

Digital Family Access and Depressive Tendency in Rural Children: Digital Usages as A Mediator

Yinan Dong *, Jing Zhao and Liping Ma

School of public administration, Zhejiang University, Hangzhou, China

* Corresponding Author Email: 18989843926@163.com

Abstract. Given the the digital era, mental health of rural children is of particular concern. Taking a total of 314 rural children in Linquan County, Fuyang City, Anhui Province, as survey respondents, and using a combination of descriptive statistics, correlation and regression analysis, this study aimed to explore the effects of digital family access on rural children's depressive tendency, and to analyse the personal digital usage as a mediator. The results of the study showed that household Internet devices had a significantly and positively impact on rural children's depressive tendency, while restrictive parental roles were negatively associated with depression. In addition, digital leisure use was identified as a mediating variable. The results of this study highlight the importance of the family in the regulation of children's digital use and children's psychological problems, and provide a basis for the development of relevant policies and interventions.

Keywords: Digital access; Leisure use; Depressive tendency; mediator.

1. Introduction

On 17 November 2021, the World Health Organization released a report showing that it is estimated that 1 in 7 (14%) 10-19-year-olds experience mental health conditions [1], with depression and anxiety being particularly prominent.[2] It is clear that children's mental health problems have become a common problem around the world, and rural children are often vulnerable to mental health problems. the Rural Children's Mental Health Survey Report reveals that the detection rate of depression among rural children is as high as 25.2 percent, highlighting the urgent need to pay attention to the mental health problems of this group.[3]

In recent years, there has been a significant increase in Internet penetration. According to the National Survey Report on the Internet Usage of Minors released in November 2022, as of 2021, the number of underage Internet users in China reached 191 million, and the Internet penetration rate among minors reached 96.8 percent. The report also points out that teenagers who use social media for more than three hours a day are twice as likely to suffer from depression, anxiety and so on.[4] The popularity of the Internet and smartphones has dramatically changed people's lifestyles, and while it opens windows for rural children to contact the outside world, it also poses the risk of exacerbating mental health problems. Much of the Internet exposure in children's lives stems from family, such as the electronic devices that the family provides for the child, which may affect children's mental health states, like depressive tendency.[5]

In summary, the study of digital family access on rural children's depressive tendency is a research topic of great academic value. The purpose of this research is to investigate the specific influence of digital family access on rural children's depressive tendency under the broad discussion of digitalization, with a focus on the mediating role of personal digital usages.

2. Literature Review

2.1. Children's Mental Health

Mental health problems, as the current focus of the children's field, have been studied widely by scholars from all circles. As for the special group, the detection rate of mental health problems among rural children is high, with 31% having mild or more psychological problems, and the prominent ones being depression, hostility, anxiety and fear.[6] As an important dimension of children's mental health,

the study of depression is of great significance in understanding the causes of children's psychological problems.

On the dimension of family influence factors, parental migration is associated with rural children's mental health, and that left-behind children have poorer mental health than non-left-behind children. In addition, sibling number, self-rated academic performance and self-perceived health were high risk factors for rural children's mental health.[7] Family caregivers' stability and effective parent-child communication are important for rural children's mental health in China.[8] Therefore there is a need to control variables for family factors.

2.2. Digital Family Access and Depressive Tendency

In exploring the impact of digital family access on children's development, digital family access is a multidimensional concept that encompasses both physical and mental access.

Physical access manifests itself primarily as differences in devices of digital access, while mental access manifests itself as differences in the users' willingness. The mental access is related to people's likes, dislikes and interests in technology [9], and as for family factors this relates to parental attitudes to, and supervisory behaviours of, children's usage of the Internet.

Currently, the mental health problems faced by rural children in China are related to the long-term weakening of the family's educational function and the direct impact of digital access.[10] Based on the principle of "substitution effect", more and more positive digital family access expands rural children's digital exposure, but also brings potential risks. Among them, the online activities replace offline social interaction behaviors, and real-world participation is negatively impacted, which makes individuals' connection to social networks is weakened and eventually lead to their deteriorating mental health.[11] In addition, a research about the data from the German Socio-Economic Data Bank (SOEP) shows the impact of internet use on lifestyle, and finds that internet usage affects an individual's sleeping time and that users had significantly weaker mental health.[12] The "substitution effect" is based on the idea that the more digital access there is, the more the internet occupies the user's real life, i.e. it can lead to mental health problems: digital usage patterns play an important role in the impact of digital access on mental health.

In addition, research has shown significant differences in access to hardware devices between different regions and socio-economic groups. For example, a study found that certain ethnic groups were less likely than others to have computers and Internet access, even after accounting for income and education levels [13] This difference is particularly pronounced in rural areas.[14] At the same time, inequality in digital family access is also reflected in gender differences. A research highlights the issue of the gender digital divide in developing countries, noting that females are generally lower than males in terms of digital access, skill levels and frequency of use.[15] And according to a research with the data on more than 6,300 children in the UK, increased digital access had a negative impact on multiple domains of well-being, with girls being affected more than boys.[16] This finding prompts researchers and educators to focus on the role of gender differences in the relationship between internet usage and mental health. This study will consider multiple dimensions, including gender, when considering digital access.

2.3. As a Mediator: Digital usages

The two models of "tool-information acquisition" and "social-affective regulation" can summarise the two purposes of children's digital use, and this study will use them to classify rural children's digital usages into educational use and leisure use.

The "tool-information acquisition" model suggests that the core purpose of youth Internet use is information access.[17] The digital Internet has created a vast flow space and communication field, and the transaction cost of information has dropped dramatically.[18] Youth can utilise emerging technologies (online meetings, online learning) to meet their productive requirements at a very low cost.[19] For the group of rural children, the main access to educational information is through the Internet, and the instrumental utility of the Internet is realised with the use of online classes and shared

materials. However, the influx of information may put pressure on rural children's cognitive competence. The networked information lack of effective information filtering, and problems such as irrational remarks and frauds are prominent, with a variety of blurred information may receive by young people.[20] Negative information puts rural children at information risk, which is not conducive to the establishment of positive emotions. And the educational information gap may cause rural children to feel frustrated and even aggravate depressive tendency.

In the "social-affective regulation" model, digital technology is more often than not used as a primary means of leisure and recreation and social contact.[21] Recreation belongs to this model along with online contact and is summarised in this study as leisure use. The model suggests that children's leisure and social use is prone to comparisons, which makes rural children may be less satisfied with their actual socio-economic conditions, resulting in negative emotions.[22] At the same time, based on the "substitution effect", leisure use may have a significant impact on real life, resulting in a decline in mental health.

As noted above, digital usage as a screening of information exposure may be a mediator in the impact of digital family access on rural children's depressive tendency.

2.4. Research purposes and hypotheses

There have been a number of studies from different perspectives on Internet access and use, but most of the previous research have been focused on the elderly or university students. Most of the studies tend to be descriptive rather than exploring the causal relationship between specific factors (e.g., digital access) and mental health, and lack a comprehensive and in-depth analysis of the detailed processes. With the increasing popularity of the Internet, the study should be extended to the group of rural children and the specific influencing process of specific factors should be explored in the content of the studies.

The purpose of this inquiry is to explore the impact of home Internet devices and parental supervisory roles on rural children's depressive tendency under the backdrop of informatization, and to examine the mediating role of different forms of digital usage in this relationship. Based on existing literature and theoretical analyses, the following research hypotheses are proposed (Fig. 1).

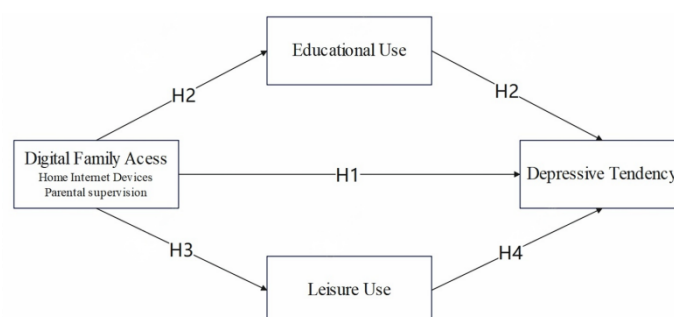


Fig. 1 The hypotheses

The first set of hypotheses concerns the correlation between digital family access and the depression tendency in rural children:

H1a. Home Internet devices have a significantly positive impact on depressive tendency in rural children.

H1b. Parental supervisory has a significantly negative impact on depressive tendency in rural children.

The second and third set of hypotheses are about the mediating effects:

H2. Educational use mediates the effects between digital family access and the depression tendency in rural children.

H3. Leisure use mediate the effects between digital family access and the depression tendency in rural children.

3. Methodology

3.1. Sample and procedure

In July 2023, this study selected students who attended the summer tutoring program of Yaozhuang Primary School, Xulao Primary School, and Huaji Central Primary School in the Linquan County, Fuyang City, Anhui Province. The questionnaire included a wide range of issues, from demographic information, use of digital media, parenting styles, and the family environment to mental health. As primary school students in grades 1-4 are under-aged and have not yet understood the questions clearly, they are not the target population for the self-administered questionnaire, so the questionnaire only surveyed children in grades 5 to 9. (Since the survey was conducted during the summer vacation, the grades of all respondents are for the academic year starting in September) In addition, children with abnormal intellectual development, mental illness or physical disability were excluded from the sample. The survey was administered by 1-2 investigators per class, with the rule that no student discussion was allowed during the completion process. To protect children's privacy, the survey did not record any personal information of the students. This research project was approved by the Ethics Committee of Zhejiang University (Ethical Review No. ZJG202307-7). The final sample consisted of 345 students from 11 classes in three schools, of which the valid sample was 314 students after excluding missing value.

3.2. Measures

3.2.1 Independent variable: digital family access

The core explanatory variable in this research is digital family access, including parental supervisory as well as hardware access in the home. The measurement of the supervisory role of the primary caregivers was adapted from the work of Ren Wei et al. The 13-item scale was designed to measure parental regulatory and guiding roles in home Internet access: six items were developed for assessing the active role of parental guidance, and seven items were designed to assess the restrictive parental roles [23]. Sample items include "explain why some websites are good or bad" "talk to me about what kinds of things should or should not be shared online" for parental guidance, and the Cronbach's α is 0.933. The seven items include "restrict the amount of time I spend online" "check messages in my email, instant messaging or social accounts" for parental restriction, and the Cronbach's α is 0.892. Students reported how often their primary caregivers engage in regulatory behaviors during their digital media use on a scale ranging from 1 (never) to 5 (always). Higher mean score of the items for each type of parental supervision indicate stronger proactive parental guidance and restrictive roles in digital access and usage for rural children.

In addition to parental supervision, home Internet devices are also a major component of digital access, including device access and network access. For device access, the questions that "What type of internet access device do you have at home?" and "Is there broadband/wifi at home?" were selected as the main measurement. The total number of hardware devices such as smartphones, desktop computers, and broadband and other network accesses were used as measurement.

3.2.2 Mediating variable: digital usage

Adapted from the work of Renwei et al., 8 items were used to measure two types of Internet usage: educational use and leisure use, four items for each type.[23] As shown in Table 1, on a 5-point scale, the questionnaire investigated how often rural children engaged in certain online activities. Sample items included "searching for learning materials" and "discussing learning matters with teachers or classmates" for educational use, as well as "playing online games", "Watching entertainment videos" for leisure use, The two subscales were then averaged to represent educational use and leisure use, with the Cronbach's α are 0.773 and 0.714, respectively.

3.3.3 Dependent variable: depressive tendency in rural children

In this study, the depressive tendency of rural children was measured by The 8-item scale Center for Epidemiologic Studies Depression (CES-D8). The results of the current study suggest that this scale is suitable for Chinese children and adolescents.[24] The CES-D8 scale consisted of "I feel depressed," "I find it hard to do anything," "I don't sleep well" "I feel lonely" "I live a happy life" "I feel sad and I can't go on with my life" and two reversed items "I feel happy" "I live a happy life" "I feel sad and I can't go on with my life". Research have confirmed the full metric and partial scalar invariance of the one-dimensional CES-D8 scale. Comparisons of relationships as well as of means of depression across countries and age categories are thus allowed and are meaningful.[25] It can be used to measure children's depressive tendency and the Cronbach's α is 0.763.

3.3.4 Control variables

Based on the relevant literature and considering that other factors may have an impact on children's depressive tendency, all models in this study control for demographic variables including individual factors (gender, age, left-behind situation, health status, and academic achievement) and family factors (economic situation, number of children in the family, and educational attainment of parents). Among these, the definition of the left-behind children is "children aged 0-17 years who have two or one parent who has been migrating across townships and cities for six months or more, and who remain in their native place and are unable to live with parents", and the measures of the other variables is shown in Table 1.

Table 1. Measures of variables.

form	variable name		Description of variables
Independent variable	Digital family access	Home Internet devices	1=one device, 2=two, 3=three, 4=four, 5=five
		Parental guidance	1=never, 2=occasionally, 3=sometimes, 4=often, 5=always
		Parental restriction	1=never, 2=occasionally, 3=sometimes, 4=often, 5=always
Dependent variable	Depressive tendency		0=less than one day, 1=1-2 days a week, 2=3-4 days a week, 3=5-7 days a week
Mediating variable	digital usage	Education use	1=almost not, 2=1-2 times per month, 3=1-2 times per week, 4=3-4 times per week, 5=almost daily
		Leisure use	1=almost not, 2=1-2 times per month, 3=1-2 times per week, 4=3-4 times per week, 5=almost daily
Control variables	personal factors	Gender	0=male, 1=female
		Grade	4=Grade 4, 5=Grade 5, 6=Grade 6, 7=Grade 7
		Left-behind situation	0=non-left-behind children, 1=left-behind children
		health status	1=very unhealthy, 2=unhealthy, 3=average, 4=healthier, 5=very healthy
		academic achievement	1=poor, 2=lower-middle, 3=middle, 4=upper-middle, 5=good
	Family factors	economic situation	1=very poor, 2=lower-middle, 3=average, 4=upper-middle, 5=very good
		number of siblings	0=only child, 1=not only child
		educational attainment of father	1=junior high school or below, 2=high school, 3=associate degree or above
		educational attainment of mother	1=junior high school or below, 2=high school, 3=associate degree or above

4. Data Analysis

4.1. Common Method Deviation Testing

If there are significant homogeneity differences in the study, the reliability of the study results will also be questioned. In this study, all questions were self-assessed by children, and homogeneity differences may exist. The deviation of the common method is controlled through measures such as anonymously collecting questionnaires, reasonably designing the location of questions, and arranging reverse questions. The first common factor accounted for 17.549% of the total load, which was less than 40%, indicating that there was no obvious common method variation in this study, and the data could be further analyzed.

4.2. Reliability and Validity Tests

As shown in Table 2, the reliability and validity of the survey data were analyzed using SPSS28.0 to test the consistency, reliability and stability of the scale. The results found that the Cronbach's α coefficients of all variables such as parental digital supervision, rural children's digital literacy and depressive tendency were all greater than 0.7, indicating that each scale had good internal consistency. The KMO (Kaiser-Meyer-Olkin) values of the variable dimension of all scales are greater than 0.7, and the significance of Bartlett's sphere test is less than 0.001, which means that there are many common factors and strong correlations between the variables.

Table 2. Results of reliability and validity tests.

Variables			Cronbach's α	KMO	Bartlett's Test of Sphericity
Independent variables	Digital family access	Parental guidance	0.933	0.906	0.000
		Parental restriction	0.892	0.828	0.000
Mediating variables	Digital usage	Education use	0.773	0.738	0.000
		Leisure use	0.714	0.748	0.000
Dependent variables	Depressive tendency		0.763	0.770	0.000

4.3. Descriptive and correlational analysis

Specific information is shown in Table 1. As shown in Table 3, data analysis found that the average score of depressive tendency among rural children is 5.86, and the score is less than 6, so the group has a mild depressive tendency, but the average difference is large, and there are large differences in mental health within rural children. Based on observations on rural children's digital usage, the average scores for educational use and leisure use were 2.483 and 2.587 respectively, both lower than the intermediate level (Five-point scoring, using the median of 3 as the intermediate level for comparison). The average score on the amount of equipment in rural households is 2.602, indicating that most households have 2 to 3 hardware devices, including smartphones, notebooks, routers, etc., and household hardware access in rural areas is relatively popular.

Table 3. Descriptive statistics of variables.

Variables	N	Proportion (%)	Mean	SD	Range
gender					
Male	161	51.3	0.49	0.501	
Female	153	48.7			
Grade	314		5.682	0.869	4-7
Left-behind situation					
Yes	158	50.3	0.497	0.501	
No	156	49.7			
Health status	314		4.27	0.908	1-5
Academic achievement	314		3.398	1.053	1-5
Family economic situation	314		2.742	0.733	1-5
Number of siblings					
One child	27	8.6	0.914	0.281	
Not an only child	287	91.4			
Educational attainment of father					
Junior high school or below	258	82.7	1.21	0.386	
High school	36	11.5			
Associate degree or above	18	5.8			
Educational attainment of mother					
Junior high school or below	260	83.6	1.29	0.353	
High school	37	11.9			
Associate degree or above	14	4.5			
Household Internet devices	314		2.602	1.029	0-5
Parental guidance	314		2.586	1.267	1-5
Parental restriction	314		1.975	0.954	1-5
Educational use	314		2.483	1.012	1-5
Leisure use	314		2.587	1.042	1-5
Personal depressive tendency	314		5.86	3.116	0-17

Descriptive statistics and correlation analysis were conducted on household digital access and its subdimensions, digital usage and its subdimensions, and rural children's depressive tendency, in order to initially verify the hypothetical relationships among independent variables, intermediate variables and dependent variables.

Table 4 shows the bivariate association between digital family access, children's digital literacy, and depressive tendency. Specifically, household hardware access is significantly positively correlated with rural children's digital literacy and depressive tendency. Similarly, except for the restrictive role of parents that has no positive correlation with children's leisure use, the role of parental supervision is basically significantly positive correlated with rural children's digital usage. However, only parental restrictive role was significantly related to children's depressive tendency, and the stronger the parental restrictive role, the less depressive tendency of rural children would be. In addition, among rural children's digital usage, only leisure use is significantly related to depressive tendency, and the more leisure use children, the more severe depressive tendency will be.

Table 4. Correlation analysis of each study variable.

Study variables	1	2	3	4	5	6
Depressive tendency	1					
Educational use	0.005	1				
Leisure use	0.347***	0.113**	1			
Household Internet devices	0.160***	0.134**	0.134**	1		
Parental guidance	-0.002	0.286***	0.137**	0.204***	1	
Parental restriction	-0.137**	0.242***	-0.073**	0.224***	0.542***	1
Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.						

4.4. The relationship between digital family access and depressive tendency

Table 5 provides the relationship between digital family access, i.e. Internet devices, parental guidance and parental restriction, and depressive tendency among rural children. After controlling for demographic variables, household Internet devices was significantly positively correlated with children's depressive tendency ($\beta = 0.18$, $p < 0.01$), indicating that rural children's depressive tendency were more obvious in families with more electronic devices. H1a was tested. In contrast, the restrictive effect of primary caregivers in the family was significantly negatively correlated with children's depressive tendency ($\beta = -0.22$, $p < 0.01$), further highlighting the importance of moderate supervision and guidance in reducing depressive tendency in the family environment. However, there is no significant correlation between parents' proactive guidance and children's depressive tendency, and H1b has been partially verified.

Table 5. Regression analysis of digital family access and depressive tendency.

	depressive tendency	
	β	SE
Digital family access		
Household Internet devices	0.18***	0.17
Parental guidance	0.11*	0.16
Parental restriction	-0.22***	0.22
Control variables	Controlled	
R^2	0.15	
F	F=4.27***	

4.5. Mediator effect analysis

Further, multiple regression analysis was conducted on the influence intensity of the relationship between digital family access, rural children's digital usage and depressive tendency, and further analyzed the mediating effect of children's digital usage through a mediating effect model.

The six models in Tables 6 and 7 show the relationship between digital family access and rural children's digital usage. After controlling for demographic variables, parents' restrictive effects were significantly related to educational use, indicating that parents restrict children's behavior by monitoring and controlling online time, purpose, type of website visited, etc., making their Internet use more inclined to learn and collect data rather than entertain and relax. Additionally, household Internet devices is positively related to leisure use, indicating that more electronic devices in the home may make rural children spend more time at home playing games and other entertainment and communication projects. In addition, comparing Table 6 with Table 7, parents' proactive teaching of their children has increased the overall use of numbers among rural children.

Table 6. Regression analysis of digital family access and educational use.

	Model 1: Educational use		Model 2: Educational use		Model 3: Educational use	
	β	SE	β	SE	β	SE
Household Internet devices	0.11*	0.06				
Parental guidance			0.27***	0.04		
Parental restriction					0.25***	0.06
Control variables	Controlled		Controlled		Controlled	
R ²	0.067		0.13		0.12	
F	2.19***		4.37***		3.91***	

Table 7. Regression analysis of digital family access and leisure use.

	Model 4: Leisure Use		Model 5: Leisure Use		Model 6: Leisure Use	
	β	SE	β	SE	β	SE
Household Internet devices	0.14**	0.06				
Parental guidance			0.14**	0.04		
Parental restriction					-0.1**	0.06
Control variables	Controlled		Controlled		Controlled	
R ²	0.06		0.07		0.06	
F	2.08***		2.1***		1.83***	

Table 8 shows the association between personal digital usage and depressive tendency, and also shows the association between digital family access and depressive tendency in rural children after adjusting for digital usage and other covariates (i.e. demographic variables). There is a significant positive correlation between digital leisure use and depressive tendency among rural children, indicating that there is a potential risk of overuse in digital leisure and entertainment. Uncontrollable entertainment time may lead to excessive screen use or bring too many negative comments and information to children., which is not conducive to children's mental health.

After controlling for the variable of leisure use, the correlation between household Internet devices and parental restriction and children's depressive tendency was still significant, and the coefficient decreased compared with the total effect coefficient, proving the existence of a mediating effect of leisure use.

Table 8. Regression coefficients for the mediation analyses.

	Depressive tendency			
	Model 1		Model 2	
	β	SE	β	SE
Digital family access				
Household Internet devices	0.18***	0.17	0.14**	0.17
Parental guidance	0.10	0.16	0.04	0.16
Parental restriction	-0.22***	0.22	-0.14**	0.21
Educational use	0.04	0.18		
Casual use			0.30***	0.16
Control variables	Controlled		Controlled	
R ²	0.15		0.22	
F	3.97***		6.62***	

Based on the above regression results, we will specifically explore the mediating role of personal digital literacy and the specific mechanism of digital family access on rural children's depressive tendency. Table 9 suggests that the mediating effect of digital leisure use is significant. Hypothesis 3 was partially verified, and Hypothesis 2 was rejected. The mechanism of action among each study variable is as follows.

The active guidance role of the main caregivers in the family has a significant indirect effect on the depressive tendency of rural children through digital leisure use (lower limit =0.025, upper limit =0.112), and the effect value is positive. Proactive behaviors such as parents introducing methods to their children to use the Internet safely and recommending good websites have a certain guiding effect on children's digital usage. However, the proactive guidance role of parents may attract rural children's interest in the Internet, improve their skills, and increase the use of electronic devices. As mentioned above, increased recreational use will aggravate the depressive tendency of rural children, but in this study, recreational use can mediate parental guidance and rural children's depressive tendency. After excluding the role of children's digital leisure use, the overall effect of parental guidance on children's depressive tendency is not significant. This may be affected by family emotional connections. Parents' active guidance will increase active communication with children. Children are communicating with their fathers or mothers receive psychological counseling to reduce children's negative emotions and psychological trauma.[26] This may provide psychological support and emotional connection, enhance the child's self-confidence and self-efficacy, which may help reduce the child's depressive tendency, resulting in a masking effect.

household Internet devices have a significant indirect effect on rural children's depressive tendency through digital leisure use among the mediating variables (a confidence interval that does not include 0 indicates a significant effect). The completeness of household Internet devices may lead children and teenagers to use these electronic devices more for leisure activities, such as games, social media and video streaming services, but long-term use of the Internet for leisure and entertainment purposes may lead to Internet addiction. Online social networking may lead to a weakening of social skills and a sense of social isolation in the real world. Time such as games takes up time for outdoor activities, and excessive exposure to violence or negative information may lead to an increase in rural children's negative emotions such as anxiety and restlessness., thereby increasing their depressive tendency.

The restrictive effect of the main caregivers in the family is also through digital leisure use, which has a significant indirect effect on rural children's depressive tendency, but it is mainly a negative effect. Parents can effectively manage their children's leisure time by setting rules, such as limiting the amount of time they use digital devices every day or week, ensure that children will not use them casually at inappropriate times or using inappropriate content through supervision and monitoring., and strictly control the information children receive through timely monitoring of children's social media. A series of restrictive effects can reduce the duration and content of leisure use by rural children, help them block online risks and have less exposure to negative information, thereby reducing personal negative emotions and reducing depressive tendency.

In conclusion, children's leisure digital usage played a partial mediating role in household Internet devices and parental restriction on children's depressive tendency, and the model fit was good ($\chi^2=0$, RMSEA = 0.001, SRMR = 0.00, CFI=0.944, GFI=1).

Table 9. Indirect effects of digital family access on depressive tendency.

Items	Coef.	SE	percentile bootstrapping 95% CI		
			Lower limit	Upper limit	<i>p</i>
household Internet devices ⇒ leisure use ⇒ depressive tendency	0.120	0.018	0.006	0.078	0.000
Parental guidance ⇒ leisure use ⇒ depressive tendency	0.165	0.022	0.025	0.112	0.000
parental restriction⇒ leisure use ⇒ depressive tendency	-0.270	0.025	-0.138	-0.037	0.000

5. Discussion

5.1. Limitations

5.1.1 Sample limitations

The size of the sample usually depends on a number of factors, including the overall size of the study, sample representativeness, target confidence level, and the acceptable margin of error. A total of 314 valid questionnaires were collected for this study, which is within the common sample size but does not leave more feasible space. In addition, the research scope of this study is within the county, and given the geographical differences in China, it may be difficult to generalise the results of this paper to other parts of the country.

5.1.2 Investigations in a single context

There are potential drawbacks that the questionnaire in this study was distributed primarily in summer school. Students who attended the summer tutoring program are not fully representative of all rural children, whose family may have more resources and support. Therefore, the sample may be biased towards left-behind children whose families are relatively better off, which will affect the representativeness of the group. Students and their families who chose to participate in the summer school may differ from those who did not in terms of educational ideas, economic conditions, and investment in their children. It may lead to results that are biased in favour of the particularities of this group rather than the general situation of all rural children. Besides, the available time and degree of participation may vary during the summer holidays, which may affect the quality of the questionnaires filled out.[27]

5.1.3 Strong subjective

This study utilized self-completion questionnaires to assess mental health status of rural children. Although this method has the advantages of being easy to operate and suitable for large-scale implementation, it inevitably has a certain degree of subjectivity. When filling out the questionnaires, children may be influenced by various factors such as their own cognition, emotional state, and reading comprehension, leading to a certain bias in the assessment results.

5.2. Future directions

There is significant individual variability in digital literacy and depressive tendency among rural children. The different results among different gender and left-behind situation still remain under-researched. Upcoming studies could investigate if digital usage's impacts vary among distinct subgroups.

Furthermore, the schools' involvement should be considered alongside the background of family. The use of digital media is not only rooted in the digital experiences that can be learned in daily family life, but also in schools.[28] By exploring the interplay between factors at the school and at home, researchers can enhance this study's focus on impacting students' mental health.

6. Discussion

This research, involving 314 children from rural areas in Linquan County, Fuyang City, Anhui Province, investigated how digital family access impacts the mental health of these children using quantitative analysis, with digital usage as a mediator. The study indicated that home Internet devices have a significantly positive impact on depressive tendency in rural children, whereas parental restriction has a notable negative impact. It means that although having hardware devices at home can enhance opportunities for children to access the internet and a wider range of information, it might also lead to excessive use and more psychological harm. Parental control over children's online activities could help in diminishing their depressive symptoms.

Furthermore, digital leisure uses significantly mediated the relationship between digital family access and the depressive tendency of children. This indicates that although household digital access provides children with a way to access the internet, how to use these technologies, especially for leisure, increases the risk of internet addiction and exposure to negative information, which may exacerbate children's tendency towards depression.

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