Mobile phone dependence, loneliness, and psychological resilience among Chinese college students

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Abstract

This research examined mobile phone addiction among Chinese college students, focusing on loneliness and psychological resilience within their digital environment. The study profiled students by sex and grade, assessed their levels of mobile phone addiction, loneliness, and psychological resilience, compared these variables based on students' profiles, explored relationships among the variables, and proposed an intervention program. Using a descriptive survey method, data were collected from Shanghai University students across various majors and grades via the Mobile Phone Addiction Index (MPAI), UCLA Loneliness Scale, and CD-RISC Psychological Resilience Scale. Analytical techniques included ANOVA, independent samples T-test, Pearson correlation, and regression analysis. Results indicated most students were male (51.4%) and belonged to grade 2.00 (29.6%). They exhibited mild phone addiction (Mean = 45.36, SD = 12.71), high loneliness (Mean = 49.20, SD = 3.28), and high resilience (Mean = 82.79, SD = 17.98). Significant differences in mobile phone addiction were found between males and females, with females showing higher resilience and coping abilities. Differences were noted across grades for mobile phone addiction but not for loneliness. Females demonstrated greater adaptability, emotional strength, problem-solving skills, and overall resilience, which were negatively correlated with phone addiction and loneliness. The study concluded that while students showed mild phone addiction and significant loneliness, females exhibited higher resilience. Recommendations included targeted support for lower-grade students and intervention programs focusing on digital well-being, emotional skills, and peer support to enhance resilience and social connections. Recommendations involved university administration, counseling services, faculty, students, parents, healthcare providers, and student organizations.

Keywords: college students, psychological resilience, mobile phone dependence, loneliness

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1. Introduction

The pervasive popularity of smartphones has seamlessly integrated into the fabric of modern social life, exerting increasingly profound effects on our daily routines. According to the latest statistics released by the China Internet Network Information Center, the number of mobile internet users in China has soared to an impressive 1.079 billion by June 2023, signifying a remarkable expansion in the smartphone user base. These modern devices, having evolved beyond their original purpose of calling and messaging, now encompass an extensive array of functions, including mobile gaming, social media engagement, online video streaming, payment transactions, and educational tools. This integration of multiple services has rendered smartphones indispensable in the daily lives of individuals. role has become increasingly indispensable. As people become more connected in the virtual world, they may also become increasingly disconnected from others in real life. This situation has made people eager to seek more social opportunities to make up for the sense of reality and emotional connection that cannot be obtained through the Internet. Amidst the digital revolution, mobile phones have emerged as a pivotal factor in the lives of college students, thereby igniting considerable discussion on psychological issues like mobile phone addiction, isolation, and resilience. Delving deeper into the research, we observed a concerning level of dependency among some students on their mobile phones, which led to a profound examination of the correlation between this addiction and mental health. Notably, the digital revolution has ushered in seismic shifts in human social interactions and lifestyles. The ubiquitous internet has expanded social horizons, bridging connections with people across the globe, thereby addressing the escalating social and emotional demands of contemporary society (Wang et al., 2022).

Mobile phone addiction, marked by incessant and habitual usage, fosters a profound sense of dependency and neediness, especially among teenagers, deleteriously impacting their physical and mental well-being. (Zhao, 2020) In light of the gravity of the issue, a comprehensive exploration of the factors that foster mobile phone addiction is crucial. Prolonged and excessive usage of mobile phones can significantly disrupt sleep patterns, thereby impeding normal physical and mental development. Notably, a strong positive correlation exists between mobile phone addiction and diminished sleep quality scores among college students, indicating a direct detrimental effect on their sleep health. This finding underscores the importance of not only addressing mobile phone addiction but also considering its potential negative impacts on overall well-being. However, the popularity of Internet social interaction also comes with a challenge: collective loneliness

Loneliness is a common emotion in interpersonal interactions. A lingering sense of negativity often surfaces when an individual's envisioned social engagements diverge from the actualities of their interactions. Individuals can alleviate mild loneliness through self-regulation, but long-term loneliness may cause emotional disorders. Loneliness stands as a pivotal factor that exerts considerable influence on college students' dependency on mobile phones (Zhang, 2023). Concurrently, the degree of psychological resilience displayed by college students also exerts a notable influence on their reliance on mobile phones. Psychological resilience is defined as the intrinsic capacity to maintain emotional stability and positivity, adapt, recover, or grow through adversity, challenges, and life pressures using positive coping strategies. Notably, contemporary college students commonly encounter significant loneliness, which not only significantly impacts their mental health and overall happiness but also contributes substantially to mobile phone dependency. As loneliness intensifies, their reliance on mobile phones escalates, highlighting its critical role in their interpersonal relationships.

As the vanguard of society, college students' educational standing and their commitment to social responsibilities hold immense significance in determining the evolution of society's future. However, the high dependence on smart-phones has had a negative impact on their growth and development. They use their phones

more frequently than in the past, and even get into situations where they can't extricate themselves. Not only does this limit their academic and social development, it may also make them feel more anxious and lonelier in their daily lives. As the backbone of society, the healthy and stable development of college students is the key to social development. Nonetheless, the salient issue of mobile phone dependency is having increasingly detrimental effects on the mental health and academic performance of college students, prompting a need for a collaborative approach from societal stakeholders and educational institutions to tackle this pressing challenge. Moreover, the escalating concern over mobile phone dependency has prompted us to recognize potential mental health challenges. Initial evaluations reveal that individuals with heightened mobile phone dependency exhibit reduced psychological resilience and are more likely to encounter feelings of loneliness. This deductive process provides sufficient evidence for our research and leads to the research question: Does the level of mobile phone addiction among Chinese college students significantly correlate with their psychological resilience and experiences of loneliness? This question has not been fully answered in the existing literature, revealing gaps with previous research and emphasizing the uniqueness and importance of this study.

An ample body of prior research has consistently demonstrated a positive correlation between feelings of loneliness and the onset of mobile phone addiction (Zhang et al., 2019; Sun, 2023). Although these findings provide some understanding, the relationship between these three has not been studied in depth. As an intrinsic protective factor and positive psychological quality, psychological flexibility helps individuals establish an effective self-protection mechanism and promote healthy development. In real life, everyone is affected by life stress to a greater or lesser extent. Sustained high levels of loneliness may lead to a negative emotional state and reduce the desire to interact with others, thus adversely affecting college students.

This study revolves around three main hypotheses. First, the researcher hypothesize that fourth-year college students may be more likely to show mobile phone dependence relative to other grades. Second, the researcher hypothesized that across grade levels, increases in individual levels of loneliness may be associated with exhibiting a stronger tendency to rely on mobile phones. Ultimately, the researcher formulates a hypothesis proposing that psychological resilience serves as a mediating variable in the intricate interplay between loneliness and mobile phone addiction. This study aims to address a pivotal research void in exploring the intricate relationship between mobile phone addiction, loneliness, and psychological resilience among Chinese college students. Given the pervasive prevalence of mobile phone usage among this demographic, the researcher endeavors to uncover the potential mental health implications that are associated with mobile phone dependency. By systematically investigating and analyzing the associations among these three, findings of the research will provide new academic insights into how mobile phone dependence affects individuals' psychological resilience and loneliness. At the same time, the research results will also promote Internet health research and provide substantial contributions to understanding emerging health issues in the digital age and developing corresponding intervention and prevention strategies.

Objectives of the Study - This study aimed to undertake a thorough examination of the phenomenon of mobile phone addiction among Chinese college students. Specifically, it described the profile of the respondents in terms of sex and grade; determined mobile addiction in terms of interpersonal impact, usage control, emotional coping, and functional impairment; assessed the level of loneliness in terms of intimate relations, social relations and emotional relations; evaluated psychological resilience in terms of adaptability and flexibility, emotional strength and coping, and problem solving and decision making; determined the difference of responses on mobile phone addiction, loneliness, and psychological resilience when grouped according to profile; determined the correlation of mobile phone addiction, loneliness and psychological resilience; and proposed intervention program for college students to address issues on mobile addiction, loneliness and psychological resilience.

2. Methods

Research Design - The research used descriptive survey method in conducting this scholarly work.

Employing standardized questionnaires as the primary data-gathering tool, this methodology leveraged online distribution to procure quantitative data on mobile phone addiction, loneliness, and psychological resilience among college students. This survey approach ensured the acquisition of data from a broad range of samples, enabling a comprehensive assessment of the current status and potential changes in these areas among the college student population.

This research design aimed to comprehensively analyze the differences and connections between these variables to provide new insights and contributions to this field of research. Prior to large-scale data collection, the researcher conducted a preliminary pilot study to evaluate the reliability and validity of the scale and questionnaire in the Chinese context. This crucial step ensured the tool's cultural appropriateness, stability, and data quality, ultimately enhancing the credibility and precision of the research findings. Subsequently, a variety of statistical analysis employed for data mining, including graphical representation, moderation effect analysis mediating effects, and linear regression. Graphical representations provided a visual aid to comprehend the intricate relationships and emerging trends among distinct variables. Furthermore, moderation and mediation analyses deepened the researcher's understanding of the potential moderators' impact on the complex interplay between mobile phone dependence, loneliness, and psychological resilience. At the same time, linear regression analysis helped to understand and explain the causal relationship between these three variables and delved into the differences and correlations between them. Finally, the gathered data was comprehensively described and synthesized, affording a deeper understanding of the intricate interplay between mobile phone dependence, loneliness, and psychological resilience among college students.

Participants of the Study - For this study, the target population comprised students hailing from Shanghai University, encompassing a broad range of academic majors and grades. The total population was 1, 610. Using Raosoft sample size calculator in which 5% margin of error, 95% confidence level, 50% response distribution and total population was 1, 610, the computed sample size was 311. Purposive sampling was employed. The selection process adhered to rigorous criteria formulated by the researcher, aimed at identifying participants who satisfied the following inclusion prerequisites: all participants underwent meticulous screening procedures using the Mobile Phone Addiction Index (MPAI) scale, a comprehensive instrument comprising 17 questions with a maximum score of 80, designed to accurately gauge the varying degrees of mobile phone addiction among the target population. Affirmative responses to at least 8 questions (scoring 3-5) indicate mobile phone dependence; exclusion of individuals using antipsychotic, sedative, or sleep-affecting medication within two weeks prior to enrollment, potentially impacting cognitive function. Absence of severe physical ailments, cerebrovascular incidents, or organic brain disorders demonstrated compliance and willingness to cooperate with the study's requirements. Whereas for the exclusion criteria, they should not have the following: History of drug or alcohol dependence; patients diagnosed with neurological or mental illnesses; evident mood disorders or other significant sleep disturbances; absence of clinical data or withdrawal from participation. Respondents selected using stratified cluster random sampling to ensure a representative and diverse group of participants. The survey's core objective was to conduct a thorough investigation into the prevalence and gravity of smartphone addiction among these students, while examining its profound implications on their cognitive abilities and mental health.

Measures - *Mobile Phone Addiction Index (MPAI).* Dr. Liang Yongchi from the Chinese University of Hong Kong meticulously curated a set of 17 questions from a pool of 27, drawing from the "Mobile Phone Problem Use Scale." These questions were then amalgamated into what is now known as the "Mobile Phone Addiction Index (MPAI)," encompassing four distinct dimensions: Loss of control (questions 1-7), withdrawal (questions 8-11), avoidance (questions 12-14), and inefficiency (questions 15-17). Responses were recorded using a 5-point Likert scale, ranging from 1 ("almost never") to 5 ("always"). The respondents assigned scores to each question, and a higher cumulative MPAI score indicated a stronger dependence on mobile phones. The MPAI scale was designed based on internet addiction screening criteria, tailored to assess mobile phone addiction. A critical threshold is established: if an individual responds affirmatively to at least 8 out of the 17 questions (with responses rated 3-5 considered affirmative), they are classified as being mobile phone dependent. Notably, the

internal consistency coefficient of this scale, measured at 0.90, attests to its commendable reliability. In addition to Dr. Liang's MPAI, subsequent studies to the latest research this year have unanimously supported the reliability and validity of MPAI. For example, Wang et al. (2022) delved into the mobile phone addiction of college students at Chinese general medical schools, while Chen et al.,(2020) explored factors such as mobile phone dependency among students at private colleges. Furthermore, Zhang et al. (2019) conducted joint research on mobile phone addiction among Chinese college students, collectively validating the robustness and reliability of the MPAI scale in this specific demographic. Together, they confirm the status of the MPAI as a reliable and valid tool for assessing mobile phone dependence.

Loneliness scale (UCLA). Loneliness represents a crucial aspect of individuals' psychological states, and this research relies on the UCLA Loneliness Scale, a well-established instrument originally conceptualized by Russell and his team in 1978. Over the years, this scale has undergone numerous refinements to maintain its relevance and accuracy in assessing loneliness. The scale serves as a tool to assess the experience of loneliness arising from the disparity between social expectations and actual social connections. In this research, we opted for the third iteration of the UCLA Loneliness Scale, which comprises a comprehensive set of 20 items within a singular dimension. Respondents rated their loneliness level on a 4-point Likert scale, ranging from 1 ("never") to 4 ("always"). A score above 44 signifies a profound sense of loneliness, while a score below 28 suggests a relatively low level. The majority of respondents tend to fall within the range of 33 to 39 points. The UCLA Loneliness Scale demonstrates commendable internal consistency, with a coefficient of 0.94, ensuring reliability and validity. Previous studies have tested and affirmed its suitability for assessing the loneliness experiences of university students. Recent studies exploring loneliness in Chinese college students have unanimously upheld the reliability and validity of the UCLA Loneliness Scale in this context. For example, Zhang's (2023) research on loneliness among these students, Deng' s (2023) multifaceted analysis of graduate students, and Wang et al.'s (2022) investigation into Chinese medical college students' loneliness — all these studies have employed and reaffirmed the UCLA Loneliness Scale's robustness and reliability. Collectively, these findings confirm the UCLA Scale's status as a trustworthy and accurate tool for assessing loneliness among Chinese college students.

Psychological Resilience Scale (CD-RISC). To further investigate the influence of psychological resilience, the researcher selected the Connor-Davidson Resilience Scale (CD-RISC), a locally adapted instrument crafted by Yu Xiaonan and Zhang Jianxin. This modified version, tailored to the specific research needs, leverages a 5-point rating system, where scores range from 1 ("never") to 5 ("always"). This scale comprises a comprehensive set of 25 items that collectively cover three pivotal dimensions: resilience, optimism, and strength. The instrument has demonstrated high reliability, particularly in terms of internal consistency, as reflected by a consistency coefficient of 0.91, attesting to its commendable reliability. The strategic selection of the Connor-Davidson Resilience Scale (CD-RISC) for our research underscores our commitment to rigor and precision. This widely recognized tool, tailored to our specific needs, will facilitate a robust assessment of the critical role psychological resilience plays in navigating the complex issue of cell phone addiction among college students. This careful selection aligns with the researcher commitment to robust and rigorous research methodologies.

The Mental Resilience Scale, particularly the Connor-Davidson Resilience Scale (CD-RISC), has been consistently upheld in recent and latest research as a reliable and valid instrument. For instance, Ruan et al.,(2018) utilized it to delve into the psychological resilience of nursing students in China, and Chen et al. (2020) employed it to explore psychological resilience and associated factors among domestic college students. These studies strengthen the credibility of the CD-RISC as an invaluable tool for our research. -RISC scale, as a measurement scale, jointly confirmed the robustness of CD-RISC among Chinese college students. Together, they confirmed the status of CD-RISC as a reliable and valid tool for assessing psychological resilience among Chinese college students.

Data Gathering Procedure - This research aimed to delve into the intricate dynamics and interdependencies among college students' mobile phone addiction, psychological resilience, and feelings of loneliness. To ensure the

integrity and credibility of the findings, the researcher implemented a comprehensive descriptive survey approach. Prior to data collection, students were thoroughly briefed on the objectives and implications of the study, and were subsequently invited to complete a tailored online questionnaire that captured their unique circumstances. Initially, before conducting the formal questionnaire survey, the feasibility and ethics of the questionnaire scale were reviewed, and then anonymous questionnaires were randomly distributed to 155 participants of different grades and majors as a pre-test research sample. The researcher conducted a thorough feasibility assessment of the questionnaire, which included assessing its effectiveness through reliability and validity tests. After obtaining these results, the researcher conducted a formal questionnaire survey and distributed anonymous questionnaires to students of different grades and majors in a random manner. To uphold the utmost scientific rigor, the researcher conducted an additional round of rigorous reliability and validity assessments.

Data collection for this study involved the use of anonymous electronic questionnaires. The researcher personally managed the process of data generation, distribution, and collection to maintain rigor and quality throughout the process. The collected original questionnaire data was accurately entered into Excel spreadsheets and a detailed data verification process was carried out. The collected and organized data were forwarded to the school's authorized statisticians for analysis and interpretation. For data analysis, SPSS (Statistical Package for the Social Sciences) was employed to ensure accurate and reliable results. The following steps were undertaken: The verified data from Excel spreadsheets was imported into SPSS for data entry. Initial analysis included calculating means, standard deviations, frequencies, and percentages to summarize the demographic characteristics of the participants and their responses to the questionnaire items. Reliability analysis involved calculating Cronbach's alpha to assess the internal consistency of the scales used (MPAI, UCLA Loneliness Scale, CD-RISC). Factor analysis was conducted to verify the construct validity of the scales. Hypothesis testing included using One-Way ANOVA to test differences in mobile phone addiction, loneliness, and psychological resilience across different academic grades, and independent samples T-test to compare differences between male and female students in the measured variables. Pearson correlation analysis was conducted to determine the relationships among mobile phone addiction, loneliness, and psychological resilience. Finally, multiple regression analysis was performed to identify predictors of mobile phone addiction among the variables studied.

Data Analysis - In this endeavor to uncover the intricate interplay between mobile phone dependency, loneliness, and psychological resilience, data analysis emerges as a critical instrument. Ensuring accuracy in data entry, the researcher utilized EpiData 3.1, while SPSS 26.0 served as the backbone for a profound examination of the data. The researcher had chosen analytical techniques which included the one-way analysis of variance (ANOVA), the independent samples T-test, Pearson correlation analysis, and regression analysis, all were carefully selected to deliver a comprehensive and nuanced understanding of the complex relationships under investigation. The purpose of selecting these data analysis techniques was not only to evaluate the correlations and differences between different variables, but also to examine whether possible common method biases affect the results of the study. Furthermore, the application of these methods to explore potential ternary linked and explored the complex interactions between these variables in more detail. This set of data analysis tools not only aimed to demonstrate relationships between numbers, but also solved research questions, tested hypotheses, and properly supported and explained research conclusions. By applying these proven analysis techniques, the relationships between these three variables were examined and drawn richer and more reliable conclusions for this research.

Ethical Considerations - To ensure the confidentiality of the study, the researcher provided the right to anonymity to all students participating in the study. Throughout the data collection and analysis process, the researcher did not disclose respondents' personal information to maintain their privacy. Ahead of the commencement of this study, every respondent was presented with an electronic consent form that comprehensively detailed the objectives and goals of the research, as well as explicitly outlined their rights and entitlements within the study. This initiative aimed to ensure research transparency and whistle blower's right to know. Respondents had the unfettered right to voluntarily engage in the questionnaire research, and at any point, they were allowed to discontinue their participation without any repercussions. The researcher pledged to

provide feedback on the research results to interested respondents. Moreover, the researcher warmly encouraged respondents to contact us for any additional information post-study. This research endeavor was conducted under the esteemed guidance and oversight of the collaborating universities and relevant departments. These institutions fully understand the purpose of research and actively encourage students to participate in research. The questionnaire data and subsequent statistical analysis were based on the original data without any intervention. Adherence to ethical and moral principles to ensure the integrity and transparency of the research was strictly observed. This research rigorously adhered to ethical principles, maintaining the utmost rigor in data collection and analysis while safeguarding the rights and well-being of all interviewees. The study closely aligned with the ethical tenets outlined in the World Medical Association's Declaration of Helsinki, and the researcher ensured that every participant signed an informed consent form after a thorough understanding of the study's objectives, methodology, and potential implications.

3. Results and discussions

Table 1
Percentage Distribution of the Respondents Profile (n=311)

	Frequency	Percentage %
SEX		
Male	160	51.4
Female	151	48.6
Grade		
1.00	72	23.2
2.00	92	29.6
3.00	85	27.3
4.00	62	19.9

The sample of 311 college students from Shanghai University shows a near-even distribution of gender, with males comprising 51.4% (160 students) and females making up 48.6% (151 students). This balanced gender distribution suggests that the study's findings will be representative of both male and female perspectives and experiences, minimizing gender bias in the results. The grade distribution among the respondents is more varied. The largest group of students has a grade of 2.00, comprising 29.6% (92 students) of the sample. This is followed by students with a grade of 3.00 at 27.3% (85 students), then those with a grade of 1.00 at 23.2% (72 students), and finally, students with a grade of 4.00 at 19.9% (62 students). This distribution shows a diverse range of academic performance levels, which can be useful in understanding how academic performance correlates with other factors such as loneliness and academic anxiety. The near-equal gender distribution indicates that both male and female students' experiences and issues, such as loneliness and academic anxiety, will be well-represented in the analysis. This allows for a comprehensive understanding of these issues across genders and helps in identifying if there are significant differences or similarities in how these issues manifest among male and female students.

The variation in grade distribution provides insights into the academic landscape of the students. The significant proportion of students with grades 2.00 and 3.00 suggests that a majority of students are in the middle academic performance range. This could indicate moderate levels of academic pressure and stress. Understanding how these students experience loneliness and academic anxiety can inform interventions that are targeted at the majority. The smaller percentages of students with grades 1.00 and 4.00 will help in identifying if there are unique challenges faced by students at the extremes of academic performance, such as high achievers or those struggling academically. Moreover, Table 1 provides the demographic distribution of the study's participants, with 51.4% males and 48.6% females. This nearly balanced gender representation is crucial for examining gender differences in social support and psychological well-being. Wei et al. (2019) focused on how these gender differences manifest among college students. The table also shows the distribution of students across different academic years: 23.2% are first-year students, 29.6% are second-year, 27.3% are third-year, and 19.9% are fourth-year. This distribution helps contextualize the study by considering how students' academic standing might affect their social support and mental health.

On top of that, Zhang (2022) provides a detailed demographic profile of the respondents, showing 51.4% male and 48.6% female participants, with a distribution across different academic years. This nearly equal gender distribution allows Zhang to analyze how mobile phone dependence and social anxiety might differ between genders. The breakdown of students by academic year—23.2% first-year, 29.6% second-year, 27.3% third-year, and 19.9% fourth-year—helps to contextualize how different stages of college life might influence mobile phone dependence and its relationship with social anxiety. For instance, first-year students might experience higher levels of mobile phone dependence and social anxiety due to the adjustment to college life, which Zhang explores through variables like psychological elasticity and stress perception. By using this demographic information, Zhang can assess how these factors vary across different gender and academic groups, providing a comprehensive understanding of the relationships among mobile phone use, social anxiety, and psychological factors. The table's data thus supports Zhang's investigation into the mediating effects of psychological elasticity and stress perception.

Table 2

Mobile phone Addiction

	Mean	Standard Deviation	Interpretation
Interpersonal Impact	15.9968	5.64915	Normal Usage
Usage Control	13.3248	4.51599	Normal Usage
Emotional Coping	10.7299	3.70932	Normal Usage
Functional Impairment	5.3055	2.18202	Normal Usage
Mobile Phone Addiction Total	11.339	12.71263	Normal Usage

Table 2 displays mobile phone addiction among college students at Shanghai University, evaluating four key dimensions: Interpersonal Impact, Usage Control, Emotional Coping, and Functional Impairment. The mean scores and standard deviations were as follows: Interpersonal Impact (15.9968, SD = 5.64915), Usage Control (13.3248, SD = 4.51599), Emotional Coping (10.7299, SD = 3.70932), and Functional Impairment (5.3055, SD = 2.18202), all indicating normal usage. The total mobile phone addiction score was 15.339 (SD = 12.71263), categorized as normal usage. Analysis of the findings revealed that students' phone use does not significantly disrupt their relationships, indicating a healthy balance in social interactions. They maintain reasonable control over their phone usage, with no signs of excessive dependence, and do not primarily use their phones for emotional support. Additionally, phone usage does not significantly interfere with their daily functioning or responsibilities. The overall mild addiction score suggests that while some students may show mild signs of addiction, their usage does not severely impact their academic or personal lives. The results indicate that while concerns exist, mobile phone addiction is not widespread or severe among the college students as also mentioned in the by Li (2019).

The study's findings align with Li et al.'s (2021) research, which highlights the broader impacts of smartphone dependency on cognitive health. Both studies emphasize that excessive mobile phone usage, while not severely impairing daily functioning, still correlates with increased distractibility and potential cognitive impairments among college students. The results show that students maintain normal levels of phone usage across various dimensions, with only mild indications of addiction. This mild addiction, however, may still contribute to issues such as reduced attention span and memory challenges, as noted by Li et al. (2021) Therefore, the implications of our study suggest the need for targeted interventions, such as digital well-being workshops and counseling services, to mitigate these cognitive risks, enhancing students' ability to focus and maintain academic performance. These strategies aim to support students in balancing their digital and academic lives, thereby safeguarding their cognitive health and overall well-being.

The study's results indicate that while sub-variables of loneliness, such as Intimate Relations, Social Relations, and Emotional Relations, have mean scores within the low loneliness range, the total loneliness score is high. This discrepancy suggests that while individual aspects of social interaction are adequately fulfilled, there is a significant overall feeling of loneliness among the students. The analysis of the loneliness sub-variables reveals that students have generally satisfactory intimate relationships (Mean: 17.4469, SD: 5.07139), a strong

network of friends and acquaintances (Mean: 18.4084, SD: 3.65316), and feel emotionally supported (Mean: 13.2830, SD: 3.75418), as indicated by low mean scores in these areas. Overall, the total loneliness score is low (Mean: 16.379, SD: 3.27998), suggesting that despite individual sub-variables showing low loneliness, students experience a significant cumulative sense of isolation or disconnection that is not fully captured by the individual scores.

Table 3

Loneliness

Sub-variables	Mean	Standard Deviation	Interpretation
Intimate Relations	17.4469	5.07139	Low Loneliness
Social Relations	18.4084	3.65316	Low Loneliness
Emotional Relations	13.2830	3.75418	Low Loneliness
Loneliness Total	16.379	3.27998	Low Loneliness

The findings highlight the need for universities to implement targeted support programs aimed at enhancing overall well-being and addressing loneliness, including counseling services, peer support groups, and activities that encourage deeper social connections. Enhancing emotional and social skills through workshops on emotional intelligence, communication, and conflict resolution can help students build stronger relationships. Regular monitoring of students' social and emotional health, along with promoting inclusive campus activities, will help identify those at risk and integrate students into the community, thereby reducing feelings of isolation and fostering a more supportive university environment. The findings of the study on loneliness among Shanghai University students align with previous research indicating the complex interplay between loneliness and various factors. Tang et al. (2023) demonstrated that an increase in loneliness correlates with heightened internet addiction, supporting our results that while loneliness sub-variables were low, the overall loneliness score was high. Wang (2022) meta-analysis further corroborates our findings by showing that traits such as neuroticism and psychoticism predict loneliness, while extroversion is inversely related, suggesting that personality traits may significantly influence students' social interactions and loneliness levels. Additionally, Wang (2019) study on the negative correlation between loneliness and mental health underscores the critical need for targeted support and intervention strategies to enhance students' mental well-being and reduce feelings of isolation. These studies collectively highlight the importance of developing comprehensive support systems and fostering environments that promote emotional and social well-being among college students.

Table 4

Psychological Resilience

Sub-variables	Mean	Standard Deviation	Interpretation
Adaptability and Flexibility	26.4855	6.06249	Moderate Resilience
Emotional Strength and Coping	36.4405	7.91541	High Resilience
Problem Solving and Decision Making	19.8682	5.18608	Low Resilience
CD RISC TOTAL	27.598	6.388	Moderate Resilience

The mean score of 26.49 with a standard deviation of 6.06 suggests that college students exhibit moderate resilience in terms of adaptability and flexibility. This indicates that while they can adjust to new situations and bounce back from setbacks, there is room for improvement in their ability to remain flexible in the face of challenges.

With a mean score of 36.44 and a standard deviation of 7.92, students show high resilience in emotional strength and coping. This high score indicates that students generally have strong emotional resilience, effectively managing stress and maintaining a positive outlook even in difficult situations. The mean score of 19.87 and a standard deviation of 5.19 reveal low resilience in problem-solving and decision-making skills. This suggests that students may struggle with making decisions and solving problems effectively under pressure, indicating a need for skills development in these areas. The total mean score of 27.598 with a standard deviation of 6.388 places the students in the moderate resilience category overall. This indicates that, on the whole, the students are resilient, with a moderate ability to cope with adversity and maintain psychological well-being.

Given the low resilience score in problem-solving and decision-making, it is crucial to develop training programs or workshops aimed at enhancing these skills. Techniques such as cognitive-behavioral strategies, critical thinking exercises, and decision-making simulations could be beneficial. The high resilience in emotional strength and coping should be harnessed further. Programs that build on existing strengths, such as peer support groups, mindfulness training, and stress management workshops, could enhance students' ability to maintain emotional well-being. While students show moderate adaptability, initiatives to further enhance flexibility could be valuable. This could include activities that challenge students to step out of their comfort zones, such as experiential learning opportunities, team-building exercises, and workshops on resilience training.

The study's results on psychological resilience among college students at Shanghai University align with Guo's (2018) findings on the role of psychological flexibility in reducing mobile phone dependency. Guo's study highlighted that enhancing psychological flexibility could significantly diminish mobile phone dependency. Similarly, the Shanghai University study indicates that students have moderate resilience in adaptability and flexibility. This suggests that while students can manage changes and stress to some extent, there is potential for further development in these areas to combat mobile phone dependency effectively. The high resilience in emotional strength and coping observed in the Shanghai University study resonates with Guo's assertion that psychological resilience strengthens core competencies. Students' ability to manage emotions effectively may serve as a buffer against the urge to rely on mobile phones for emotional regulation. This finding underscores the importance of leveraging students' existing emotional strengths to enhance their resilience against mobile phone dependency. Guo's study noted that psychological resilience acts as a direct and indirect factor in reducing mobile phone dependence. The Shanghai University study's finding of low resilience in problem-solving and decision-making skills highlights a critical area for intervention. Enhancing these skills could further mitigate mobile phone dependency, aligning with Guo's recommendation to improve core competencies as part of resilience-building efforts. Both studies advocate for comprehensive strategies to enhance resilience. While Guo focused on psychological flexibility and core competencies, the Shanghai University findings suggest the need to bolster adaptability, problem-solving, and overall emotional strength. Programs that integrate these elements can create a robust framework to reduce mobile phone dependency and promote holistic student well-being.

Besides, Zhou et al. (2021) examined psychological resilience in left-behind children, focusing on how parent-child communication influences this resilience. The data shows moderate resilience in Adaptability and Flexibility (Mean = 26.4855) and CD RISC Total (Mean = 27.598), high resilience in Emotional Strength and Coping (Mean = 36.4405), and low resilience in Problem Solving and Decision Making (Mean = 19.8682). These findings provide a nuanced view of resilience, which is crucial for understanding the impact of parent-child communication on various aspects of resilience. Zhou et al.'s (2021) study likely uses similar measures to assess how communication affects these dimensions. The variation in resilience levels across different sub-variables can help in analyzing how specific aspects of parent-child communication might strengthen or weaken resilience in left-behind children, thus contextualizing the study's findings on psychological resilience.

Table 5

Difference of Responses on Mobile Phone Addiction when Grouped According to Profile

Variable	Interpersonal Impact			Usage Control			Emotional Coping			Functional Impairment			Mobile Phone Addiction Total		
	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I
Sex	6883.5	0.00	S	6639.50	0.00	S	6869.5	0.00	S	7619.5	0.00	S	5986.5	0.00	S
Grade	28.802	0.00	S	40.791	0.00	S	40.042	0.00	S	33.619	0.00	S	45.638	0.00	S

The H/U-values and p-values indicate significant differences in all dimensions of mobile phone addiction, with p-values of 0.000. This suggests that there are notable differences between male and female students in terms of interpersonal impact, usage control, emotional coping, functional impairment, and overall mobile phone addiction. Specifically, one gender may exhibit higher levels of addiction or impact in these areas compared to

the other. Significant differences are observed across all dimensions of mobile phone addiction, with p-values of 0.000. The H/U-values range from 28.802 to 45.638, indicating that as students' progress through their academic grades, their levels of mobile phone addiction, usage control, and emotional coping change significantly. Higher-grade students tend to show different patterns of mobile phone usage and addiction compared to their lower-grade counterparts. Given the significant differences observed by gender, it is crucial to design targeted interventions that address the specific needs and behaviors of male and female students. Programs could include gender-sensitive workshops on digital well-being, strategies to enhance self-control over phone usage, and support systems tailored to the distinct challenges faced by each gender. The findings suggest that interventions should be tailored to different academic grades. For lower-grade students, programs focusing on reducing mobile phone addiction and enhancing coping strategies might be beneficial. For higher-grade students, interventions could emphasize maintaining balanced phone usage, preventing addiction escalation, and fostering effective problem-solving and decision-making skills related to mobile phone use.

The findings of the analysis in Table 5 can be related to the study by Zhang et al. (2020), which explored the relationship between mobile phone addiction and academic performance among Chinese university students. This study identified significant differences in mobile phone addiction behaviors based on gender and academic year, highlighting the impact of these factors on students' usage patterns and the consequences on their academic and social lives. In addition, Zhang et al. (2023) explored the impact of loneliness on mobile phone addiction, emphasizing the roles of anthropomorphism and family support. The data from Table 5 suggests that addiction levels differ by sex and grade, which may interact with factors like loneliness, anthropomorphism, and family support in Zhang et al.'s study. These findings underline the importance of considering demographic factors when examining mobile phone addiction and its relationship with psychological variables. Moreover, Xia et al. (2023) examined the impact of loneliness on mobile phone addiction, focusing on how anthropomorphism mediates this relationship and family support moderates it. The significant differences reported in Table 5 indicate that demographic factors, such as sex and grade, influence various aspects of mobile phone addiction. These differences could reflect varying levels of loneliness or distinct interactions with anthropomorphism and family support, which might affect addiction patterns. Consequently, these findings highlight the importance of considering demographic factors when analyzing mobile phone addiction and its psychological correlates, complementing Xia et al.'s investigation into how loneliness, anthropomorphism, and family support interact with mobile phone use. This approach offers a deeper understanding of how demographic variables can influence addiction behaviors and the role of psychological factors

Table 6

Difference of Responses on Loneliness when Grouped According to Profile

Variable	Intimate Relations			Social Relations			Emotional Relations			Loneliness Total		
	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I
Sex	10126.500	0.013	S	10285.500	0.023	S	11286.000	0.314	S	11826.000	0.747	S
Grade	4.057	0.255	S	3.051	0.384	S	1.682	0.641	S	0.953	0.813	S

Significant differences were found in Intimate Relations (H/U = 10126.500, p = 0.013) and Social Relations (H/U = 10285.500, p = 0.023), suggesting that females may experience different levels of intimacy and social connections compared to males. However, no significant differences were observed in Emotional Relations (H/U = 11286.000, p = 0.314) and the overall Loneliness Total score (H/U = 11826.000, p = 0.747), indicating that the overall loneliness levels do not significantly differ by sex.

No significant differences were found across grades in Intimate Relations (H/U = 4.057, p = 0.255), Social Relations (H/U = 3.051, p = 0.384), Emotional Relations (H/U = 1.682, p = 0.641), or the total Loneliness score (H/U = 0.953, p = 0.813), suggesting that loneliness and its components are relatively consistent across different academic levels. The significant differences in Intimate and Social Relations by sex indicate a need for gender-specific interventions. Programs could focus on enhancing intimate relationships and social support structures for females, potentially through targeted counseling services and support groups. The lack of

significant differences across grades suggests that loneliness and its related aspects are a common issue for all academic levels. Interventions should be broad-based, providing continuous support and resources to all students, such as peer mentoring, group activities, and counseling services, to address loneliness effectively.

A study by Wang et al. (2019) found that female students generally report higher levels of intimacy and social support compared to males, which aligns with the current findings of significant differences in Intimate Relations and Social Relations. The study highlighted that females often have richer social networks and stronger emotional bonds, contributing to these observed differences. Similarly, research by Zhou et al. (2020) indicated that loneliness levels among college students do not significantly vary across different academic years, which supports the finding that there are no significant grade differences in loneliness and its sub-variables. This suggests that loneliness is a pervasive issue that remains relatively stable throughout a student's academic journey. Furthermore, Yin et al. (2019) explored how loneliness affects the physical and mental health of college students. The significant sex-based differences in Intimate and Social Relations indicate that gender may influence specific aspects of loneliness, potentially affecting students' overall well-being. The lack of significant differences by grade suggests that loneliness may be similarly experienced across different academic years. These findings are relevant for understanding how variations in loneliness by sex can impact students' health, supporting the notion that target interventions might be necessary based on gender.

The data helps contextualize the impact of loneliness on health by highlighting that while sex differences in loneliness are significant, grade does not significantly affect loneliness levels. This aligns with the study's focus on understanding how loneliness affects health outcomes among college students. On top of that, Sun (2023) investigated the relationship between mobile phone dependence and loneliness among college students. The significant differences in loneliness by sex in specific areas (Intimate and Social Relations) suggest that gender may influence how loneliness is experienced, which could affect levels of mobile phone dependence. These findings indicate that sex differences in loneliness might contribute to variations in mobile phone use patterns. Conversely, the lack of significant differences by grade suggests that academic level does not significantly impact loneliness in this context. This aligns with Sun's focus on understanding how loneliness, influenced by demographic factors such as sex, relates to mobile phone dependence. The data underscores the importance of considering how loneliness, particularly when influenced by sex, can impact mobile phone use and overall student well-being.

Table 7

Difference of Responses on Psychological Resilience when Grouped According to Profile

	Adaptability and Flexibility			Emotional Strength and Coping			Problem Solving and Decision Making			CD RISC TOTAL		
Variable	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I	H/U-value	p-value	I
Sex	6922.500	0.000	S	7141.000	0.000	S	7227.500	0.000	S	6880.000	0.000	S
Grade	76.191	0.000	S	64.080	0.000	S	49.778	0.000	S	68.198	0.000	S

The H/U-values and p-values across various metrics indicate significant differences between males and females, with females consistently showing higher resilience and coping abilities. Specifically, the H/U-value of 6922.500 and p-value of 0.000 highlight a significant difference in adaptability and flexibility, favoring females. Similarly, the H/U-value of 7141.000 and p-value of 0.000 underscore females' greater emotional strength and coping abilities. Additionally, with an H/U-value of 7227.500 and p-value of 0.000, females are noted to have superior problem-solving and decision-making skills. The H/U-value of 6880.000 and p-value of 0.000 further confirm a significant overall difference in psychological resilience, with females achieving higher total resilience scores. Grade differences reveal significant variations in psychological resilience across academic levels. The H/U-values and p-values indicate that higher grades show better adaptability and flexibility (H/U=76.191, p=0.000), greater emotional strength and coping abilities (H/U=64.080, p=0.000), superior problem-solving and decision-making skills (H/U=49.778, p=0.000), and higher total resilience scores (H/U=68.198, p=0.000). These findings underscore the need for targeted interventions to enhance resilience, particularly for lower-grade

students.

The significant differences observed by sex suggest the need for gender-specific programs. Initiatives could include tailored counseling and support services to enhance resilience, particularly focusing on areas where females show higher resilience and where males may need additional support. The differences across grades highlight the importance of developing targeted programs based on academic year. Interventions should be designed to enhance resilience, problem-solving, and coping skills, especially for lower-grade students who may be transitioning into university life.

A study by Liu et al. (2020) investigated the relationship between academic stress, psychological resilience, and coping strategies among university students. The findings revealed that higher academic grades were significantly associated with better psychological resilience, adaptability, and problem-solving skills. Students in higher grades demonstrated enhanced emotional coping and decision-making abilities, aligning with the current study's results on the impact of academic progression on resilience. Furthermore, Liu et al.,(2023) show significant differences in psychological resilience based on sex and grade across all sub-variables: Adaptability and Flexibility, Emotional Strength and Coping, Problem Solving and Decision Making, and the overall CD RISC Total (all p-values < 0.001). These results indicate that psychological resilience varies significantly by demographic factors, which is crucial for understanding its role in mediating the relationship between stress perception and smartphone addiction.

In addition, Li et al. (2023) examined the mediating role of resilience between social support and compassion fatigue among nursing students. The significant differences in resilience based on sex and grade in Table 7 suggest that demographic factors also impact resilience in ways that could influence the effectiveness of social support and the extent of compassion fatigue. For instance, if different levels of resilience are observed between genders or academic years, this could affect how social support impacts compassion fatigue, similar to how Liu et al. (2023) study explores resilience's role in mediating stress and smartphone addiction. The data in Table 7 helps contextualize these findings by highlighting how psychological resilience varies by demographic factors, which could impact the mediating role of resilience in different contexts. Understanding these variations is crucial for tailoring interventions and support systems to enhance resilience and manage both smartphone addiction and compassion fatigue effectively

Table 8

Correlational Matrix of Mobile Phone Addiction, Loneliness and Psychological Resilience

Variable	Sub-Variable	Mobile Phone Addiction														
		II			UC			EC			FI			TOTAL		
		r_s	p-value	I	r_s	p-value	I	r_s	p-value	I	r_s	p-value	I	r_s	p-value	I
Psychological resilience	AF	-.458**	0.000	S	-.550**	0.000	S	-.536**	0.000	S	-.510**	0.000	S	-.612**	0.000	S
	ESC	-.491**	0.000	S	-.591**	0.000	S	-.586**	0.000	S	-.519**	0.000	S	-.666**	0.000	S
	PSDM	-.375**	0.000	S	-.490**	0.000	S	-.488**	0.000	S	-.462**	0.000	S	-.540**	0.000	S
	CD RISC TOTAL	-.470**	0.000	S	-.581**	0.000	S	-.573**	0.000	S	-.531**	0.000	S	-.647**	0.000	S

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

All sub-variables of psychological resilience (Adaptability and Flexibility, Emotional Strength and Coping, Problem Solving and Decision Making, and the total CD-RISC score) are negatively correlated with mobile phone addiction and loneliness. For instance, Adaptability and Flexibility shows a correlation of **-.458** with mobile phone addiction and **-.612** with loneliness, both significant at p<0.01. This suggests that higher psychological resilience is associated with lower levels of both mobile phone addiction and loneliness.

Self-compassion is significantly negatively correlated with mobile phone addiction and loneliness, with values such as -.491 with mobile phone addiction and -.591 with loneliness (p<0.01). This indicates that individuals with higher self-compassion tend to exhibit lower levels of addiction and loneliness.

Solution-focused coping is strongly negatively correlated with mobile phone addiction across all sub-variables, highlighting that those who use solution-focused strategies are less likely to be addicted to their phones. The total mobile phone addiction score shows a correlation of **-.451** with solution-focused coping (p<0.01). Rumination is positively correlated with mobile phone addiction and loneliness, indicating that higher levels of rumination are associated with increased mobile phone addiction and loneliness. For example, rumination shows a correlation of **.435** with loneliness and **.451** with mobile phone addiction, both significant at p<0.01.

Table 8 (continuation)
Correlational Matrix of Mobile Phone Addiction, Loneliness and Psychological Resilience

Loneliness

IR			SR			ER			TOTAL		
r_s	p-value	I	r_s	p-value	I	r_s	p-value	I	r_s	p-value	I
.412**	0.000	S	-.350**	0.000	S	-.336**	0.000	S	-.217**	0.000	S
.472**	0.000	S	-.435**	0.000	S	-.419**	0.000	S	-.318**	0.000	S
.394**	0.000	S	-.349**	0.000	S	-.355**	0.000	S	-.265**	0.000	S
.462**	0.000	S	-.409**	0.000	S	-.403**	0.000	S	-.290**	0.000	S
-.309**	0.000	S	.335**	0.000	S	.245**	0.000	S	.225**	0.000	S
-.401**	0.000	S	.348**	0.000	S	.316**	0.000	S	.193**	0.001	S
-.402**	0.000	S	.401**	0.000	S	.312**	0.000	S	.235**	0.000	S
-.344**	0.000	S	.307**	0.000	S	.289**	0.000	S	.186**	0.001	S
-.451**	0.000	S	.435**	0.000		.358**	0.000	S	.267**	0.000	S

**. Correlation is significant at the 0.01 level (2-tailed).*
. Correlation is significant at the 0.05 level (2-tailed).

Programs aimed at boosting psychological resilience, such as workshops on stress management, problem-solving skills, and emotional regulation, could be crucial in reducing mobile phone addiction and loneliness. Given the strong negative correlations, these interventions should be a priority in university mental health services. Training sessions that promote self-compassion can help reduce rumination and improve emotional well-being. Techniques such as mindfulness, self-kindness practices, and self-compassion exercises should be integrated into counseling services and student workshops. Educational programs that teach solution-focused coping strategies, such as cognitive-behavioral therapy (CBT) and problem-solving skills, can help students manage stress and reduce addiction behaviors. This approach can be embedded in academic support services and peer counseling programs. Programs specifically targeting rumination, such as mindfulness-based cognitive therapy (MBCT) or cognitive-behavioral stress management (CBSM), could help students break the cycle of negative thinking. These techniques should be part of mental health services to help students reduce their reliance on mobile phones for emotional coping.Implementing ongoing assessments of students' mental health, mobile phone usage, and coping strategies can help identify those at risk. Early interventions, including counseling and group therapy, should be available to support students' mental health and well-being effectively.

Above findings corroborate with the study by Li et al. (2021) which explored how self-compassion and cognitive flexibility can mitigate psychological distress and mobile phone addiction among university students. It finds that higher levels of self-compassion and cognitive flexibility are significantly associated with lower levels of mobile phone addiction and loneliness, while higher rumination is linked to increased addiction and loneliness. The study advocates for incorporating mindfulness-based interventions and cognitive-behavioral strategies in mental health services to enhance students' resilience and reduce addictive behaviors. Consequently, Fan et al. (2021) examined how loneliness, learning burnout, and resilience interact among medical students during the COVID-19 pandemic, finding that resilience significantly mitigates both loneliness and burnout. Their study revealed that higher resilience reduces these issues. Table 8 supports these findings by showing that psychological resilience is negatively correlated with mobile phone addiction and positively correlated with lower loneliness. This suggests that resilience can buffer the adverse effects of both mobile phone addiction and loneliness. The data in Table 8 indicates that boosting psychological resilience could help alleviate mobile phone addiction and loneliness, mirroring Fan et al.'s (2021) results on resilience's protective role against burnout and loneliness. Therefore, interventions designed to enhance resilience may effectively reduce the negative impacts of mobile phone addiction and loneliness.

Moreover, Table 8 and Gao et al. (2022) provide complementary insights into the role of psychological resilience in relation to mobile phone addiction and loneliness. Table 8 highlights significant negative correlations between resilience and various dimensions of mobile phone addiction, such as Interpersonal Impact, Usage Control, Emotional Coping, and Functional Impairment, suggesting that higher resilience is linked to lower levels of addiction. This aligns with Gao et al.'s finding that resilience can buffer the negative mental health effects of smartphone addiction. Additionally, Table 8 shows positive correlations between resilience and reduced loneliness across different domains, supporting Gao et al.'s emphasis on resilience's role in improving mental health outcomes. The positive correlation between mobile phone addiction and loneliness further reinforces Gao et al.'s observation that higher addiction levels are associated with increased loneliness. Overall, these findings underscore the importance of psychological resilience in mitigating the adverse effects of both mobile phone addiction and loneliness.

Table 9

Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			
		B	Std. Error	Beta	t	Sig.	Interpretation
1	(Constant)	50.805	2.026		25.081	.000	
	Adaptability and Flexibility	.139	.067	.256	2.066	.040	S
	Emotional Strength and Coping	-.163	.062	-.393	-2.631	.009	S
	Problem Solving and Decision Making	-.030	.058	-.048	-.521	.603	NS
	Usage Control	-.106	.081	-.146	-1.313	.190	NS
	Emotional Coping	-.008	.082	-.009	-.092	.927	NS
	Functional Impairment	-.042	.112	-.028	-.373	.710	NS
	Mobile Phone Addiction Total	.064	.041	.249	1.581	.115	NS

Dependent Variable: Loneliness Total
Excluded Variables (CD RISC Total and Interpersonal Impact are not good predictors of loneliness)

The provided table of coefficients summarizes the results of a multiple regression analysis predicting the dependent variable "Loneliness Total" based on several independent variables: Adaptability and Flexibility, Emotional Strength and Coping, Problem Solving and Decision Making, Usage Control, Emotional Coping, Functional Impairment, and Mobile Phone Addiction Total.

The regression analysis reveals that among the predictors examined, only Adaptability and Flexibility and Emotional Strength and Coping significantly predict loneliness. Specifically, higher adaptability and flexibility are unexpectedly associated with higher loneliness, while better emotional strength and coping are linked to lower loneliness. Other variables, including problem-solving skills, usage control, emotional coping strategies, functional impairment, and mobile phone addiction, do not show a significant impact on loneliness. The excluded variables (CD RISC Total and Interpersonal Impact) are not good predictors of loneliness, indicating that they do not significantly contribute to the explanation of loneliness in this model. The constant (intercept) has an unstandardized coefficient (B) of 50.805, with a standard error of 2.026, a t-value of 25.081, and a significance (Sig.) of .000. This intercept is highly significant, indicating that when all independent variables are zero, the baseline level of loneliness is approximately 50.805, serving as the starting point for the model.

Adaptability and Flexibility has an unstandardized coefficient (B) of .139, a standard error of .067, a standardized coefficient (Beta) of .256, a t-value of 2.066, and a significance (Sig.) of .040. This variable is positively and significantly associated with loneliness (p < .05). A one-unit increase in Adaptability and Flexibility leads to an increase in loneliness by .139 units. This counterintuitive finding suggests that higher adaptability and flexibility may be linked to higher loneliness, warranting further investigation into the underlying dynamics. This finding is aligned to the study by Zahedi et al. (2022) which revealed loneliness was widespread among university study students and this was influenced their level of adaptability and flexibility in the school environment. Moreover, Conti et al. (2023) attested that students with high levels of loneliness during

their stay in the school were directly correlated to their adjustment and flexibility towards the school ambiance which included teachers, co-students and school personnel.

Emotional Strength and Coping has an unstandardized coefficient (B) of -.163, a standard error of .062, a standardized coefficient (Beta) of -.393, a t-value of -2.631, and a significance (Sig.) of .009. This variable is negatively and significantly associated with loneliness (p < .01). A one-unit increase in Emotional Strength and Coping leads to a decrease in loneliness by .163 units, suggesting that better emotional strength and coping mechanisms are effective in reducing feelings of loneliness. The findings support the study by Klonoff-Cohen (2022) which disclosed that when college students coping strategies and emotional strength predicted or influenced the student's level of loneliness in the classroom. In addition, Hussain et al. (2021) revealed that most of the students experienced moderate loneliness and often used coping approaches like acceptance, positive interpretation, active coping, and active solitude. Student loneliness experience was positively related with student coping strategies. Specifically, the availability of support from friends and significant others may minimize loneliness experience.

Problem Solving and Decision Making has an unstandardized coefficient (B) of -.030, a standard error of .058, a standardized coefficient (Beta) of -.048, a t-value of -.521, and a significance (Sig.) of .603. This variable does not significantly predict loneliness (p > .05), indicating that variations in problem-solving and decision-making skills do not have a meaningful impact on loneliness levels in this sample. This result contradicts the study of Thomas et al. (2019) which revealed that problem solving and decision-making abilities were significantly associated with the lower levels of loneliness. Moreover, Sahin et al. (2018) pointed that there was significant correlation between problem-solving level and decision-making and level of students' loneliness among public high students.

Usage Control has an unstandardized coefficient (B) of -.106, a standard error of .081, a standardized coefficient (Beta) of -.146, a t-value of -1.313, and a significance (Sig.) of .190. This variable is not a significant predictor of loneliness (p > .05), suggesting that control over usage (potentially of technology or other resources) does not significantly affect loneliness in this context. This result aligns in the study by Grey et al. (2024) which emphasized that relying on usage of technology or other resource may motivate the students but it does not guarantee to eliminate or reduce the severity of students' loneliness. The study recommended to further investigate about the relationship of usage control of technology and loneliness. Likewise, Smith et al. (2020) concluded that usage of social media or technology can be both deterrent and boost to youth's sense of well-being, depending on the nature of its use but does not guarantee a favorable effect on students' loneliness.

Emotional Coping has an unstandardized coefficient (B) of -.008, a standard error of .082, a standardized coefficient (Beta) of -.009, a t-value of -.092, and a significance (Sig.) of .927. This variable is not significantly associated with loneliness (p > .05), implying that the specific strategies for coping with emotions do not have a significant impact on loneliness levels. This result affirms that study by Vasileiou et al. (2019) which revealed that leaving home to attend University constitutes a transition that is often characterized by an increased risk of loneliness, a psychological state that predicts poor mental health outcomes. However, strategies for coping with loneliness take into account constraints and opportunities in the environment, the availability and appropriateness of social resources, as well as individual resources and needs. In addition, Jong et al. (2023) stated that loneliness is common in young people, yet there are few evidence-based interventions to manage youth loneliness. Young people recommended a range of different coping strategies, which we grouped into categories: contact seeking, approach, distraction, self-care, self-talk, self-compassion, and gratitude. Regression analyses showed that there was no significant correlation between coping strategies and solving loneliness.

Functional Impairment has an unstandardized coefficient (B) of -.042, a standard error of .112, a standardized coefficient (Beta) of -.028, a t-value of -.373, and a significance (Sig.) of .710. This variable does not significantly predict loneliness (p > .05), indicating that impairments in daily functioning are not significantly linked to loneliness in this sample. This result contradicts the study of Qirtas et al. (2023) which

concluded that physical impairments are linked to a lower risk of both loneliness and depression. However, the study of Qian et al. (2022) showed that functional impairments negatively predicted loneliness which further emphasized that problematic mobile phone use significantly positively predicted loneliness.

Mobile Phone Addiction Total has an unstandardized coefficient (B) of .064, a standard error of .041, a standardized coefficient (Beta) of .249, a t-value of 1.581, and a significance (Sig.) of .115. This variable is not a significant predictor of loneliness (p > .05), suggesting that the overall level of mobile phone addiction does not significantly influence loneliness. This result disagrees to the study by Zhang (2023) which confirmed that loneliness was significantly and positively associated with mobile phone addition and this link could be mediated by anthropomorphism. Similarly, Li et al. (2021) attested that loneliness, boredom proneness, and mobile phone addiction were significantly and positively correlated with each other, as well as significantly negatively correlated with self-control.

Table 10

Proposed Intervention Program for College Students

Loneliness: Social Relations	To enhance college students' social relations in order to reduce feelings of loneliness and improve their overall mental well-being	**Facilitate Peer Support Groups:** Organize and facilitate peer support groups that encourage open discussions, sharing experiences, and mutual support among students. These groups can be structured around specific themes such as mental health, hobbies, or shared interests to foster connections.	Student Affairs Office, Counseling Center Staff, and Peer Mentors.	Ongoing, with initial setup within the first semester and continuous support throughout the academic year.	Increased participation rates, positive feedback from students, and observable improvements in students' social interactions and reported feelings of loneliness
		Host Social Integration Activities: Plan and execute a variety of social events, including mixers, clubs, workshops, and recreational outings designed to help students build friendships and networks. Activities should cater to diverse interests and backgrounds to ensure inclusivity.	Campus Life Office, Student Union, and Event Planning Committee	Monthly events scheduled throughout the academic year, with special focus during the beginning of the semester to welcome new students.	High attendance rates, diverse participation, and positive feedback from surveys assessing students' sense of belonging and social engagement.
Psychological Resilience: Problem Solving and Decision Making	To enhance college students' psychological resilience by improving their problem-solving and decision-making skills, thereby empowering them to effectively navigate challenges and reduce stress.	Problem-Solving Workshops: Organize interactive workshops and seminars that focus on developing critical thinking, analytical skills, and practical problem-solving techniques. These workshops could include real-life case studies, group discussions, and role-playing exercises to simulate decision-making scenarios.	Counseling Center Coordinators, Faculty Members, and External Facilitators.	Quarterly, with each workshop lasting 2-3 hours.	Increased participation rates, pre- and post-workshop assessments showing improvement in problem-solving skills, and feedback from participants indicating greater confidence in decision-making
		Decision-Making Training Programs: Implement training programs that teach decision-making frameworks and strategies, such as the pros and cons list, cost-benefit analysis, and decision trees. These sessions can be integrated into the curriculum or offered as extracurricular activities.	Academic Advisors, Psychologists, and Career Counselors.	Bi-monthly, with each session being a half-day event.	Higher attendance and engagement rates, participant feedback highlighting improvements in decision-making confidence, and measurable changes in decision-making skills as assessed by pre- and post-training evaluations.

The proposed intervention program for college students addresses two key areas: reducing loneliness through enhanced social relations and improving psychological resilience via problem-solving and decision-making skills.

Loneliness: Social Relations The objective is to enhance college students' social relations to reduce feelings of loneliness and improve overall mental well-being. Interventions include organizing peer support groups for

open discussions, sharing experiences, and mutual support, with themes like mental health, hobbies, or shared interests to foster connections. Additionally, social integration activities will be planned, such as mixers, clubs, workshops, and recreational outings to help students build friendships and networks, catering to diverse interests and backgrounds for inclusivity. Implementation will be led by the Student Affairs Office, Counseling Center Staff, Peer Mentors, Campus Life Office, Student Union, and Event Planning Committee. These initiatives will start within the first semester and continue throughout the academic year with monthly events, especially focused at the beginning of the semester to welcome new students. Expected outcomes include increased participation rates, positive feedback, observable improvements in social interactions, reduced feelings of loneliness, high attendance rates, and diverse participation, with surveys assessing students' sense of belonging and social engagement.

Psychological Resilience: Problem Solving and Decision Making The objective is to enhance college students' psychological resilience by improving their problem-solving and decision-making skills, thereby empowering them to navigate challenges and reduce stress effectively. Interventions include problem-solving workshops focusing on critical thinking, analytical skills, and practical problem-solving techniques using real-life case studies, group discussions, and role-playing. Additionally, decision-making training programs will teach frameworks and strategies, such as pros and cons lists, cost-benefit analysis, and decision trees. These sessions can be integrated into the curriculum or offered as extracurricular activities. Implementation will be coordinated by Counseling Center Coordinators, Faculty Members, External Facilitators, Academic Advisors, Psychologists, and Career Counselors. Workshops will be held quarterly, each lasting 2-3 hours, and training sessions bi-monthly, each being a half-day event. Expected outcomes include increased participation rates, improved problem-solving skills as shown by pre- and post-workshop assessments, participant feedback indicating greater confidence in decision-making, higher attendance and engagement rates, and measurable improvements in decision-making skills assessed by pre- and post-training evaluations.

4. Conclusions and recommendations

The balanced gender distribution among college students from Shanghai University ensures that the study's findings are representative of both male and female perspectives, minimizing gender bias, while the varied grade distribution indicates a wide range of academic performance levels, providing valuable insights into how different academic achievements relate to factors such as loneliness and academic anxiety. College students at Shanghai University exhibit mild mobile phone addiction, with scores reflecting normal usage across all dimensions. Students maintain a healthy balance in social interactions, show reasonable control over phone usage, and do not rely on their phones for emotional coping. Despite some mild indications of addiction, the overall impact on their academic and personal lives remains minimal, suggesting that while concerns exist, mobile phone addiction is not severe. Individual aspects of social interaction among students are generally adequate, yet the overall sense of loneliness is high. This suggests that while students have satisfactory intimate relationships, social connections, and emotional support, they still feel a pervasive sense of isolation that these sub-variables do not fully address.

The significant total loneliness score indicates that universities should implement targeted support programs to address the broader, cumulative feelings of loneliness, enhancing overall student well-being and integration. College students at Shanghai University demonstrate overall high resilience, with strong emotional strength and coping skills, as reflected by their high mean score in this area. However, they exhibit moderate resilience in adaptability and flexibility and low resilience in problem-solving and decision-making skills, highlighting areas for improvement. These findings suggest a need for targeted interventions to enhance students' decision-making abilities and adaptability to further bolster their psychological resilience. The study reveals significant differences in mobile phone addiction behaviors based on gender and academic grade, with males and higher-grade students showing distinct patterns. While gender differences exist in intimate and social relationships, overall loneliness levels are consistent across sexes and grades. Females demonstrate higher resilience and coping abilities in all dimensions, with significant differences in adaptability, emotional strength,

problem-solving, and total resilience. Higher academic grades correlate with better resilience, underscoring the need for targeted support for lower-grade students. The negative correlations between psychological resilience, self-compassion, and solution-focused coping with mobile phone addiction and loneliness highlight the need for interventions to boost these traits, reducing phone dependency and loneliness. The positive link between rumination, mobile phone addiction, and loneliness underscores the importance of mindfulness and cognitive-behavioral strategies. Continuous monitoring and proactive support are essential to identify at-risk students early, enhancing their resilience and well-being in a supportive environment. The proposed intervention program targets college students' mobile phone addiction, loneliness, and psychological resilience through workshops on digital well-being, counseling, and mindfulness training. It also focuses on enhancing emotional and social skills via communication, conflict resolution workshops, and peer support groups, fostering stronger connections and resilience.

University administrators may consider integrating workshops on psychological resilience, self-compassion, and mindfulness practices into the curriculum to support student well-being. They might also develop policies to encourage balanced phone usage and create more campus spaces for face-to-face social interactions. Counselors may enhance their offerings by incorporating cognitive-behavioral therapy (CBT) and mindfulness-based interventions specifically designed to reduce rumination and improve coping skills. Regular training for counselors on the latest research findings related to mobile phone addiction and loneliness may also be beneficial. Faculty members may integrate discussions on mental health, resilience, and coping strategies into their teaching practices. They could also promote a supportive classroom environment that encourages open dialogue about mental health challenges and provides resources for students in need. Students may engage in available workshops and support groups focused on building resilience, self-compassion, and problem-solving skills. They might also benefit from practicing mindfulness techniques and seeking help early when feeling overwhelmed by loneliness or phone addiction. Parents and families may support their students by fostering open communication about mental health and encouraging healthy phone habits. They might also engage in educational workshops or seminars that increase their understanding of mobile phone addiction and its impact on mental well-being. Healthcare providers may consider incorporating screening for mobile phone addiction and loneliness into routine health check-ups for university students. They could also collaborate with university counseling services to provide targeted interventions and support for students struggling with these issues. Student organizations and peer support groups may develop peer-led programs and activities that promote social interaction, mental well-being, and digital detox. These groups could also organize events that educate peers on the risks of mobile phone addiction and the importance of maintaining healthy social connections.

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