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A Study on Learning Engagement and Its Determinants Among Rural Left-Behind Children

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Abstract
This study investigates the current status and determinants of learning engagement among rural left-behind children in China, with the aim of providing a scientific basis for educational interventions. A total of 491 rural left-behind children were selected through convenience sampling. Standardized questionnaires were used to measure psychological characteristics including grit, subjective well-being, perceived social support, and growth mindset. Data were analyzed using ANOVA, correlation analysis, and multiple regression. The average learning engagement score was 3.651 (SD = 1.245), indicating a moderately high level. Significant differences were found in learning engagement based on access to mental health services ($p < 0.001$) and frequency of parent-child interaction ($p = 0.003$). Correlation analysis showed that grit ($r = 0.580$), subjective well-being ($r = 0.675$), perceived social support ($r = 0.618$), and growth mindset ($r = 0.376$) were all positively associated with learning engagement. Multiple regression analysis revealed that access to mental health services, perceived social support, grit, subjective well-being, and growth mindset jointly explained 58.8% of the variance in learning engagement (adjusted $R^2 = 0.588$). These findings suggest that both internal and external factors significantly influence learning engagement among rural left-behind children. Multilevel interventions are recommended to enhance their academic participation.

Keywords
rural left-behind children, learning engagement, grit, well-being, social support

1 Introduction

With the rapid pace of urbanization in China, the large-scale migration of rural laborers to urban areas has led to a sustained increase in the number of left-behind children. According to the Ministry of Civil Affairs, over 60 million rural children were identified as left-behind by 2023 [1]. These children often face substantial challenges in mental health, educational quality, and social adjustment, largely due to prolonged separation from parental care. Among these challenges, insufficient learning engagement has emerged as a particularly pressing concern.

Learning engagement—defined as students' active involvement at cognitive, emotional, and behavioral levels [2]—is a key predictor of academic achievement and long-term development. Existing studies indicate that left-behind children generally report lower levels of learning engagement compared to their non-left-behind

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counterparts [3], which may negatively affect their educational outcomes and future opportunities. This underscores the need to explore the underlying factors that influence learning engagement in this population, in order to inform more effective and targeted interventions.

In recent years, growing attention has been paid to the role of psychological traits in shaping learning engagement. For example, grit—characterized as an individual's perseverance and passion for long-term goals—has been shown to significantly correlate with both academic success and learning engagement [4]. Similarly, well-being, as a central component of mental health, can enhance engagement by fostering positive emotions and a sense of purpose [5]. The concept of a growth mindset, which posits that abilities can be developed through effort, also promotes sustained motivation when students face academic challenges [6]. Additionally, perceived social support (PSS) has been found to strengthen teacher-student relationships and peer interactions, thereby fostering a more supportive learning environment that encourages engagement [7].

Despite these insights, research examining the combined effects of these psychological and contextual variables on the learning engagement of rural left-behind children remains limited. Most prior studies have focused on isolated psychological or demographic factors, without exploring integrated, multifactorial influences. Against this backdrop, the present study aims to systematically investigate both individual psychological traits and external support systems that contribute to learning engagement among rural left-behind children. The study seeks to (a) provide empirical evidence to inform educational practices and (b) develop targeted strategies to enhance the academic engagement and developmental outcomes of this vulnerable population.

2 Materials and Methods

2.1 Participants

Data were collected using a dual-mode approach (both online and paper-based questionnaires) administered to students from multiple rural primary and secondary schools. A total of 500 questionnaires were distributed, and 491 valid responses were obtained, yielding a response rate of 98.2%. The participants ranged in age from 10 to 18 years (M = 14.30, SD = 1.55), including 212 males (43.2%) and 279 females (56.8%). All participants were identified as rural left-behind children, defined as having at least one parent engaged in migrant work for more than six consecutive months. Informed consent was obtained from schools and guardians, and all responses were anonymous to ensure data authenticity.

2.2 Research Instruments

Perceived Social Support Scale :

The PSSS, originally developed by Zimet et al. [8] and adapted into Chinese by Yan Biaobin and Zheng Xue, consists of 12 items across three dimensions: family support, friend support, and other support. Responses are rated on a 7-point Likert scale. In this study, the Cronbach’s alpha for the scale was 0.89.

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Learning Engagement Scale:

This study employed the Learning Engagement Scale developed by Schaufeli [9] and revised by Fang Laitan and Shi Kan. The scale measures three dimensions—vigor, dedication, and absorption—using a 6-point Likert scale. It demonstrated excellent internal consistency in this sample (Cronbach's $\alpha = 0.96$).

Grit Scale:

Grit was assessed using the Short Grit Scale (Grit-S) developed by Duckworth et al. [10], which comprises two subscales: perseverance of effort and consistency of interests. Each item is rated on a 5-point scale. The Cronbach's alpha in this study was 0.73.

Growth Mindset Scale:

The Growth Mindset Scale, developed by Dweck et al. [11], contains six items. Items 1–3 reflect a fixed mindset, while items 4–6 assess a growth mindset. Responses were recorded on a 6-point Likert scale. The scale showed good reliability in this study (Cronbach's $\alpha = 0.76$).

Well-Being Scale:

Participants' well-being was measured using the WHO-5 Well-Being Index [12], which consists of five items rated on a 6-point scale (0–5), with higher scores indicating greater well-being. The Cronbach's alpha coefficient for this scale in the present study was 0.93.

2.3 Statistical Analysis

All data were analyzed using SPSS version 23.0. The analytical procedures included independent-sample t-tests, analysis of variance (ANOVA), correlation analysis, and multiple linear regression analysis.

3 Results and Discussion

3.1 Differences in Learning Engagement by Demographic Characteristics

The rural left-behind children were grouped according to gender, access to mental health services, parental migration status, and frequency of parent-child interaction in order to compare differences in learning engagement. Analysis of variance revealed statistically significant differences in learning engagement scores based on access to mental health services ($F = 3.606$, $p < 0.001$) and frequency of parent-child interaction ($F = 3.627$, $p = 0.003$). Specifically, children who had received mental health services reported significantly higher levels of learning engagement ($M = 3.92$, $SD = 1.21$) than those who had not ($M = 3.40$, $SD = 1.24$), suggesting a positive influence of such services. Similarly, children with frequent parent-child interactions (e.g., daily or multiple times per day, $M = 3.87$, $SD = 1.40$) exhibited significantly higher engagement than those with infrequent contact (e.g., rarely or never, $M = 3.32$, $SD = 1.25$).

In contrast, no significant differences in learning engagement were observed based on gender ($t = 0.029$, $p = 0.977$) or parental migration status ($F = 1.174$, $p = 0.165$). These results are summarized in Table 1.

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Table 1. Differences in Learning Engagement Among Rural Left-Behind Children by Demographic Characteristics (n = 491)

Characteristics	Classification	N	Learning Engagement (M ± SD)	F/t-value	p-value
gender	Male	212	3.652±1.255	0.029	0.977
	Female	279	3.649±1.240		
Access to Mental Health Services	Yes	178	3.916±1.212	3.606	<0.001
	No	313	3.400±1.240		
Parental Migration Status	Mother working as migrant laborer	77	3.727±1.386	1.174	0.165
	Father working as migrant laborer	179	3.688±1.196		
	Both parents as migrant laborers	235	3.597±1.236		
Frequency of Parent-Child Interaction	Once/multiple times daily	116	3.869±1.403	3.627	0.003
	Once/more times weekly	270	3.672±1.166		
	Once a month	28	3.8691±1.141		
	Multiple times a month	36	3.657±0.985		
	Multiple times a year	25	3.544±1.180		
	Rarely/Never	16	3.324±1.245		

Note: M = Mean; SD = Standard Deviation

3.2 Descriptive Statistics and Correlation Analysis

Descriptive statistics and Pearson correlation analyses were conducted to examine the relationships among grit, subjective well-being, perceived social support, growth mindset, and learning engagement. As shown in Table 2, all four psychological traits demonstrated significant positive correlations with learning engagement. Specifically, grit ($r = 0.580$, $p < .001$), well-being ($r = 0.675$, $p < .001$), perceived social support ($r = 0.618$, $p < .001$), and growth mindset ($r = 0.376$, $p < .001$) were all significantly associated with higher levels of learning engagement among rural left-behind children.

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Table 2. Descriptive Statistics and Pearson Correlations Among Major Variables (n = 491)

	M	D	**1**	2	3	4	**5**
1.Grit	3.162	0.712	1				
2.Well-being	3.911	1.263	0.482***	1			
3.Perceived Social Support	4.637	1.468	0.492***	0.668***	1		
4.Growth Mindset	3.756	0.889	0.367***	0.251***	0.230***	1	
5.Learning Engagement	3.651	1.245	0.580***	0.675***	0.618***	0.376***	1

Note: *p < .05, **p < .01, ***p < .001

3.3 Multiple Linear Regression Analysis of Learning Engagement

A multiple linear regression analysis was conducted to identify significant predictors of learning engagement among rural left-behind children. Learning engagement was set as the dependent variable, while the independent variables included two demographic factors from Table 1 (access to mental health services and frequency of parent-child interaction) and four psychological variables from Table 2 (grit, well-being, perceived social support, and growth mindset).The model demonstrated strong explanatory power, with R^2 = 0.593 and adjusted R^2 = 0.588 ($p < .001$). All variance inflation factor (VIF) values were below 2, indicating no significant multicollinearity issues. Collectively, the independent variables accounted for 58.8% of the variance in learning engagement.

As shown in Table 4, well-being ($\beta = 0.347$, $p < .001$), grit ($\beta = 0.259$, $p < .001$), perceived social support ($\beta = 0.238$, $p < .001$), and growth mindset ($\beta = 0.135$, $p < .001$) all had significant positive effects on learning engagement. In contrast, access to mental health services, though negatively coded ($\beta = –0.064$, $p < .05$), indicated that children who had received mental health services exhibited higher levels of engagement. The frequency of parent-child interaction did not significantly predict learning engagement ($\beta = –0.010$, $p = .728$).These findings highlight that both internal psychological resources and external support systems, particularly mental health services and perceived social support, are key contributors to promoting learning engagement among rural left-behind children.

Table 3. Coding Scheme for Independent Variables in the Analysis of Learning Engagement Among Rural Left-Behind Children

Independent variables	Coding
Access to Mental Health Services	Yes = 1; No = 2
Frequency of Parent-Child Interaction	1 = Daily/Multiple times daily 2 = Weekly/Multiple times weekly 3 = Monthly once 4 = Monthly multiple times 5 = Yearly few times 6 = Yearly once 7 = Rarely/Never interact

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Table 4. Multiple Linear Regression Analysis Predicting Learning Engagement Among Rural Left-Behind Children

Variables	B	SE	β	t	p
Constant	0.107	0.265	—	-0.404	0.686
Perceived Social Support	0.202	0.034	0.238	6.003	0.000
Growth Mindset	0.188	0.044	0.135	4.277	0.000
Grit	0.452	0.061	0.259	7.389	0.000
Well-being	0.341	0.040	0.347	8.435	0.000
Access to Mental Health Services	-0.166	0.076	-0.064	-2.176	0.030
Frequency of Parent-Child Interaction	-0.017	0.050	-0.010	-0.347	0.728

Note: Adjusted R^2 = 0.588; F(6, 484) = 117.426

4 Discussion

4.1 Current Status of Learning Engagement Among Rural Left-Behind Children

The findings revealed that the average learning engagement score among rural left-behind children was 3.651 (SD = 1.245), reflecting an overall moderate-to-high level. Despite challenges such as prolonged parental absence and limited educational resources, many left-behind children were able to maintain a certain degree of motivation and involvement in their studies. This may be attributed to improvements in rural educational infrastructure and increased societal attention to the welfare of left-behind children. However, substantial individual differences were observed; some children exhibited signs of learning burnout and reduced attention. These disparities suggest a need for targeted interventions to address the emotional deprivation and accumulated academic stress experienced by this population.

4.2 Factors Influencing Learning Engagement

Learning engagement plays a pivotal role in shaping the academic trajectories of rural left-behind children. This study identified multiple interrelated internal and external factors that significantly influence engagement levels.

Among psychological traits, grit emerged as a significant positive predictor of learning engagement ($\beta = 0.259$, $p < .001$), consistent with the findings of Wang Chengqing [13]. Children with higher grit levels tend to persevere in the face of academic setbacks and sustain their long-term academic goals through enhanced resilience.

Growth mindset also demonstrated a significant positive effect on learning engagement ($\beta = 0.135$, $p < .001$), corroborating the results of Zhao Yanrong and Chang Baorui [6]. Students who view intelligence as malleable are more likely to interpret academic difficulties as growth opportunities, thereby adopting more adaptive coping strategies.

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Subjective well-being was found to be the strongest predictor among the internal psychological variables ($\beta = 0.347$, $p < .001$), in line with the work of Li Binghuang and Guo Liang [5]. High levels of well-being promote engagement through both cognitive and motivational pathways—expanding positive affective experiences and enhancing intrinsic motivation, which together form a reinforcing cycle of academic involvement.

Regarding external support factors, mental health services were associated with significantly higher levels of learning engagement ($p < .05$), echoing findings by Xiong Hongxing et al. [14]. Such services not only improve mental health but also help develop psychological capital that sustains learning behavior.

Perceived social support also showed a strong facilitative effect ($\beta = 0.238$, $p < .001$), consistent with the research by Zhou Wei and Chen Ze [7]. This support encompasses emotional assistance from family, academic guidance from teachers, peer encouragement, and community-based resources. Together, these elements foster both emotional security and academic self-efficacy, creating a holistic environment that promotes sustained engagement.

4.3 Study Limitations

Several limitations should be acknowledged. First, the sample was limited to 491 rural left-behind children, which may restrict the generalizability of the findings. Second, the study employed a cross-sectional design, capturing data at a single time point. This limits the ability to infer causal relationships or track developmental trends. Future research should consider expanding the sample size and employing longitudinal or experimental designs to explore the dynamic interactions and causal pathways between psychological traits, social support, and learning engagement in this population.

5 Conclusions and Recommendations

This study found that the overall level of learning engagement among rural left-behind children was within a moderate-to-high range. Their engagement was significantly influenced by a combination of individual psychological traits—namely grit, subjective well-being, and growth mindset—and external support factors such as perceived social support and access to mental health services. Based on these findings, the following recommendations are proposed to inform targeted intervention strategies and improve educational outcomes for left-behind children.

5.1 Enhancing Individual Psychological Resilience and Adaptability

Given the strong predictive effects of grit, growth mindset, and subjective well-being, it is recommended that schools and families collaboratively implement strategies to foster positive psychological traits in left-behind children. At the school level, grit and growth mindset education should be integrated into the standard curriculum through the design of challenging academic tasks and long-term goal setting. Such efforts can help transform academic difficulties into growth opportunities, cultivating persistence and a proactive learning attitude. Additionally, mental health education should include structured courses on emotional regulation to enhance students' well-being and stress management capabilities.

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At the family level, parents should be guided to recognize and respond to the emotional needs of their children. Through remote communication, parent training, and emotional support, families can help children build confidence, reduce feelings of isolation, and promote consistent academic engagement.

5.2 Strengthening Multilevel Social Support Systems

A coordinated and comprehensive support network involving schools, families, communities, and mental health services should be established. Schools should improve infrastructure for psychological services, provide both individual and group counseling, and ensure collaboration between subject teachers and mental health professionals to monitor students' academic and emotional status.

Families are encouraged to adopt a blended online-offline interaction model to maintain regular communication with their children and remain actively involved in their academic and psychological development. Community-based initiatives—such as peer support groups, interest-based clubs, and care programs—can further enhance the sense of belonging and support among left-behind children.

Moreover, access to mental health services should be expanded. Professional psychological assessment and timely intervention must be made available to every left-behind child, ensuring that mental health support becomes an integral part of their developmental environment.

5.3 Optimizing Policy Safeguards and Resource Allocation

To create an enabling environment for long-term intervention, policymakers must refine institutional frameworks and increase investments in rural educational and mental health infrastructure. Particular emphasis should be placed on constructing school-based mental health service systems, equipping them with well-trained professionals, and maintaining ongoing support mechanisms.

Dedicated funding should be allocated to upgrade facilities, train staff, and support community programs. In addition, routine mental health assessments and policy evaluation mechanisms must be established to ensure accurate implementation and efficient use of resources.

A cross-sectoral collaboration mechanism—linking education, civil affairs, health, and related departments—should be institutionalized. Enterprises and civil society organizations should be actively encouraged to participate in support programs for left-behind children, creating a societal climate of shared responsibility. Such efforts will provide sustained support for enhancing learning engagement and contribute to the comprehensive well-being and development of rural left-behind children.

Author Contributions

Conceptualization: Li Jialian; Methodology: Li Jialian; Software: Li Jialian; Validation: Li Jialian; Formal analysis: Li Jialian; Investigation: Li Jialian; Resources: Chen Xinying; Data Curation: Li Jialian; Writing – original draft preparation: Li Jialian; Writing – translation: Jiang Shijie; Writing – review and editing: Chen Xinying; Visualization: Li Jialian; Supervision: Chen Xinying; Project administration: Chen Xinying; Funding acquisition: Chen Xinying.

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