

The Association Between Internet Use and Mental Health in Western China: The Mediating Role of Self-Evaluation

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Abstract. With the development of the internet, digital technology has become an integral part of life. The study is based on data from the 2022 China Family Panel Studies (CFPS). Focusing on residents in Western China, the study uses Ordinary Least Squares (OLS) and a mediating mechanism to examine the association between internet use and mental health, the potential mechanism of self-evaluation, and age heterogeneity. After controlling for gender, age, educational attainment, marital status, and urban-rural hukou status, the study finds that internet use is significantly associated with lower depression scores ($\beta = -0.318$, $p < 0.05$). The mechanism analysis shows that internet use is positively related to marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction. These dimensions also affect depression scores, with life satisfaction having the strongest effect. In the age analysis, the association between internet use and mental health is mainly observed among subjects below 60 years old ($\beta = -0.378$, $p < 0.05$). Therefore, the internet improves mental health by providing better standards and experiences, but the benefit varies by individuals.

Keywords: Internet use, mental health, self-evaluation, age heterogeneity, Western China

1. Introduction

Nowadays, the internet is an integral part of daily life. Information is disseminated through electronic devices, such as computers, mobile phones, and tablets. According to the International Telecommunication Union (ITU), 74% of the global population used the internet in 2025: an increase from 5.8 billion to 6 billion compared with 2024 [1]. Admittedly, the internet makes life convenient by providing digital payments, videos, online platforms, news, etc. However, its effect on users' physiological and mental health has drawn growing attention. Scholars have paid attention to the association between internet use and mental health.

The internet can be a double-edged sword: it promotes information spread and weakens users' attention and social interaction. Meanwhile, competitive life, study pressure, financial burden, and social expectations affect mental health, making people upset and depressed, which may lead to depression, anxiety, mania, etc. According to the World Health Organization (WHO), in 2021, one out of every seven people was likely to experience a mental disorder. 359 million people suffered from anxiety, 280 million from depression, and 37 million from bipolar disorder [2]. As people

depend more on the internet, the link between internet use and mental health has become an inevitable issue.

Researchers have found an association between internet use and mental health. Age heterogeneity can enhance precision, since older adults tend to use the internet less frequently than younger people and are often neglected by society. In China, population aging encourages scholars to focus on older adults. Moreover, because of the digital divide and uneven regional development, older adults in Western China may show different patterns of internet use and mental health. Thus, the study focuses on residents in Western China. It aims to examine how internet use affects their mental health, to identify possible mechanisms behind this effect, and to analyze whether the effect differs between older adults and the younger generation. To address these issues, the study aims to answer three research questions: (1) What is the association between internet use and mental health? (2) Does self-evaluation mediate this relationship? (3) Can findings based on Western samples be generalized to older adult populations?

2. Literature review

2.1. The association between internet use and mental health

Recent research has been unable to draw a simple conclusion about internet effects. On the positive side, internet use can benefit users' mental health by improving living standards, building social connections, or providing educational guidance. Older adults use electronic devices to connect with relatives and friends, gain health knowledge, and stay with children through opportunities brought by e-commerce [3, 4]. Younger adults use social media to get more online support, likes, or subscriptions, ask for help on online platforms, and prevent mental disorders through health education [5].

On the negative side, internet use may harm users' mental health due to excessive use and cybersecurity concerns. For example, using electronic devices for a long time causes attention deficit, social isolation, and sleep disorders [4]. Frequent use brings emotional exhaustion, appearance anxiety, and cyberbullying, which may cause anorexia nervosa, depression, anxiety, etc. [5].

2.2. Heterogeneity of the internet effect on mental health

2.2.1. Age heterogeneity

Age heterogeneity can be divided into teenagers, college students, and older adults. Teenagers are open-minded and curious because of their younger age. At the same time, they are more sensitive to the environment compared to other stages because of self-identity formation. As their nervous system develops, teenagers care more about peer feedback and acceptance, which makes them spend more time socializing and building self-identity via peer interaction [6].

In China, studies on college students often focus on the effect of internet use on academic results. The internet was classified into educational and recreational uses, with mental health as a mediator. The research found that educational internet users are less likely to be depressed than recreational users [7]. Recreational internet use harms mental health, which is counterintuitive. Possible explanations include students' academic pressure, family expectations, and career uncertainty.

When older adults are discussed, research focuses on medication care, physical and mental health maintenance, enhancement of health awareness, and frequency of contact with children, because

elderly people suffer from cognitive impairment and dementia [3]. After all, with heterogeneity and an aging population, older adults should be prioritized. It is important to recognize the challenges they face, such as the digital divide, limited telemedicine access, and insufficient health services.

2.2.2. Urban-rural heterogeneity

Chinese society is characterized by an urban-rural dual structure. Researchers commonly discuss the internet's effect on mental health around urban-rural differences. City residents are more likely to have access to recreational facilities, and engaging in preferred activities brings a sense of belonging, reduces loneliness, and promotes mental health. Rural residents face the digital divide and stereotypes. They are less likely to have access to the internet and electronic devices. Meanwhile, ideas like burden, uselessness, and illness negatively affect their mood. So, urban residents are more likely to feel a sense of belonging through internet use compared with rural residents [3]. The latter tend to focus on survival rather than quality of life. Declining physical function, undeveloped medical technology, and a lack of health awareness lead to a worse mood, contributing to mental disorders.

2.2.3. Regional heterogeneity

Different developmental levels across regions may contribute to heterogeneity. Poor areas usually face severe economic burden, insufficient professional counseling, outdated health equipment, and limited medical services. China's economic development shows a clear transition from prosperity in the east to relative poverty in the west. Even so, most studies still center on the general population and pay little attention to regional differences. Some studies have indeed looked at specific areas, but they mostly concentrate on the developed regions in eastern China. As a result, it is not appropriate to apply their findings to Western regions. Empirical analysis grounded in Western areas is therefore needed.

2.3. Mechanism of internet use on mental health

The way internet use affects mental health differs across groups. For instance, when researchers study teenagers, they often look at self-esteem, sense of security, and sense of control, all of which are closely tied to the environment and social expectations [6]. College students, by contrast, may become restless under study pressure and occupational stress. This negative mood then pushes them away from their family, which in turn worsens their negative emotions. For older adults, however, the mechanism may work differently. Because of the digital divide, older adults are less likely to go online. Their low online participation makes it easier for society to overlook them. The aging population makes research on this group especially important: they must cope with children leaving home and living independently, declining physical health, communication barriers caused by regional differences, and cognitive deterioration. These difficulties breed a sense of loneliness, which is a topic researchers often examine [3].

In addition, self-evaluation is a critical yet often overlooked mediator. Most prior studies have focused on loneliness, self-esteem, sense of security, and sense of control. Self-evaluation, which includes marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction, also constitutes an important dimension for analysis. They reflect social comparison orientation, self-esteem, and sense of control, which are pivotal to mental health outcomes.

2.4. Contributions

The effect of internet use on mental health varies across individuals due to different use purposes, use duration, and information acquisition ability. When online interactions are positive, they can ease loneliness, boost self-confidence, and cultivate a sense of control. When the content is negative and malicious, however, it may trigger depression, anxiety, and bipolar disorder. To provide useful advice, it is essential to strike a balance between internet use and mental health. Reducing the influence of sample heterogeneity is also indispensable, and age serves as a key dimension for classifying that heterogeneity. Admittedly, narrowing down sample representativeness does limit generalizability. Still, by offering targeted suggestions grounded in heterogeneous characteristics, the study can help ensure that internet use benefits mental health.

Given the limited research on Western China, the study focuses on older adults in poor and undeveloped areas, covering Xizang, Qinghai, Sichuan, Gansu, Yunnan, and Xinjiang. Considering insufficient infrastructure in western regions, marginal utility may be more pronounced. In this study, internet use serves as the independent variable, mental health (specifically depression) as the dependent variable, and self-evaluation as the mediator. On this basis, the study conducts its analysis and offers suggestions, identifying the challenges local people face and the improvements that may be possible.

3. Methodology

3.1. Source of data

The study uses data from the 2022 China Family Panel Studies (CFPS). The survey covers 25 provinces, cities, and autonomous regions in China. 16,000 households are interviewed in each wave, and respondents include all family members. The study is based on a self-administered questionnaire, which is for respondents aged 18 and above. For age heterogeneity, older adults are defined as those aged 60 years or older, following the WHO definition. Given the digital divide in Western China, the study focuses on residents of Xizang, Qinghai, Sichuan, Gansu, Yunnan, and Xinjiang. Furthermore, the interview adopts computer-assisted interviewing technology. CFPS satisfies diverse design requirements, which improves efficiency and ensures data quality.

In the basic regression results, the average age of respondents from the three regions and three prefectures is 47.49 years (standard deviation (SD) = 17.61), of whom 49.45% are female. For the age heterogeneity analysis, the young subsample (aged 18 to 59) consists of 5,182 observations, with an average age of 39.41 (SD = 12.05) and 49.07% female. The older subsample (aged 60 to 99) consists of 1,805 observations, with a mean age of 70.71 (SD = 7.58) and 50.53% female.

3.2. Measured variables

Internet use is the independent variable, which is a binary variable set by two questions in the survey: whether the respondent uses the internet via mobile devices and whether via computer, with Yes coded as 1 and No as 0.

Mental health is the dependent variable. The study uses eight questions from the Center for Epidemiologic Studies Depression Scale (CESD) to measure the level of depression among respondents. The questions ask about respondents' moods and behaviors that occurred during the past week, with the frequency of each experience scored accordingly. Respondents were given four choices: rarely or none of the time (less than 1 day), sometimes (1-2 days), occasionally (3-4 days),

and most or all of the time (5-7 days), with options coded 1 to 4, respectively. Two items ("feel happy" and "feel amused") were reverse-scored. The total score ranges from 8 to 32. Higher scores indicate more severe depression.

The study considers individual differences and regional heterogeneity, controlling for age, gender, marital status, educational attainment, and urban-rural hukou status. Age is a continuous variable to capture possible nonlinear relationships. Some variables are recoded: gender with Female coded 0 and Male coded 1; hukou status with non-agricultural hukou coded 0 and agricultural hukou coded 1; educational attainment with Illiterate and Semi-literate coded 0, primary coded 1, junior high coded 2, senior high coded 3, and college or above coded 4; marital status with no spouse coded 0 and having a spouse coded 1.

3.3. Statistical approach

The statistical work unfolded in four steps. First, the study ran descriptive analyses of the variables. Second, it employed an Ordinary Least Squares (OLS) linear regression model to estimate how internet use and mental health are associated in Western China. Third, it applied a two-step regression method to test the mediating effect of self-evaluation. Fourth, it brought age heterogeneity into focus by comparing older adults with younger ones.

4. Results

4.1. Descriptive analyses of variables

Tables 1 and 2 present the descriptive statistics for the variables. The mean age of respondents is 47.49. The mean value for internet use is 0.57. Since internet use is a binary variable, 57% of respondents use the internet, and 43% do not. 51% of respondents have attained education at the high school level or above. 81% of respondents hold agricultural hukou. In addition, the study recoded marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction into binary variables, with dissatisfaction coded as 0 and satisfaction as 1.

Table 1. Descriptive statistics for categorical variables

	category	frequency	percentage (%)
internet use	no = 0	3002	42.97
	yes = 1	3985	57.03
urban-rural classification	rural = 0	4152	60.07
	urban = 1	2760	39.93
educational attainment	illiterate/semi-literate or below = 1	1885	29.04
	primary school = 2	1328	20.46
	junior high school = 3	1714	26.41
	senior high school = 4	889	13.70
	college or above = 5	674	10.39
marital status	unmarried/divorced/widowed = 0	1564	24.93
	remarried / cohabiting = 1	4710	75.07

Table 1. (continued)

hukou status	agricultural hukou = 0	5335	80.88
	non-agricultural hukou = 1	1261	19.12

Note: All percentages are calculated using the valid sample size of each variable as the denominator. Missing values and invalid responses are excluded from the analysis. Therefore, the frequencies may vary across variables. For binary variables, 0 and 1 indicate the two categories of the respective variable.

Table 2. Descriptive statistics for continuous variables

variable	observations	mean	std. dev.	minimum	maximum
mental health	5728	14.381	4.270	8	32
marital satisfaction	6987	0.535	0.498	0	1
job satisfaction	6987	0.515	0.500	0	1
life satisfaction	6987	0.583	0.493	0	1
social status satisfaction	6987	0.258	0.437	0	1

Note: All percentages are calculated using the valid sample size of each variable as the denominator. Missing values and invalid responses are excluded from the analysis. Therefore, the frequencies may vary across variables. For binary variables, 0 and 1 indicate the two categories of the respective variable.

4.2. The association between internet use and mental health

Table 3 presents regression results for the association between internet use and mental health in Western China. The results of model (1) reveal that internet use is negatively associated with mental health ($\beta = -1.227$, $p < 0.01$). Model (2), which controls for gender, age, educational attainment, marital status, and hukou status, shows a decrease in the absolute value of the coefficient ($\beta = -0.318$, $p < 0.05$), which remains statistically significant.

Table 3. Regression results of internet use on mental health

mental health	model (1)	model (2)
internet use (reference=no)	-1.227*** [-1.464, -0.990]	-0.318** [-0.619, -0.018]
gender (reference=female)		-0.675*** [-0.903, -0.447]
age		0.014*** [0.005, 0.024]
educational attainment (reference=illiterate)		
primary school		-0.430** [-0.777, -0.082]
junior high school		-1.003*** [-1.345, -0.657]
senior high school		-1.358*** [-1.769, -0.948]

Table 3. (continued)

college or above		-1.380*** [-1.857, -0.903]
marital status (reference=no spouse)		-0.115 [-0.406, 0.177]
hukou status (reference=agricultural hukou)		-0.577*** [-0.884, -0.269]
intercept	15.228*** [15.031, 15.425]	15.272*** [14.667, 15.877]
control variables	No	Yes
sample size	5728	5416

Note: 95% confidence intervals are reported in parentheses. Model (1) excludes control variables. Model (2) includes gender, age, educational attainment, marital status, and hukou status as controls. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.3. Mediating effect of internet use on mental health



Figure 1. Path diagram of the mediating effect of internet use on mental health

(Picture credit: Original)

Figure 1 displays a path diagram of the mediating effect of internet use on mental health (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). All regression models control for gender, age, educational attainment, marital status, and hukou status. Internet use is positively associated with marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction. Meanwhile, marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction are negatively associated with mental health. These results demonstrate the mediating effect of these four dimensions, thereby providing a potential mechanism through which internet use influences mental health.

4.4. Analysis of age heterogeneity

Table 4 presents the regression results of age heterogeneity. For subjects aged below 60, internet use is negatively associated with mental health ($\beta = -0.378$, $p < 0.05$). Among control variables, regression coefficients of gender, age, educational attainment, and hukou status are statistically

significant, whereas that of marital status is not. In contrast, for subjects aged 60 or older, internet use does not show a statistically significant association with mental health ($\beta = -0.086$, $p > 0.10$).

Table 4. Regression results of age heterogeneity

mental health	age < 60	age $\geq$ 60
internet use (reference = No)	-0.378** [-0.715, -0.041]	-0.086 [-0.765, 0.592]
gender (reference = female)	-0.659*** [-0.904, -0.414]	-0.673** [-1.273, -0.072]
age	0.026*** [0.012, 0.040]	-0.040 [-0.089, 0.009]
educational attainment (reference = illiterate)		
primary school	-0.387* [-0.786, 0.011]	-0.435 [-1.191, 0.321]
junior high school	-1.001*** [-1.388, -0.613]	-0.750* [-1.592, 0.093]
senior high school	-1.316*** [-1.776, -0.856]	-1.289*** [-2.274, -0.304]
college or above	-1.380*** [-1.882, -0.877]	-1.785* [-3.807, 0.237]
marital status (reference = no spouse)	-0.192 [-0.529, 0.144]	-0.934** [-1.777, -0.092]
hukou status (reference = agricultural hukou)	-0.289* [-0.622, 0.043]	-1.585*** [-2.357, -0.813]
intercept	14.875*** [14.175, 15.576]	19.623*** [16.035, 23.211]
control variables	Yes	Yes
sample size	4348	1113

Note: Values in parentheses are 95% confidence intervals. All models control for gender, age, educational attainment, marital status, and hukou status. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Discussion

5.1. The association between internet use and mental health

The study uses data from the 2022 CFPS to analyze the association between internet use and mental health in Western China, showing that internet use decreases the total CESD score of respondents by 1.227. The result indicates a strong association between internet use and a lower likelihood of depressive symptoms without control variables. In contrast, after controlling for gender, age, educational attainment, marital status, and urban-rural hukou status, internet use decreases the total CESD score by 0.318. Among specific subgroups, the positive effect of internet use on mental health is mainly attributable to respondents' relatively good baseline mental health. For example, highly

educated, non-agricultural young adults in western regions have relatively high demand for digital access, better infrastructure, employment opportunities, and focused media attention, which facilitates their access to the internet and supports their mental health [8, 9, 10]. Therefore, internet use is not a fundamental determinant of mental health. It serves as an amplifying tool, with sufficient financial capacity, social welfare, and infrastructure as prerequisites.

5.2. The mediating effect of self-evaluation

The regression results of the mediating effect identify life satisfaction, marital satisfaction, job satisfaction, and social status satisfaction as four distinct pathways. Their coefficients, ranked from highest to lowest, follow the order of life satisfaction, job satisfaction, marital satisfaction, and social status satisfaction. Life satisfaction ranks first, which is not surprising given the prevalent economic deprivation, geographical isolation, the digital divide, and daily inconvenience in the western regions. For instance, transportation difficulties and low population density stem from the alpine pastoral regions in Xizang, the Hengduan mountain range between Sichuan and Yunnan, the mountain ranges in Qinghai, and the Gobi Desert in Gansu and Xinjiang.

As the internet develops, delivery services lower the threshold for accessing goods, videos enrich daily lives, and communication tools strengthen emotional bonds between family members [11]. In this way, the internet eases the physical constraints that geographic conditions impose, and loneliness is thereby reduced. Marital and job satisfaction further underscore the social connections and employment opportunities that the internet provides. Lovers can keep their emotional connections alive through video calls, while younger generations can remain with their families and gain a sense of security through e-commerce and livestream selling [12]. Social status satisfaction has the lowest coefficient, which may reflect unchangeable circumstances faced by residents. As a result, they tend to focus more on survival needs [13]. This compromise attenuates the effect of social status evaluation on depressive symptoms.

5.3. Differences in the effect between older adults and the younger generation

In the age heterogeneity analysis, internet use among subjects under 60 lowers the CESD score by 0.378, and age, gender, educational attainment, and hukou status are statistically significant, which may be attributable to high demands in daily life, academics, and work for the younger generation. For example, online job hunting, online courses, and live-streaming promote economic contribution. Online platforms, video games, and films provide outlets in a tedious life [14]. These benefits help overcome the negative effects of the internet. For subjects aged 60 and above, the regression coefficients are not statistically significant. The result suggests that the benefit does not generalize to older adults. Possible reasons are physical decline, age-related comorbidities, and social disconnection. Older adults thereby feel insecure and lonely [15].

Older adults in Western regions are less likely to have access to the internet. Thus, the study cannot draw a firm conclusion about the association between internet use and mental health. Table 4 presents the statistical significance of marital status, which implies the irreplaceability of physical companionship. Although video calls are a useful communication tool, they cannot provide companionship when the elderly face disease and pain. However, among older adults, those with a college education or above and non-agricultural hukou have much higher coefficients than other control variables. This suggests that the effect depends on individuals' cultural capital and living conditions. Higher educational attainment means adequate social welfare and material security. Better facilities and various activities enrich their life and ease loneliness. Therefore, the influence

of internet use on mental health is highly dependent on older adults' quality of life and inner horizons.

Most studies based on national samples focus on loneliness and sleep quality as mediators and have concluded that internet use is generally beneficial for mental health. This study's regression results are consistent with previous research and contribute by introducing a new mediator and the importance of age heterogeneity. Given that western regions face shortages of goods and survival challenges, self-evaluation works well for residents in western regions. In the age heterogeneity analysis, the benefits are significant for younger adults. This benefit does not generalize to older adults, which suggests that the mental health effects of internet use are constrained by the digital divide, cultural capital, geographical isolation, and poverty.

5.4. Limitations

The study has several limitations. First, because of low population density and urbanization, young laborers move into provincial capitals or other provinces, which limits the sample sizes of elderly and rural respondents. Although the study ensures statistical power by targeting the three most impoverished regions and three prefectures, this choice inevitably limits how far the findings can be generalized to the national level. Second, since the 2022 CFPS data were collected at the end of the COVID-19 pandemic, travel restrictions and collective anxiety may have systematically affected residents' mental health, which may limit the applicability of the findings to non-pandemic contexts.

5.5. Implications

Despite these limitations, the study makes the following contributions. First, this study is the first to examine the effect of internet use on mental health in the three most impoverished regions and prefectures. This focus sacrifices generalizability for an in-depth understanding of the three regions and three prefectures. Second, this study not only examines the direct effect of internet use on mental health, but also constructs a framework with four mediating pathways, revealing the rank of different mechanisms. This gradient accurately reflects the demand pyramid of residents in Western impoverished areas in the digital age. Third, this study further examines age heterogeneity, examining how the effects differ between younger and older adults. The null effect among older adults reveals the irreplaceability of physical companionship.

5.6. Future directions

The study underscores the irreplaceable role of physical companionship and social bonds: the internet can be beneficial only when it addresses what users truly need. Current studies recognize that policies should address not only coverage and user numbers, but also economic development, educational resources, public services, and digital infrastructure. Thus, future research should prioritize identifying people's needs before considering how to improve internet facilities. For example, many users face difficulties, such as unfamiliarity with internet use, confusion caused by excessive content, and unstable signals. More efforts could be directed toward improving volunteer-based device guidance, delivery-related digital services, online medical care, skill training, and educational platforms to alleviate daily inconveniences, rather than enhancing social status approval.

6. Conclusion

Overall, this study focuses on residents in the "most impoverished three regions and three prefectures". With internet use as the independent variable and mental health as the dependent variable, the regression results reveal that internet use is beneficial to residents' mental health, consistent with previous studies. Possible explanations lie in the higher daily digital needs of educated, non-agricultural hukou users in Western China. Taking marital satisfaction, job satisfaction, life satisfaction, and social status satisfaction as mediators, the study builds a mediating framework linking internet use and mental health, and the result forms a gradient: life satisfaction carries the strongest mediating effect, while social status satisfaction carries the weakest. This result further indicates that internet use does shape mental health in Western China and brings to light the survival dilemma residents face, noting that the burdens of life leave them with little energy to seek social status approval. As for age heterogeneity, the study sets out to examine how the effects differ between older adults and younger generations. The effect is mainly observable among young adults, since they rely heavily on electronic devices in college and at work. The regression results for older adults reveal their need for physical companionship and comprehensive social welfare, which underscores that the internet plays an amplifying rather than a fundamental role. In addition, for older adults, the effect of internet use is relatively weaker than that of other control variables, implying that only once material security and emotional companionship are no longer scarce can the internet serve as a limited but tangible enhancing tool.

The study lays out future research directions in clear terms, stressing how important it is to identify what residents in Western China truly need in their daily lives. Only after the challenges tied to family connection, education, economic development, and employment opportunities are tackled can future improvements in internet infrastructure be taken into account. Such improvements may help young residents stay in their hometowns, while older adults could benefit from on-site companionship and volunteer-assisted device guidance, which would ease their digital difficulties and enhance their daily lives.

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