and 55.5% females. In terms of family structure, a significant majority (71.2%) are not single children, while 28.8% are single children. The respondents also exhibit varied birthplaces, with 35.8% coming from towns and 64.2% from villages. The distribution across majors shows a prevalence of students in Literature and History (56.2%) compared to Science and Engineering (43.8%). Academic classification spans all four years, with the largest representation being freshmen (30.7%), followed closely by sophomores (28.5%). Regarding phone usage, a substantial proportion has used mobile phones for more than four years (31.7%), with 41.8% using them for less than two years. The majority of respondents (58.7%) use their phones for over seven hours daily. Monthly living expenses vary, with 68.1% spending between 1000 to 2000 yuan, while 27.5% report above-average school performance. This comprehensive demographic overview provides insights into the diverse characteristics of the

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surveyed university student population, encompassing gender, family structure, birthplace, major, academic year, phone usage patterns, and financial aspects.

The survey used in this study (MPAI) utilized a Likert 5-point scale (1=Never, 5=Always), with higher scores indicating a higher level of mobile phone dependence. The total score on the scale is 85 points. Specifically, in 8 of the questions (numbers 3, 4, 5, 6, 8, 9, 14, 15), answering affirmatively to 5 or more of these questions was used to determine mobile phone dependence.

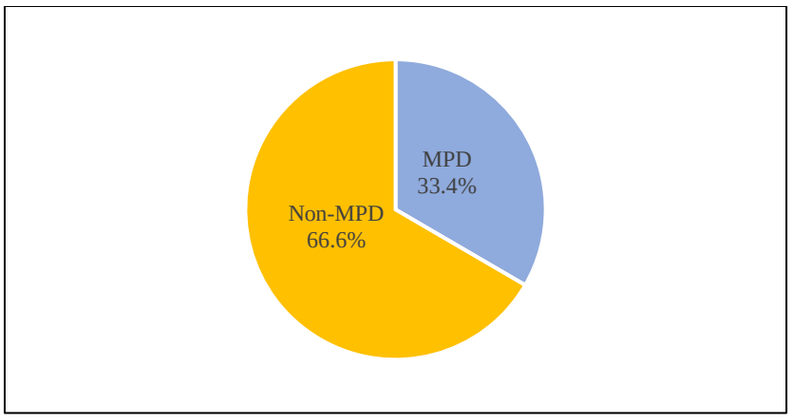
The survey found that the smartphone ownership rate among students at X University was 100%. Among these students, 197 were identified as mobile phone dependent, resulting in a detection rate of mobile phone dependence among college students of 33.4%.

Table 3. *The responses of 197 MPD to 8 determination questions*

Topic	Never	Occasionally	Sometimes	Often	Always	*N*
Q3: You try to hide from others how much time you spend on your phone.	53	41	65	32	6	197
Q4: You find yourself using your phone longer than you expected.	1	15	68	61	52	197
Q5: You can't spend enough time on your phone.	18	35	95	30	19	197
Q6: You try to cut back on your phone but you don't.	2	18	94	52	31	197
Q8: For a while, you're preoccupied with missing a call.	48	52	71	17	9	197
Q9: If you haven't checked your messages or clicked on your phone for a while, you feel anxious.	8	36	92	42	19	197
Q14: When you're feeling down, you turn to your phone to feel better.	3	21	90	54	29	197
Q15: You find yourself too busy with your phone when you need to be doing something else, which can cause problems.	2	25	99	50	21	197

Figure 1

Statistics of the dependency detection rate of MPD



In the study conducted by Chai Jingxin et al. (2016) titled "An Investigation of MPD and Usage Among College Students in Changchun City," the prevalence

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of MPD among college students was found to be 21.56%. Similarly, Wang Huan, Huang Hai, and their colleagues (2014) reported that 30% of college students exhibited MPD. Therefore, when comparing these findings with the studies conducted by Chai Jingxin, Wang Huan, Huang Hai, and others, it is evident that the prevalence of MPD among college students has increased, indicating a serious escalation of the issue.

3.2 Factors of Mobile Phone Dependence (MPD)

The research findings reveal that mobile phone dependence (MPD) among X University students is influenced by a combination of social, familial, academic, and individual factors. Social factors such as the advanced functionalities of smartphones, which allow students to engage in entertainment and social networking, contribute to excessive usage, particularly among students with impulsive behaviors. Negative consumer culture, the allure of brand status, and mismanagement of social networks also exacerbate this dependency. Academically, outdated teaching methods and a lack of engagement in classrooms lead students to turn to their smartphones during boring lectures. Additionally, universities provide insufficient guidance or effective measures to curb phone use in class. On the familial side, parents' smartphone habits and neglect in emotional and educational guidance further influence students' MPD. Individually, students with weak self-discipline, unclear learning goals, or poor time management are more susceptible to smartphone addiction. Feelings of loneliness, the psychological need for recognition, and self-actualization further drive their dependence on smartphones. Moreover, addiction psychology plays a role, as many students find it difficult to reduce phone use, despite recognizing its negative effects. Different stages of university life also affect students' smartphone reliance, with third-year students showing the highest levels of MPD due to psychological fatigue and lighter academic pressure. In contrast, first-year and fourth-year students exhibit lower levels of dependency due to the novelty of university life or the focus on job hunting and future plans.

3.3 Impacts of underlying causes of MPD

The analysis of Mobile Phone Dependence (MPD) reveals its wide-ranging impacts across individual physiology, psychology, behavior, and society, with foundational effects on physiology and psychology triggering societal issues. In learning environments, MPD causes students to lose focus, disrupts the classroom, and diminishes their critical thinking abilities, leading to poor academic performance. Socially, it weakens real-life communication skills and fosters disconnection, while physically, it contributes to eye strain, musculoskeletal issues, and poor sleep. Mentally, MPD exacerbates feelings of anxiety, depression, and loneliness. Economically, it results in higher expenses, job opportunity losses, and vulnerability to fraud, while fostering unhealthy consumerism and challenges in time management.

3.4 Difference in MPD across various demographic variables

This study utilized independent sample t-tests to explore the differences in MPD among college students from different areas. From Table 4, it can be observed that there were no significant differences in MPD and its dimensions of loss of control, withdrawal, escapism, and inefficiency among students from different areas. This indicates that both urban and rural college students experience MPD.

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Table 4. *The differences in MPD among college students from different birthplace*

Factor	Town *N*=212 *M±SD*	Village *N*=381 *M±SD*	*t*	*P*
MPD	46.36±12.611	45.55±11.547	1.272	0.26
Loss of control	17.3±5.319	17.27±4.851	3.276	0.071
Withdrawal	10.34±4.14	10.1±4.228	0.006	0.94
Escapism	9.54±3.161	9.06±2.994	1.354	0.245
Inefficiency	9.19±2.94	9.11±2.923	0.262	0.609

As can be seen, there is no significant difference in MPD and its various dimensions based on students' family residence. This could be attributed to the portability of smartphones, allowing students to meet their mobile phone usage needs anytime and anywhere. Moreover, in the era of big data, the widespread use of multimedia applications on smartphones has eliminated time and space constraints. As a result, there is not much disparity in MPD levels, whether students reside in urban or rural areas.

Zhang Yanzhen and others also believe that smartphones have become a widely used means of communication among college students. Both urban and rural students have the opportunity to access the internet through their phones, leading to the occurrence of MPD in both settings.

To explore the differences in MPD among college students with different years of smartphone usage, a one-way analysis of variance (ANOVA) was conducted. The results, as shown in Table 5, indicate that there is a significant difference in the dimension of "withdrawal symptoms" ($P<0.05$) among students with different years of smartphone usage.

Further comparative analysis revealed that college students who have been using smartphones for over four years scored higher in the dimension of "withdrawal symptoms" compared to those who have been using smartphones for less than two years. "Withdrawal symptoms" refer to the negative emotions or reactions that individuals experience when they are unable to use their smartphones normally.

Table 5. *MPD is compared between arrays of different phone years of use*

Factor	<2 years N=248 M±SD	2-4 years N=157 M±SD	>4 years N=188 M±SD	F	P	Pairwise (LSD)
MPD	39.67±11.76	39.93±12.07	40.07±11.56	0.11	0.892	—
Loss of control	15.02±4.98	14.93±4.90	14.70±4.80	0.44	0.646	—
Withdrawal	11.71±4.88	12.29±4.90	12.65±5.03	3.64	0.027	3>1*
Escapism	7.63±2.97	7.52±3.23	7.64±3.29	0.16	0.851	—
Inefficiency	5.31±2.20	5.19±2.22	5.21±2.21	1.02	0.36	—

Note: *$P<0.05$, **$P<0.01$; <2years=1，2-4years=2，>4years=3.

As can be seen, despite the fact that the total score of MPD increases with the length of phone usage, there is no significant difference in the degree of MPD among students with different usage durations. This indicates that the level of MPD in college students is not necessarily correlated with the number of years they have been using their phones. In other words, individuals with longer phone

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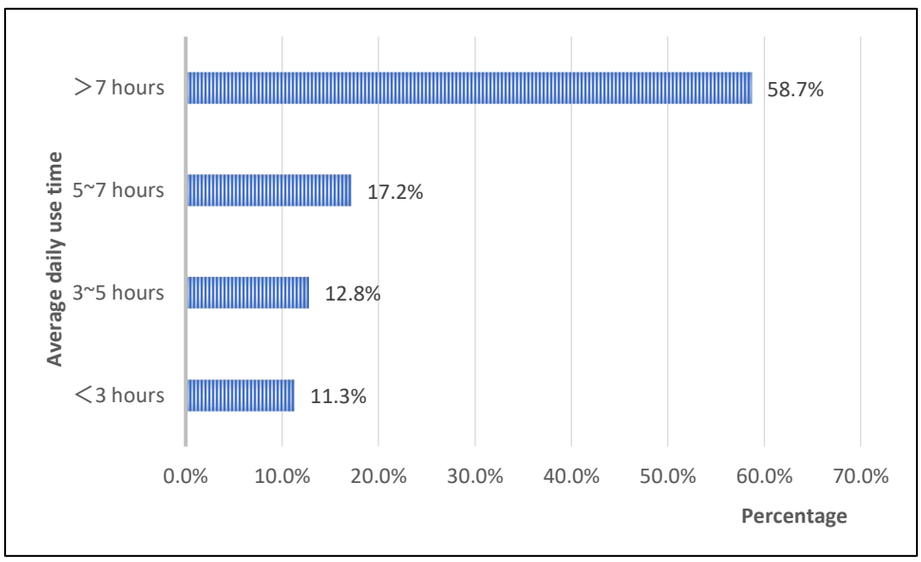
usage history do not necessarily exhibit a stronger tendency towards MPD, which aligns with some domestic research findings.

However, in the aspect of withdrawal symptoms, students who have been using their phones for more than four years scored higher than those with less than two years of usage. This suggests that as the phone usage duration extends, it becomes more difficult for individuals to detach from their phones. Although it may not lead to addiction, students who have been using their phones for more than four years are more prone to experiencing negative emotional reactions when they are unable to use their phones normally.

In this survey, it was found that among college students at X University, 58.7% of them spend an average of 7 hours or more on their smartphones daily. Additionally, 17.2% of students use their smartphones for 5 to 7 hours per day, while 12.8% limit their daily usage to 3 to 5 hours. Only a small proportion of students, 11.3%, have an average daily smartphone usage of less than 3 hours.

Using one-way ANOVA, we explored the differences in MPD among college students based on their daily smartphone usage. From Table 6, it is evident that there are significant differences in MPD and its dimensions (i.e., loss of control, withdrawal symptoms, escapism, and inefficiency) among college students with varying daily smartphone usage.

Figure 4. *Distribution of daily cell phone usage hours*



Post hoc analysis shows that smartphone usage duration is strongly linked to Mobile Phone Dependence (MPD) among college students. Those using smartphones for more than 7 hours daily exhibit significantly higher MPD compared to those using them for 5 to 7 hours. Similarly, students using their phones for 5 to 7 hours show higher dependence than those using them for 3 to 5 hours, and this group, in turn, shows greater dependence than students using smartphones for less than 3 hours. This pattern is particularly evident in the dimensions of loss of control and withdrawal symptoms.

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Table 6. *The difference of MPD among college students who use mobile phones at different time every day*

Factor	<3hours *N*=67 *M±SD*	3-5hours *N*=76 *M±SD*	5-7hours *N*=102 *M±SD*	>7hours *N*=348 *M±SD*	*F*	Pairwise (LSD)
MPD	35.71±7.263	45.73±10.755	46.03±11.784	50.2±11.972	22.805**	1,2**; 2,3**; 3,4**
Loss of control	13.95±3.66	16.48±4.299	18.82±5.231	17.28±5.029	14.992**	1,2**; 3,4**
Withdrawal	7.59±2.722	9.61±4.125	10.08±4.081	11.73±4.226	15.615**	1,2**; 3,4**
Escapism	7.2±2.453	9.51±2.887	9.26±3.091	9.86±3.059	11.235**	1,2**
Inefficiency	6.98±2.203	9.52±2.873	9.09±2.801	9.79±2.953	14.236**	1,2**

Note: *P<0.05, **P<0.01; <3hours=1，3-5hours=2，5-7hours，>7hours=4.

At X University, a significant 58.7% of students report using their smartphones for over 7 hours daily, which is the highest percentage among those surveyed and indicates that these students spend nearly one-third of their entire day on their phones. Conversely, only 11.3% use their phones for less than 3 hours each day. Further interviews highlight that most students who use their phones for more than 5 hours daily show signs of Mobile Phone Dependence (MPD), with those using their phones for over 7 hours exhibiting the highest levels of dependence, while those using them for less than 3 hours show the least. These findings support Yang Chunhong's (2016) research, which found a significant difference in daily phone usage between students with varying levels of MPD; specifically, those with higher MPD scores use their phones approximately 2 hours more each day, often for entertainment and leisure, reflecting a stronger addictive tendency.

A one-way analysis of variance (ANOVA) was conducted to examine the differences in mobile phone dependency among college students across various academic years. The results, presented in Table 7, indicated significant disparities in mobile phone dependency and its dimensions—loss of control, withdrawal, escapism, and inefficiency—among students from different years. Third-year students reported the highest mean scores in mobile phone dependency across all dimensions, followed by second-year and first-year students, who had the lowest scores. Post-hoc analyses showed that third-year students had significantly higher overall mobile phone dependency levels compared to second-year students ($P < 0.05$), while second-year students also outperformed fourth-year students ($P < 0.05$). No significant differences were found between fourth-year and first-year students ($P > 0.05$). In the dimensions of escapism and loss of control, third-year students again scored significantly higher than second-year students ($P < 0.05$), and second-year students had higher scores than fourth-year students ($P < 0.05$). Only in the inefficiency dimension was a significant difference noted between fourth-year and first-year students ($P < 0.05$). Overall, these findings suggest that second- and third-year college students are more susceptible to mobile phone dependency compared to their peers in other academic years.

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Table 7. *The difference analysis of college students' MPD in different grades*

Factor	Freshman *N*=182 *M±SD*	Sophomore *N*=169 *M±SD*	Junior *N*=126 *M±SD*	Senior *N*=116 *M±SD*	*F*	Pairwise (LSD)
MPD	39.62±8.276	47.7±12.39	53.36±10.442	42.32±11.53	35.987**	2, 3*; 2,4*
Loss of control	14.93±3.799	18.01±4.616	20.37±4.514	15.62±5.218	32.962**	2, 3*; 2,4*
Withdrawal	8.14±3.302	10.73±4.501	12.34±3.953	10.19±4.191	23.745**	2,4*
Escapism	8.46±2.568	9.48±3.238	10.23±3.163	8.75±2.964	7.906**	2, 3*; 2,4*
Inefficiency	8.09±2.692	9.48±3.056	10.42±2.513	8.5±2.897	15.605**	1,4*

Note: *P<0.05, **P<0.01; Freshmans=1, Sophomore=2, Junior=3, Senior=4.

The analysis of mobile phone dependency (MPD) among college students by academic year indicated significant differences, with third-year students exhibiting the highest levels of MPD across all four measured dimensions, followed by second-year students, while first-year students showed the lowest dependency. This suggests that third and second-year students are more susceptible to MPD. A potential explanation for this trend is that first-year students, as they acclimate to college life, may prioritize adapting to their new environment, which can limit excessive smartphone use. Moreover, first-year students often participate in various extracurricular activities, reducing the time they spend on their phones. In contrast, as second and third-year students progress, they may experience reflection and uncertainty regarding their academic and personal goals, leading them to use smartphones as a means of escape from their ambiguous circumstances. Conversely, fourth-year students, facing graduation and job searches, tend to reduce their smartphone usage as they focus more on planning their career paths and engaging in internships, resulting in less time spent on their devices compared to their second and third-year peers.

A one-way analysis of variance (ANOVA) was performed to examine mobile phone dependency among students with varying academic performances, revealing significant differences in withdrawal, loss of control, inefficiency, and the overall mobile phone dependency scores (P<0.01). Further post-hoc comparisons indicated that students with below-average academic performance exhibited significantly higher levels of mobile phone dependency across all dimensions—withdrawal, loss of control, inefficiency—as well as in the overall score compared to their peers with above-average and average academic performance (P<0.05). This suggests a correlation between lower academic performance and higher levels of mobile phone dependency among students.

Table 8. *The differences in MPD among college students with different average scores*

Factor	Above medium *N*=163 *M±SD*	Medium *N*=343 *M±SD*	Lower medium *N*=87 *M±SD*	*F*	Pairwise (LSD)
MPD	39.99±11.10	40.51±10.22	44.37±10.72	12.34**	1,3*; 2,3*
Loss of control	16.48±5.10	16.71±4.72	18.75±5.18	15.56**	1,3*; 2,3*
Withdrawal	9.13±3.10	9.25±3.02	10.10±2.94	7.30**	1,3*; 2,3*
Escapism	7.35±2.70	7.36±2.48	7.81±2.41	2.66	1,3*; 2,3*
Inefficiency	7.02±2.47	7.19±2.35	7.71±2.55	5.25**	1,3*; 2,3*

Note: *P<0.05, **P<0.01; Above medium=1，Medium=2，Lower medium=3.

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The analysis of mobile phone dependency (MPD) among college students based on their academic performance indicates significant differences, with students of average academic performance demonstrating higher scores in withdrawal, loss of control, inefficiency, escapism, and overall scale scores compared to those with slightly above-average performance. Notably, students with below-average academic performance displayed significantly higher scores across all dimensions, indicating a more severe MPD. These findings align with the study by Liu Yan Su et al. (2017), which found that students with higher academic self-efficacy are less prone to smartphone addiction and tend to perform better academically. Thus, it is evident that poorer academic performance is associated with a more pronounced MPD, reinforcing the conclusions of this research.

Independent sample t-tests were conducted to examine the differences in mobile phone dependency among students from different majors. The test results are presented in Table 9. According to Table 9, significant differences were observed in the dimensions of withdrawal, loss of control, inefficiency, escapism, and the overall total score of the mobile phone dependency scale ($P<0.01$). Specifically, students majoring in the humanities and social sciences showed significantly higher levels of mobile phone dependency compared to those in the science and engineering majors across all four dimensions of the mobile phone dependency index and the total score.

Table 9. *The difference analysis table of college students of different majors in MPD*

Factor	Literature and History *N*=333 *M±SD*	Science and Engineering *N*=260 *M±SD*	*t*
MPD	43.84±10.84	37.20±9.09	11.83**
Loss of control	18.29±4.91	15.22±4.45	11.71**
Withdrawal	9.75±3.34	8.82±2.53	5.56**
Escapism	8.06±2.64	6.60±2.13	10.81**
Inefficiency	7.74±2.45	6.55±2.21	9.09**

Note: *P<0.05, **P<0.01.

The analysis of college students' MPD based on different academic burdens shows that students with a lighter academic burden are more prone to MPD. Generally, college students believe that there is a significant difference in academic burden between students in humanities and science and engineering majors. Science and engineering students often spend considerable time on repetitive calculations and experiments, leading to a heavier academic burden compared to humanities students. On the other hand, humanities students have relatively lighter academic burdens, allowing them more free time, which may lead to increased smartphone usage.

Therefore, it can be inferred that students with lighter academic burdens in humanities majors are more susceptible to severe MPD. This implies that the severity of MPD is higher among students with lighter academic burdens.

Research by Yang Chun Hong (2016) revealed that humanities students score significantly higher in MPD than science and engineering students. Similarly, Wei Hui Chao (2016) studied the differences in MPD among students in different majors, considering social gains, salience, compulsivity, conflict, and withdrawal. The results showed significant differences in salience, withdrawal, and overall scores, with humanities students scoring higher and exhibiting more MPD compared to science and engineering students. These findings are consistent with previous studies.

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Independent sample t-tests were conducted to analyze the MPD levels of different categories of students at X University. The following conclusions were drawn:

1) MPD levels of male and female students were compared using independent sample t-tests. Table 10 indicates that there were highly significant differences ($P < 0.01$) in the withdrawal factor, lack of control factor, inefficiency factor, escapism factor, and total score of the dependency scale between male and female students. Female students scored significantly higher than male students in all four dimensions of the MPD scale and the total score.

2) Independent sample t-tests were performed to compare MPD levels between only children and non-only children. Table 10 shows that there were highly significant differences ($P < 0.01$) in the lack of control factor, escapism factor, and total score of the dependency scale between only children and non-only children. Only children scored significantly higher than non-only children in the lack of control factor, escapism factor, and total score.

3) Independent sample t-tests were conducted to compare MPD levels between single and dating college students. Table 10 reveals highly significant differences ($P < 0.01$) in the withdrawal factor, lack of control factor, inefficiency factor, escapism factor, and total score of the dependency scale between single and dating students. Dating students scored significantly higher than single students in all four dimensions of the MPD scale and the total score.

Table 10. *The difference analysis of MPD of different college students*

Factor		*N*	Withdrawal	Loss of control	Inefficiency	Escapism	MPD
			M±SD	*M±SD*	*M±SD*	*M±SD*	*M±SD*
Gender	Male	264	8.73±2.65	15.26±4.56	6.58±2.27	6.45±1.97	37.02±9.37
	Female	329	9.84±3.25	18.30±4.84	7.74±2.42	8.21±2.67	44.08±10.55
	t		-6.657**	-11.630**	-8.874**	-13.305**	-12.686**
Single-child	Yes	171	9.57±3.16	17.69±5.17	7.43±2.47	7.79±2.68	42.49±11.10
	No	422	9.25±3.00	16.64±4.83	7.13±2.40	7.28±2.46	40.30±10.38
	t		1.75	3.50**	2.04	3.34**	3.39**

Note: *P<0.05, **P<0.01.

As can be seen, greater mpd among students with strong social needs

(1) Female College Students Exhibit More Severe MPD

The current survey revealed that female college students, only children, and students in romantic relationships tend to have higher social needs, leading to more severe MPD. According to studies by Luo Xingyu (2017), any form of relationship involves emotional and behavioral involvement, which can lead to emotional and psychological fluctuations among college students. A common emotion experienced by students with close interpersonal relationships is loneliness. This sense of loneliness increases their social needs, consequently leading to more severe MPD.

Research by Liu Qinxue et al. also showed gender differences in MPD, with females exhibiting higher levels of dependency than males. Liu Hong and Wang Hongli's study indicated that feelings of loneliness significantly influence MPD, and compared to males, females tend to prioritize interpersonal interactions. As smartphones offer convenient means of socializing anytime and anywhere, females might be more inclined to utilize smartphones to fulfill their social needs. This survey's results align with the studies by Liu Qinxue, Liu Hong, and Choli et al., indicating that females, with stronger social motivations, are more prone to frequent smartphone usage for interpersonal communication, leading to MPD.

(2) Only Children Exhibit More Severe MPD

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Interviews revealed that only children, who lack same-age companions since childhood, often prefer solitude and feel averse to interacting with unfamiliar people in real life. Growing up in such an environment, they might develop real-life social anxiety and seek consolation through virtual social interactions. This, to some extent, creates opportunities for MPD among only child college students.

In conclusion, female college students and only children at X University exhibit stronger social needs, which are closely related to their MPD.

A one-way analysis of variance (ANOVA) was conducted to investigate the differences in mobile phone dependency (MPD) among college students with varying monthly living expenses. The analysis revealed significant differences across the dimensions of withdrawal, loss of control, inefficiency, and overall scores of MPD ($P<0.05$). Specifically, students with monthly living expenses of 2000 yuan or more demonstrated significantly higher MPD scores compared to those in lower expense groups. Post-hoc analyses further indicated that students with monthly living expenses of less than 1000 yuan scored lower in escapism compared to those with expenses between 1000 and 2000 yuan. Additionally, those with expenses below 1000 yuan exhibited a highly significant difference when compared to students with expenses of 2000 yuan or more, who consistently scored higher across all dimensions. These findings suggest that college students with higher monthly living expenses, particularly those spending 2000 yuan or more, tend to show greater levels of mobile phone dependency than their peers with lower living expenses.

Table 11. *The difference analysis of college students with different living expenses on MPD*

Factor	＜1000 yuan *N*=166 *M±SD*	1000-2000 yuan *N*=404 *M±SD*	＞2000 yuan *N*=23 *M±SD*	F	Pairwise (LSD)
MPD	38.93±10.53	41.30±10.36	48.67±11.97	21.47**	1，2*；1,3*；2,3*
Loss of control	16.05±4.72	17.11±4.91	20.50±5.35	20.56**	1，2*；1,3*；2,3*
Withdrawal	8.94±3.06	9.39±2.95	11.33±3.73	14.70**	1，2*；1,3*；2,3*
Escapism	7.14±2.53	7.47±2.52	8.63±2.43	8.46**	1，2*；1,3*；2,3*
Inefficiency	6.81±2.29	7.33±2.44	8.21±2.52	10.71**	1，2*；1,3*；2,3*

Note: *$P<0.05$，**$P<0.01$；＜1000 yuan=1，1000-2000 yuan=2，＞2000 yuan=3.

A single-factor variance analysis was performed to examine mobile phone dependency (MPD) among university students based on their primary purposes for mobile phone use. The results indicated significant differences ($P < 0.05$) in the factors of withdrawal, lack of control, inefficiency, escapism, and the overall dependency score among students with varying tendencies in mobile phone usage. Multiple comparisons revealed that students primarily using their phones for shopping had significantly higher scores in withdrawal, lack of control, inefficiency, escapism, and overall MPD compared to other groups. Additionally, students using their phones mainly for entertainment scored significantly higher in withdrawal, lack of control, and overall MPD compared to those using their phones for studying. Furthermore, within the entertainment group, scores for lack of control and overall dependency were higher than those for students primarily using their phones for communication. In terms of inefficiency, entertainment-focused users scored higher than their peers using their phones for communication and studying. Lastly, students using their phones for entertainment exhibited significantly higher escapism scores compared to those whose primary purpose was studying.

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Table 12. *The difference analysis of MPD of college students with different purposes of using mobile phones*

Factor	Entertainment *N*=499 *M±SD*	Communication *N*=28 *M±SD*	Learning *N*=34 *M±SD*	Shopping *N*=16 *M±SD*	Other *N*=16 *M±SD*	*F*	Pairwise (LSD)
MPD	41.11±10.61	37.59±8.86	38.40±10.49	50.06±10.28	40.29±9.14	10.31**	1, 4**; 2, 4**; 3, 4**; 4, 5**; 1,3**; 1,2**;
Loss of control	17.05±4.96	15.21±3.96	15.36±4.80	20.53±5.15	16.80±4.17	8.68**	1, 4**; 2, 4**; 3, 4**; 4, 5**; 1,3*; 1,2**
Withdrawal	9.37±3.00	8.73±2.96	8.50±2.96	11.76±3.58	9.00±3.01	7.75**	1, 4**; 2, 4**; 3, 4**; 4, 5**
Escapism	7.44±2.50	7.16±2.46	6.84±2.66	8.97±2.66	7.17±2.93	4.48**	1, 4**; 2, 4**; 3, 4**; 4, 5**;1,3*
Inefficiency	7.25±2.44	6.49±1.83	6.70±2.38	8.79±1.90	7.31±2.63	6.03**	1, 4**; 2, 4**; 3, 4**; 4, 5**;1,2**; 1,3*

Note: *P<0.05, **P<0.01; Entertainment=1, Communication=2, Learning=3, Shopping=4, Other=5.

As can be seen, the MPD of X University students is closely related to their monthly living expenses. Students with higher monthly living expenses and a stronger inclination towards smartphone entertainment tend to exhibit more severe MPD. This indicates a close correlation between MPD and entertainment needs, which may be attributed to the prevailing business model of popular entertainment apps in the market.

Currently, mainstream entertainment apps often offer unique and attractive features that require in-app purchases. Clearly, this approach serves as the primary revenue model for app developers.

3.4 5. Interventions and Recommendations

The author believes that addressing the MPD among college students at X University requires a collaborative effort from various stakeholders, including society, schools, families, and individuals.

Key Result Area: Strengthening Social Governance **Rationale:** The society, as a macro system, may have limited direct interactions with college students. However, being an integral part of this system, college students are also influenced by various societal changes. Therefore, the society, as a broader environment, should provide a healthy and positive smartphone usage environment for college students.		
Action Plan	**Compliance Task Forces**	
Objective	**Strategy**	**Expected Output**
Strengthening Relevant Institutional Development	Society should strengthen its supervision of mobile networks and establish relevant laws and regulations to standardize mobile network order. Stringent measures should be taken to combat harmful information online, ensuring that unlawful actions find no refuge	Implementation of an internet censorship system and enforcing real-name registration for online social activities Enhance the screening and filtering of uploaded information, removing irrelevant and potentially harmful content
Increasing Attention from Various Sectors of Society	Enhance oversight from all sectors of society. Everyone can act as a supervisor and report dangerous content and harmful information at any time. This not only operationalizes specific regulations but also fosters a sense of social responsibility among citizens	Clean online environment Guide people in the proper use of the internet and smartphones, promoting a healthy media usage perspective
Cultivating a Positive Cultural Atmosphere	Mobile developers should improve smartphone functionalities, reducing radiation exposure and promoting a healthier physical condition, helping individuals stay away from suboptimal health. Create more software conducive to work and study, while minimizing the use of harmful applications. Strengthen the promotion of responsible smartphone usage	Building a positive social atmosphere.
Key Result Area: University Education		

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Rationale: Higher education plays an irreplaceable role in fostering a healthy and positive online environment and cultivating highly qualified university students. Leveraging its abundant faculty and systematic educational mechanisms, universities should educate students on understanding the essence of mass communication media, mastering the fundamental skills of mobile media, and establishing a balanced and constructive relationship with mobile media.

Action Plan	**Compliance Task Forces**	
Objective	**Strategy**	**Expected Output**
Offering Media Literacy Education Courses	Teachers are the direct implementers of media literacy education, and their rational judgment ability and level of media literacy directly influence the media usage habits of students. Clarify and enhance teachers' moral integrity, knowledge literacy, and management abilities. Regular professional training on media literacy knowledge should be provided to teachers to ensure that their media literacy remains up-to-date. Advanced educational concepts should be introduced from outside the school. Inviting renowned media professionals and authoritative opinion leaders to conduct media literacy seminars on campus will broaden students' horizons and guide them in cultivating a scientific approach to media literacy.	Content-rich knowledge system about Media Literacy Courses
Shifting Educational Approaches	Transition from "cramming" teaching to "guidance-based" teaching Guide students to develop a positive attitude towards learning and assist them in formulating reasonable study plans	Proactively enhance their mobile new media self-management skills
Prioritizing University Students' Mental Health	Universities should employ professional counseling staff and incorporate psychological education courses into the regular curriculum Identifying and addressing students' psychological and social issues, and timely counseling and support should be provided to those experiencing psychological challenges, helping them find confidence in the real world Universities should provide more opportunities for students to gain exposure and experiences to broaden their horizons and increase their knowledge. Universities should conduct regular courses that enhance campus culture with guidance, thoughtfulness, and artistic elements	Cultivate students' diverse interests and improve their intellectual levels and comprehensive qualities.
Revision of Comprehensive Assessment Criteria for University Students	Include the ability of students to utilize mobile new media to develop themselves in the comprehensive assessment criteria Regular and comprehensive assessments should be conducted Organizing new media competitions like public account operation and maintenance, mobile app development, and presentation Students' participation and performance in these tasks can be one of the criteria for assessing their comprehensive qualities, linked with exam results, scholarships, and various honors, thereby stimulating their enthusiasm for media engagement	Accurately gauges students' media literacy levels but also guides and motivates their learning and innovation Gain a more thorough understanding of new media operation mechanisms
Establishing regulations for the use and management of smart mobile devices and other mobile new media	Regulate and guide the reasonable use of mobile new media among university students, the institution can establish a comprehensive set of policies Prohibition of mobile phone usage in classrooms and study areas Plagiarism from online sources during assignments or examinations, appropriate educational measures and penalties should be enforced. Wireless devices within the campus should be judiciously controlled, and certain restrictions on students' internet access should be applied to prevent excessive indulgence in online activities	Regulations for the use and management of smart mobile devices and other mobile new media
Enriching campus cultural activities and enhancing university students' participation in campus events	Institution should enrich its cultural events Universities and faculties should strive to provide students with ample opportunities to participate in campus activities Enriched campus cultural activities can effectively alleviate students' feelings of loneliness during their leisure time, lessen their reliance on smartphones, and increase their engagement in campus life, fostering their all-around development Encourage students to participate in extracurricular academic contests, such as the "Challenge Cup," or joining the "Internet Plus" innovation and	Positive academic atmosphere, institutional culture, and educational environment can significantly influence students' attitudes towards learning and personal growth Offering students more opportunities for personal development, enhancing their abilities, work skills, and social interactions.

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	practice competition can effectively redirect students' focus from their phones and gradually overcome phone dependency Professors can inspire students to work in groups and create theme-based short films related to their courses Universities and faculties can hold occasional "Fun Sports Games" and other sports activities	
Key Result Area: Family Education **Rationale:** Parents, as guides in their children's lives, should start with themselves, rectify their own attitudes towards the internet, and set an example for them.		
Action Plan	**Compliance Task Forces**	
Objective	**Strategy**	**Expected Output**
Leveraging the Positive Influence of Families	Parents should engage in self-education, improve their understanding and control of mobile new media Parents should strengthen communication with their children, understand their use of mobile new media in a timely manner, and provide appropriate guidance during their children's growth.	Enhance the self-management proficiency
Cultivating Children's Financial Literacy	Parents should convey a correct consumption concept to their children Parents should control the frequency and amount of their living expenses	Limit excessive consumption through online shopping channels
Confronting MPD and Cultivating Proper Usage Habits	Strengthen the construction of a family culture, starting with developing good smartphone usage habits to reduce the impact of parents' negative smartphone usage habits on their children Parents should view MPD as a growth obstacle in their children's lives Communicate more with their children, provide guidance, and instill proper smartphone usage habits from an early age Parents need to stay informed about their children's academic and personal lives through various channels and means, such as maintaining active communication with their children's teachers and peers	Limit the subtle impact on the formation of their children's personal habits

To address mobile phone dependence (MPD) among university students, a multi-faceted approach is recommended across societal, educational, and familial levels. Societal strategies include strengthening regulations against harmful online content and promoting responsible smartphone use through public campaigns. In educational settings, enhancing media literacy through courses and mental health support is crucial, alongside revising assessment criteria to include mobile media skills.

Families are encouraged to foster positive attitudes towards mobile media by educating themselves about new media and instilling proper usage habits in children. Students should focus on self-education to improve self-discipline, develop media literacy, and manage their smartphone usage effectively. Tools like screen time tracking apps can help reduce mindless use, while personal goal systems enhance time management. Additionally, promoting mindfulness and collaborative governance can further address the complexities of MPD. Overall, these recommendations aim to empower students to use smartphones responsibly and tackle the societal challenges of mobile phone dependency.

4. Conclusions

This research delved into the prevalence, contributing factors, impacts, and variations of Mobile Phone Dependence (MPD) among university students at X University. The study revealed a 100% smartphone ownership rate, with 33.4% of students experiencing MPD issues. Various factors, including social, school, family, and personal aspects, were identified as significant contributors to MPD. Social factors encompassed smartphone allure, negative consumer culture, chaotic online practices, and the absence of real-world support. School-related factors included outdated teaching methods and inadequate guidance, while family factors implicated parental influence and neglect in family education.

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Personal factors involved weak self-discipline, unclear goals, loneliness, psychological needs, and addiction psychology. The impacts of MPD spanned academic, social, physical health, mental health, economic, consumer mindset, and behavioral domains. Additionally, demographic variables like hometown, years of smartphone use, daily usage duration, academic year, academic performance, field of study, gender, siblings, relationship status, monthly living expenses, and primary use of smartphones exhibited significant variations in MPD. The study highlighted the need for multifaceted interventions, emphasizing social governance, higher education, family education, and self-education, supported by collaborative governance. The recommendations aim to address MPD comprehensively, recognizing the importance of a coordinated effort from regulatory bodies, educational institutions, families, and individuals. This research provides a comprehensive understanding of MPD and offers a strategic framework for tackling this issue among college students.

The findings on mobile phone dependence (MPD) among university students reveal a complex interplay of factors, including academic performance, living expenses, academic year, and purposes of smartphone use. The analysis indicates that higher levels of MPD correlate with prolonged smartphone usage, especially among students using their devices primarily for entertainment or shopping. Notably, students in their second and third years exhibit the most significant dependency, potentially due to their transitional life stages and the associated uncertainties. Additionally, those with below-average academic performance demonstrate more pronounced MPD, highlighting the detrimental effects of excessive smartphone use on educational outcomes.

To mitigate these challenges, a comprehensive strategy encompassing societal, educational, and familial dimensions is essential. Society must foster a conducive environment for healthy smartphone use through regulations and awareness campaigns. Educational institutions should prioritize media literacy and mental health support, while families play a crucial role in shaping children's attitudes towards mobile media. Students are encouraged to develop self-discipline, employ time management techniques, and engage in real-life activities to counteract MPD.

By implementing these recommendations, stakeholders can collaboratively address the growing issue of mobile phone dependence, empowering university students to cultivate responsible smartphone habits and enhancing their overall well-being. As the prevalence of smartphones continues to rise, it is imperative to create a balanced approach that fosters healthy usage while recognizing the inherent challenges associated with mobile technology in contemporary society.

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