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ORIGINAL RESEARCH

Perceived Social Mobility and Smartphone Dependence in University Students: The Roles of Hope and Family Socioeconomic Status

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Purpose: Drawing upon the cognitive-behavioral model of pathological Internet use (PIU) and tunnel effect, this study aimed to construct a moderated mediation model from the perspective of social ecology. Specifically, the model investigated the relationship between perceived social mobility and smartphone dependence, with a focus on the mediating role of hope and the moderating effect of family socioeconomic status (SES) underlying this relationship.

Methods: A cross-sectional study was conducted with 718 Chinese university students (M_{age} = 19.19, 70.2% female) from Beijing, Henan, and Tianjin, who anonymously filled out the Perceptions of Socioeconomic Mobility Scale, Mobile Phone Addiction Index Scale, Openness to the Future Scale, and family socioeconomic status questionnaire. Preliminary data analysis was executed using SPSS 22.0, and the moderated mediation effect was tested using the latent moderated structural equations approach in Mplus 8.3.

Results: The results showed that (a) less perceived social mobility was linked with greater smartphone dependence; (b) hope mediated the aforementioned relationship; and (c) family SES moderated the first-stage path of the indirect effect through hope. For university students with low (rather than high) family SES, their level of hope increased with the improvement of perceived social mobility, and in turn, that of smartphone dependence decreased.

Conclusion: These findings suggest that positive perceptions of upward social class mobility and hopeful attitudes toward future opportunities and personal development among disadvantaged university students may alleviate their reliance on smartphones. Researchers and policymakers should pay attention to the role of individuals' perceptions of the macro environment in motivating specific risky behaviors among university students. Future interventions are essential to mitigate pessimistic environmental perceptions and foster a sense of hope among university students.

Keywords: family socioeconomic status, hope, moderated mediation, perceived social mobility, smartphone dependence

Introduction

Smartphones have become an important tool to improve the convenience of individual lives due to their multifunctionality (eg, information collection and instant communication);[1] however, their overuse may evolve into a form of compulsive and problematic behavior when individuals lose control over smartphone use and suffer from impaired daily functions (ie, smartphone dependence).[2,3] A cross-sectional study of 1087 Chinese university students revealed that 4.05% of those were diagnosed as smartphone addicts, and 58.33% were possibly smartphone addicts.[4] Moreover, university students heavily immersed in smartphones experience a variety of maladaptive outcomes, such as a lower likelihood of excellent academic performance,[5] poor sleep quality,[6] and a higher level of academic procrastination.[7] Therefore, it is of great practical significance to explore the protective factors and potential formation mechanisms of smartphone dependence among university students.

Existing empirical investigations into the antecedents of smartphone dependence have predominantly focused on personal factors, including demographics (eg, level of education), personality traits (eg, conscientiousness), and psychological/emotional states (eg, loneliness).[8–13] Although it is widely acknowledged that social environment serves as both

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a risk and protective factor for the initiation, treatment, and prevention of addictive behaviors,[14] there remains insufficient attention to the social factors associated with smartphone dependence.[15] Currently, research mainly revolves around risk indicators, such as neighborhood social disorder, social digital pressures, and various life stress.[15–18] How university students perceive the social environment they live in (eg, social mobility) has been found to play a crucial role in shaping behaviors.[19,20] When individuals perceive high rather than low social mobility, they tend to have stronger self-motivation ability and participate in more adaptive behaviors conducive to the future.[21] In turn, the close link between social mobility and smartphone dependence seems possible; however, this issue needs further exploration. More importantly, why and how perceived social mobility influences smartphone dependence remains unclear. Therefore, the present study attempted to investigate the association between perceived social mobility and smartphone dependence in university students and further explored the mediating role of hope and the moderating role of family socioeconomic status (SES) in the above relationship.

Perceived Social Mobility and Smartphone Dependence

Perceived social mobility refers to an individual's subjective judgment of objective social mobility, ie, the individual's perception of the possibility of upward or downward mobility of social class.[22] In hierarchical societies, individuals are inspired to take full advantage of their personal resources and put forth effort to achieve upward mobility.[23,24] Thus, perceived social mobility may be one of the key factors determining the establishment of social beliefs and the development of behaviors in individuals.[25] For example, one study has shown that individuals perceiving higher levels of social mobility were more inclined to view society as fair and equitable and to believe that they can move up the income ladder through personal effort.[22] In addition, a cross-sectional study of adolescents conducted in Mexico found that those with higher perceptions of social mobility were less likely to exhibit problem behaviors such as alcoholism, detention, junk food consumption, fighting, or watching television for long periods; instead, they engaged in physical activities more frequently.[26] Similarly, perceiving society as highly mobile could weaken materialistic consumers' impulsive spending tendencies.[27]

The above empirical research indirectly supports that perceived social mobility has the potential to influence the self-regulation process, and individuals who perceive high mobility in social class may be better able to resist the attraction of current pleasures and temptations. The cognitive-behavioral model of pathological Internet use (PIU) emphasizes a more important role of cognition in PIU.[28] Cognition about the self and society (eg, perceived social mobility) provides individuals with a way of thinking to regulate their attitudes and behaviors toward the Internet. Maladaptive cognition makes individuals seek positive responses and need satisfaction from the Internet, thereby exacerbating a series of PIU symptoms and undesirable behaviors related to excessive time spent online.[28] Accordingly, adaptive cognition may play an opposite role and alleviate individuals' dependence on the Internet. Lu and Yeo conducted a survey of 1493 Malaysian university students and validated cognitive distortions, depression, loneliness, motivation, and stressful life events as significant predictors of PIU.[29] In a broad sense, both smartphone dependence and PIU refer to addictive behaviors of excessive use or abuse of Internet functions whose specific symptoms and characteristics are similar (eg, loss of control, withdrawal), except for the differences in the media tools they use. Therefore, based on the theory and relevant empirical research, it can be inferred that university students' positive cognition of social class mobility in general (ie, high levels of perceived social mobility) may reduce their tendency toward smartphone dependence; that is, there may be a significant negative correlation between perceived social mobility and smartphone dependence in university students.

The Mediating Role of Hope

Hope, as a key psychological resource,[30] refers to a positive motivational state that includes goal thinking that individuals exhibit about future growth and development.[31] The level of perceived social mobility directly determines whether individuals can combine their present actions with a better prospect for the future.[32] For instance, Jeon investigated the relationship between perceived social mobility and goal motivation and found that individual perceptions of social mobility, both for themselves and for society as a whole, were significantly positively associated with hope as a fairly general assessment of motivation to pursue goals.[33] Individuals who perceive greater social mobility tend to believe that they can find pathways to upward mobility and demonstrate stronger willingness and determination to achieve such

goals, so they may hold higher levels of hope for the future.[34] Moreover, applying the tunnel effect to the socioeconomic level, it can be seen that even though individuals know little about their future income, if some people in the interpersonal circle they belong to have improved their socioeconomic status at some point, the individual may then look forward to having such opportunities and derive satisfaction for a while from the upward mobility of others.[35] Thus, it can be inferred that the tunnel effect, which emphasizes the perception of personal opportunity through the situation of others, may also work when university students perceive higher upward mobility in social class, prompting them to be more hopeful about their future development.

In addition, hope, as an element of psychological capital, plays an important role in the realization of adaptive outcomes.[36,37] That is, hopefulness about the future can be a critical foundation for taking action to regulate personal behavior to pursue goals.[38] For example, primary school students with a heightened sense of hope were more willing to get involved in school activities, such as actively cooperating with group work.[39] Conversely, adolescents with low levels of hope may use smartphones to escape from the realities of their lives due to a lack of clear path and agency thinking required for goal achievement.[40] Furthermore, several studies have demonstrated hope to be positively related to the completion of substance addiction treatment.[41–43] For instance, Russo et al investigated patients who took part in treatment for alcohol and cocaine addiction and showed that hope mediated the association between self-transcendental value and psychological resilience in substance addicts.[43] In addition, upward social mobility beliefs may help individuals develop a hopeful mindset,[44] which in turn affects individual performance in academics and self-help.[45,46] In conclusion, hope may have a mediating effect on the relationship between perceived social mobility and smartphone dependence among university students.

The Moderating Role of Family SES

It is worth noting that although perceived social mobility is a favorable factor in terms of the hope of university students, this effect seems to be particularly pronounced in those with low family SES. Social mobility is generally understood as upward rather than downward mobility.[44,47] For individuals with high family SES, perceived social mobility does not improve their access to resources and their psychophysical features;[48] however, those with low family SES usually lack sufficient social support or alternative means to pursue stratum leap and thus are more dependent on the external environment,[25,49] including their perceptions of social mobility. Browman et al have demonstrated through correlational and experimental studies that among university students with low family SES, perceived higher social mobility was associated with greater persistence in the face of academic difficulties; however, academic persistence of those with high family SES did not vary along with the levels of perceived social mobility.[50] In addition, Browman et al proposed an integrated theoretical model of how economic inequality affects the behavior of low-SES instead of high-SES young people.[32] In view of the existing research, low-SES students may be more susceptible to the influences of perceived social mobility.

Prior research has shown that if individuals with low SES believe that society is fair and just, they are more willing to look to the future and struggle for long-range goals, and are more able to persevere even when faced with difficulties and setbacks; however, whether individuals of high SES believe in social justice does not affect their pursuit and adherence to long-term goals.[51] This suggests that the effect of perceived social mobility, which can reflect individuals' judgment on the degree of social fairness and justice to a certain extent,[51] on future hope may be potentially moderated by family SES. Furthermore, Browman et al found that low-SES students' perceptions of the possibility of achieving upward mobility influenced their academic intentions and performance by influencing their degree-oriented future identities.[52] On the basis of previous research, this study hypothesized the first-stage path of the indirect effect of perceived social mobility on smartphone dependence through hope is moderated by family SES. For university students with low family SES, perceived social mobility is a stronger predictor of hope, and hope plays a stronger mediating role between perceived social mobility and smartphone dependence.

The Present Study

This study aimed to construct a moderated mediation model (Figure 1) to explore why and under which condition perceptions of social mobility have a motivational role for undergraduates and inspire them to be full of expectations for

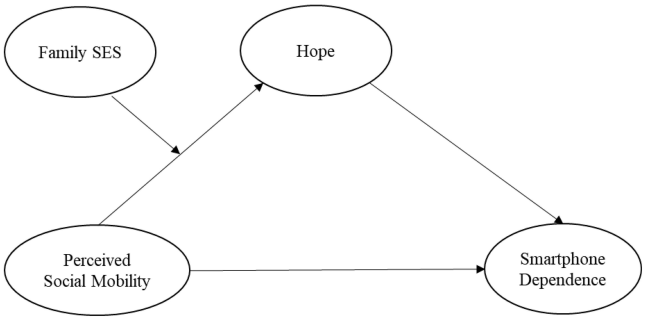

Figure 1 Hypothesized model.

future development and then to rationally plan and regulate their current behaviors to strive for better prospects. Three main hypotheses were examined.

H1: Perceived social mobility was negatively correlated with university students' tendency to become dependent on smartphones.

H2: The negative relationship between perceived social mobility and smartphone dependence was mediated by hope.

H3: The first-stage path of the indirect effect of perceived social mobility via hope was moderated by family SES.

Methods

Participants and Procedures

750 university students enrolled in a particular course were recruited from four universities in Beijing, Henan, and Tianjin utilizing the cluster sampling method. Following the acquisition of informed consent from both instructors and students, the online survey was collectively conducted during class sessions, with participating students who volunteered scanning the access link to the questionnaire. Data collection was completed between November 6th and 15th, 2021. In total, 718 valid questionnaires were collected by excluding 24 questionnaires that were not answered seriously and 8 questionnaires with outliers of hope according to plus or minus three standard deviations. Among them, there were 214 (29.8%) men and 504 (70.2%) women with an average age of 19.19 years (*SD* = 1.29). A total of 311 participants (43.3%) were only children, and 407 (56.7%) had siblings. The grade composition of the participants was 360 (50.1%) freshmen, 195 (27.2%) sophomores, 76 (10.6%) juniors, and 87 (12.1%) seniors. A post hoc power analysis was conducted using G*Power 3.1 to evaluate the current effective sample size for correlation analysis. With a total sample size set of 718 participants, a significance level of $\alpha = 0.001$, and an effect size of $r = -0.15$, the statistical power reached 0.83.[53] The procedures in this study adhered to the Declaration of Helsinki and received approval from Institutional Review Board of the authors' institution.

Measures

Perceived Social Mobility

The Perceptions of Socioeconomic Mobility Scale compiled by Browman et al was adapted to assess university students' level of perceived social mobility.[50] The scale consisted of six items, such as "People can do things different, but they can't really change their status in social". All items were assessed on a 7-point Likert scale (ranging from 1 = *strongly disagree* to 7 = *strongly agree*), of which three items were scored in reverse, such that higher scores reflected a higher likelihood of perceived upward or downward social mobility. The scale has been widely used in research about the perception of social mobility[52,54] and has demonstrated satisfactory reliability and validity among Chinese university students.[55] For the present study, confirmatory factor analysis showed good construct validity, and the measurement model fit well with the data, $\chi^2/df = 2.15$, TLI = 0.995, CFI = 0.998, RMSEA = 0.040, SRMR = 0.011. In addition, Cronbach's α for perceived social mobility was 0.876.

Hope

Three of the 10 items in the Openness to the Future Scale were used to measure hope.[56] The specific items included "I am very excited about future opportunities and challenges", "I have a lot of illusions and future plans", and "I feel hopeful about what the future may bring" with responses on a 5-point Likert scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*), such that higher scores indicate higher levels of hope. The scale has been extensively employed within both general and clinical adult populations with robust reliability and validity.[57–59] In this study, Cronbach's α for hope was 0.652.

Smartphone Dependence

Smartphone dependence in university students was assessed with the Mobile Phone Addiction Index Scale,[60] which included 17 items (eg, "You feel lost without your mobile phone") and four dimensions: inability to control craving, anxiety and feeling lost, withdrawal and escape, and productivity loss. The frequency of each item was rated on a 5-point Likert scale (1 = *not at all*, 2 = *rarely*, 3 = *occasionally*, 4 = *often*, and 5 = *always*), with higher scores indicating higher levels of maladaptive and intensive use of smartphones. The scale has been widely utilized for assessing problematic mobile phone usage among Chinese university students, with its reliability and validity confirmed.[61–63] In our samples, confirmatory factor analysis on the scale showed good construct validity, and the measurement model fit well with the data, $\chi^2/df = 3.99$, TLI = 0.925, CFI = 0.938, RMSEA = 0.065, SRMR = 0.054. These subscales also demonstrated acceptable internal reliability, with Cronbach's α values of 0.797, 0.852, 0.751, and 0.801, respectively.

Family Socioeconomic Status

Family socioeconomic status was measured in terms of annual household income and parental education.[64] This measurement approach has been adopted and validated in numerous empirical studies in China,[65–67] providing strong support for this study. Taking into account the situation of China's economy, annual household income was divided into 10 categories: "10,000 RMB and below", "10,000–30,000 RMB", "30,000–80,000 RMB", "80,000–150,000 RMB", "150,000–300,000 RMB", "300,000–500,000 RMB", "0.5–1 million RMB", "1–5 million RMB", "5–10 million RMB" and "more than 10 million RMB". Parental education was divided into 7 categories: "primary school or below", "junior middle school", "senior high school or technical secondary school", "junior college", "undergraduate college", "master's degree", and "doctorate". The above observation indicators were coded with scores of 1–10 and 1–7, respectively. Referring to Bradley and Corwyn,[68] the scores of annual household income, mother's education level, and father's education level were converted into standardized scores as the measurement indicators of family SES. The sum of the standard scores of these three measures is the composite score of family SES.

Data Analysis

Descriptive statistics and correlation analyses were performed using SPSS 22.0, and the moderated mediation model was tested using the three-step latent moderated structural equations (LMS) approach to obtain bias-corrected bootstrap confidence intervals in Mplus 8.3.[69,70] When constructing structural equation models (SEM), perceived social mobility, hope, smartphone dependence, and family SES were taken as latent variables, the corresponding items or dimensions of each variable were taken as observation indicators, and age and gender were included as control variables for data processing. Given the absence of commonly used model fit indices such as CFI, TLI, RMSEA, and SRMR in LMS, the first step of our analysis involved constructing a baseline SEM without the latent interaction term to assess model fit. In the second step, after confirming a satisfactory fit for the baseline model, we introduced the latent interaction term of perceived social mobility and family SES to establish a moderated mediation model. A log-likelihood ratio test was then conducted to examine whether the moderated mediation model fits the data better. In the third step, we examined whether there are indirect effects at different levels of family SES, and bias-corrected bootstrap confidence intervals with 1000 bootstrap samples were used to determine the significance of these indirect effects. Finally, we interpreted the moderating effect in essence by conducting a simple slope test at five levels (−2*SD*, −1*SD*, mean, +1*SD*, +2*SD*) of family SES and probed the moderating effect with the Johnson-Neyman approach.[71,72]

Results

Preliminary Analysis

The means, standard deviations, skewness, kurtosis, and Pearson correlation coefficients for the study variables are presented in Table 1. Perceived social mobility was positively correlated with hope and negatively associated with smartphone dependence and family SES. Moreover, hope was negatively correlated with smartphone dependence but not with family SES. In addition, there was no significant correlation between smartphone dependence and family SES.

Testing for Moderated Mediation Effect

The LMS method was employed to examine whether family SES moderates the indirect effect of perceived social mobility on smartphone dependence through hope among university students, aiming to provide a comprehensive understanding of how the incentive effects of perceived social mobility vary across different levels of family SES. Following the three-step procedure,[69,70] the first step was to estimate the structural equation model without the latent interaction term (Model 0). It showed that Model 0 fit the data well, with satisfactory fit indices: χ^2/df = 2.42, TLI = 0.960, CFI = 0.967, RMSEA = 0.044, SRMR = 0.048.

The second step was to estimate the structural equation model with a latent interaction term (Model 1) and use a log-likelihood ratio test to determine whether Model 1 fits better than Model 0. The statistic of a log-likelihood ratio test, called *D*, was calculated by multiplying −2 by the difference subtracting the log-likelihood value for Model 1 (−13,698.455) from Model 0 (−13,701.304), yielding a *D* value of 5.7 that was greater than the χ^2 critical value of 3.84 (df = 1, $p < 0.05$), which indicated that the moderated mediation model fit better. The specific unstandardized path coefficients are shown in Figure 2. The paths from perceived social mobility to hope ($\beta = 0.19$, 95% CI = [0.11, 0.28]) and to smartphone dependence ($\beta = -0.22$, 95% CI = [−0.31, −0.11]) were statistically significant; and the path from hope to smartphone dependence was negative and significant ($\beta = -0.17$, 95% CI = [−0.32, −0.04]). Moreover, there was a significant latent interaction effect of perceived social mobility and family SES on hope ($\beta = -0.12$, 95% CI = [−0.27, −0.01]).

The third step was to estimate the conditional indirect effect of perceived social mobility on smartphone dependence through hope at five levels of family SES (Table 2). When family SES was one standard deviation above the mean (+1*SD*), the indirect effect was not significant, with a value of −0.02 (95% CI = [−0.05, 0.01]), accounting for 8% of the total effect of −0.24 (95% CI = [−0.32, −0.13]). When family SES was one standard deviation below the mean (−1*SD*), the indirect effect was significant with a value of −0.05 (95% CI = [−0.11, −0.01]), accounting for 19% of the total effect of −0.27 (95% CI = [−0.36, −0.16]). Moreover, the index of moderated mediation was 0.02 (95% CI = [0.01, 0.07]), which also concluded that the indirect effects at various levels of family SES were statistically significantly different.

Then, the present study further examined the statistical significance of the unstandardized simple main effect of perceived social mobility on hope at five levels of family SES to illustrate the nature of the moderating effect.[71] The simple slope test showed that when family SES was one standard deviation above the mean (+1*SD*), the effect of

Table 1 Descriptive Statistics and Correlations Among Variables

Variables	1	2	3	4	5	6
1. Age	–					
2. Gender[a]	0.20***	–				
3. Perceived social mobility	0.01	0.05	–			
4. Hope	−0.12**	−0.01	0.25***	–		
5. Smartphone dependence	0.02	−0.02	−0.15***	−0.12**	–	
6. Family socioeconomic status	−0.02	−0.14***	−0.09*	−0.04	0.04	–
M	19.19	0.70	4.23	3.77	2.92	0
SD	1.29	0.46	1.14	0.67	0.74	2.49
Skewness	0.72	−0.89	−0.10	−0.44	0.17	0.41
Kurtosis	0.13	−1.22	0.21	−0.05	−0.37	−0.51

Notes: [a]Gender is dummy coded such that 0 = men and 1 = women. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

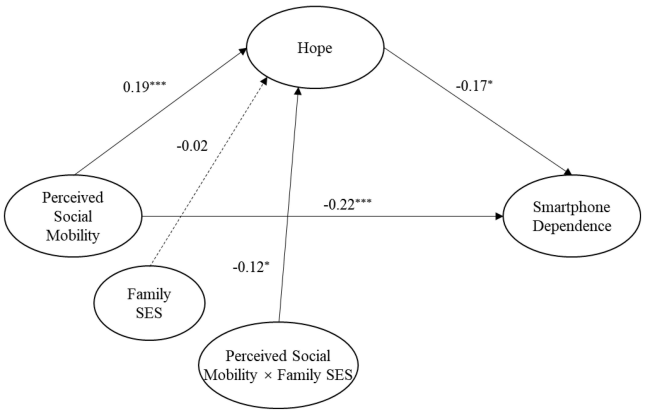

Figure 2 Moderated mediation model.
Notes: The control variables age and gender are not presented to simplify the model; the values shown are unstandardized coefficients. *$p < 0.05$. ***$p < 0.001$.

perceived social mobility on hope was not statistically significant ($\beta = 0.09$, 95% CI = [−0.06, 0.21]); when it was two standard deviations above the mean (+2*SD*), the effect remained no significant ($\beta = -0.01$, 95% CI = [−0.28, 0.20]). However, when family SES was one standard deviation below the mean (−1*SD*), the effect of perceived social mobility on hope was statistically significant ($\beta = 0.29$, 95% CI = [0.16, 0.45]); when it decreased to −2*SD*, the effect remained significant ($\beta = 0.39$, 95% CI = [0.18, 0.65]). Meanwhile, estimating the conditional main effects at five levels enabled the interaction effect to be graphically displayed with the Johnson-Neyman approach,[72] with the X-axis representing family SES and the Y-axis representing the unstandardized simple main effects (ie, perceived social mobility on hope). Figure 3 shows that the lower the level of family SES, the greater the role that perceived social mobility plays in promoting hope.

Discussion

In this study, individual internal and external factors were combined to comprehensively examine how they work together on smartphone dependence behaviors. Taking hope as the mediating variable and family SES as the moderating variable, a moderated mediation model was constructed, which not only shed light on the association between perceived social mobility and smartphone dependence among university students but also provided answers to the conditions under which the mechanism between perceived social mobility and smartphone dependence was more significant.

This study confirmed that perceived social mobility was negatively associated with smartphone dependence; in other words, the higher the degree of perceptions of social mobility of university students, the lower their tendency to indulge in smartphones, which enriches existing empirical research on the protective predictors of reducing smartphone dependence tendency.[73,74] It has been noted that perceived social mobility can affect a series of outcome variables ranging from individual abstract attitude toward society to individual actual behaviors.[25] More specifically, university students' positive subjective perceptions of objective socioeconomic mobility, especially upward mobility, are related to a wide variety of adaptive outcomes and provide them with a reference group to change social class and successfully

Table 2 Moderated Mediation Effect of Perceived Social Mobility on Smartphone Dependence Through Hope at Various Levels of Family SES

	Family SES	Effect	*SE*	95% CI
+2*SD*	1.65	0	0.02	[−0.04, 0.05]
+1*SD*	0.83	−0.02	0.01	[−0.05, 0.01]
Mean	0	−0.03	0.02	[−0.07, −0.01]
−1*SD*	−0.83	−0.05	0.02	[−0.11, −0.01]
−2*SD*	−1.65	−0.07	0.03	[−0.16, −0.02]

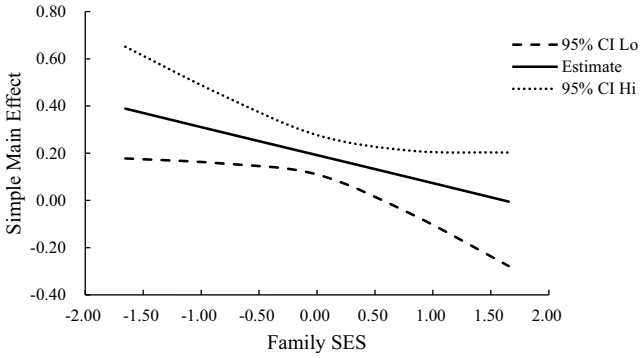

Figure 3 Unstandardized effects of perceived social mobility on hope at various levels of family SES.
Notes: 95% CI Lo=lower limit of bias-corrected bootstrap confidence interval; 95% CI Hi=upper limit of bias-corrected bootstrap confidence interval.

implement identity transformation.[75] Therefore, based on the life course of the reference group in the same social status before the class jump, the way for university students to change their destiny at the current stage is to rely more on accepting scientific and cultural knowledge and avoid the pursuit of the meaning of life being replaced by pleasure, for example, avoiding falling into feelings of emptiness by satisfying immediate psychological needs through social media such as smartphones. In addition, the cognitive-behavioral model proposes that cognitive distortion is an important risk factor for PIU, which will aggravate an individual's dependence on the Internet.[28] From the opposite point of view, this study extends this model to emphasize that individuals' adaptive cognition of the social environment can effectively reduce smartphone use and enhance subjective well-being, which can be used as a treatment for smartphone dependence and conforms to the methodological principle of adopting positive psychology techniques to cope with PIU.[76]

Perceived social mobility was not only directly related to the smartphone dependence of university students but also indirectly linked to their tendency through hope. This finding can be explained by the tunnel effect and pragmatic prospection theory. The tunnel effect works because the social class mobility of others provides better information about the external environment, such as changes in resource allocation and social structure, as well as the emergence of personal chances and challenges.[77] Receiving such signals leads to stronger positive affect experience[78,79] and greater levels of hope, diminishing concerns about one's future and career development. Thus, individuals perceiving higher social mobility are more likely to set targets for themselves to achieve higher social status, adopt problem-solving strategies to achieve goals and maintain hope for results during goal monitoring.[80] Especially for university students who are at the stage of forming a sense of meaning and becoming aware of who they want to be in the future, there is a need to keep expectations and dreams while also urging themselves to develop grounded plans and actions. As pragmatic prospection theory puts forward, individual thinking about the future guides actions, thus yielding ideal results.[81] Individuals with chronically high levels of hope are flexible thinkers who have many avenues to accomplish their aims and are motivated to seek out and engage in the best ways to reach their goals.[31] Therefore, university students who are hopeful about the future are usually self-controlled and goal-oriented, and inclined to engage in actual social and academic activities to satisfy their needs, rather than seeking short-term compensation in the virtual world by resorting to smartphone functions; thus, they are not prone to smartphone dependence.

The present study also revealed that the mediating role of hope between perceived social mobility and smartphone dependence was moderated by family SES. Specifically, the positive predictive effect of perceiving society as highly mobile on hope and the mediating effect were only significant for university students with low family SES. This result is similar to previous studies and contributes to the growing recognition that subtle psychological factors (eg, perceived social mobility) can influence the development of objectively disadvantaged university students.[50,52] In the process of growth, individuals with high family SES have abundant social and economic resources and have more opportunities to choose according to their own will and get material or psychological needs satisfied, so they tend to believe that the internal characteristics of individuals are the main factors that dominate behaviors or outcomes; whereas for individuals with low family SES, the scarcity of environmental resources or external opportunities prevents them from acting exactly

as they wish, so it is easy for them to believe that uncontrollable external factors determine the outcomes of life events.[49] Thus, individuals with low family SES are more susceptible to perceptions of the external environment, such as perceived social mobility, than those with high family SES.

Furthermore, beliefs about the variability of adverse social circumstances are the key drivers of compensatory behavior.[82] For students with low family SES, perceived social mobility reflects an important and powerful contextual cue that influences their psychological dispositions when facing challenges.[50] Specifically, the perception that social status is changeable can alleviate the hostility generated by low social positions and make individuals who are disadvantaged more likely to adopt effort-oriented strategies to achieve their goals,[83] be more resilient and persistent in the face of difficulties and challenges, and remain optimistic and hopeful about the future.[80] In other words, they have the motivation to directly address the source of their self-threat.[82] In addition, the predictive path from perceived social mobility to hope and the mediating effect of hope were not established among university students with high family SES. Although individuals tend to focus on upward social mobility,[44,47] for university students with high family SES, paying more attention to the crisis of downward social mobility may enable them to grasp available resources and strive to maintain existing advantages and social class compared to those who are less concerned about moving down the socioeconomic ladder. Future research is necessary to further refine the potential impact of perceptions of different types of social mobility among university students.[50]

Implications, Limitations, and Suggestions for Future Directions

These findings contribute to research on the social ecology of smartphone dependence by providing original evidence that perceived social mobility can serve as a protective social factor in reducing smartphone dependence among university students. Furthermore, these results add to the broader body of studies exploring the incentive effects of perceived social mobility, in which positive perceptions of the social environment stimulate individuals to trust, internalize, and eventually act in a manner that conforms to the prevailing social system. In addition, the mechanism of hope and family SES in the effect of perceived social mobility on smartphone dependence underscores the motivational effect of low-SES university students' perceptions of such uncontrollable external factors, mainly by boosting their positive expectations and level of hope for personal upward mobility, to then guide them to obtain social resources such as wealth, prestige and power through individual endeavors, instead of being addicted to the Internet and sticking to the status quo.

In practical terms, policymakers should pay close attention to the role of individual perceptions of the macro environment in motivating specific risky behaviors when formulating social welfare policies to enhance the standard of living and ensure the well-being of the population. Especially for university students facing disadvantaged circumstances, it is necessary to implement measures aimed at bolstering their resilience and sense of control to attenuate the negative impact of their pessimistic environmental perceptions and enhance their levels of hope, because individuals with low resilience and sense of control may be more susceptible to the adverse influences of the external environment.[84,85] Furthermore, educators could intervene externally to enhance the perceived social mobility of disadvantaged students, for example, by presenting different information or giving sufficient reasons to believe that everyone has a fair chance to achieve upward mobility.[27,82] Additionally, educators should encourage students to cultivate strong academic interests, increase their level of academic engagement, and foster the belief that higher education can empower them with greater autonomy in choosing their careers and transitioning their identities upon entering society. Under the impetus of such positive beliefs, the disadvantaged can actively regulate undesirable behaviors, such as smartphone dependence and sleep procrastination, while reinforcing adaptive behaviors that promote goal attainment.

There remain several limitations to be noted when interpreting these results. First, the cross-sectional design used in this study was insufficient to infer the directionality, temporal sequences, and causal logic of the relationship between variables. Future research could consider adopting longitudinal designs over extended periods or experimental manipulation paradigms to further elucidate the protective factors and underlying mechanisms contributing to smartphone dependence. Second, the gender ratio in the sample size of this study was unbalanced, with the number of women being far greater than men. Previous studies have suggested that women tend to use smartphones more than men to maintain social relationships and relieve social anxiety, potentially making them more susceptible to smartphone dependence.[86,87]

In this study, gender was treated as a control variable to mitigate its impact on the relationship between variables and improve statistical robustness. Future studies could further explore whether there are gender differences in the mediating effects observed in this study. Finally, this study mainly investigated university students' general perceptions of overall social class mobility, which entails a subjective assessment of the objective environment. Individuals who perceive themselves as more likely to achieve higher SES in the future tend to be more self-motivated, take more initiative, and engage in more self-regulation behaviors.[21,88] Therefore, future research is warranted to further examine whether future-oriented personal subjective social mobility exerts a stronger influence on university students' hope and smartphone dependence compared to general perceptions of social mobility, or whether general perceptions of social mobility first affect personal subjective social mobility to form a chain mediation model.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Statement

All procedures performed in this study complied with the Declaration of Helsinki and were approved by the Institutional Review Board of Beijing Normal University (No.202003260033). Informed consent was obtained from all participants before the survey.

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Disclosure

The authors declare no conflicts of interest.

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