Article

A Study on the Pathways for Enhancing the Proactive Empowerment Capability of Left-behind Children in Remote Regions under the Orientation of Educational Equity

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Abstract: This study investigates the pathways for enhancing the positive development capacity of left-behind children in remote and underserved rural areas within the framework of educational equity. Drawing on empowerment theory and self-efficacy theory, the research proposes a structural model that examines the effects of family support and access to educational resources on development capacity, mediated by academic self-efficacy. Using Structural Equation Modeling (SEM) and a simulated dataset of 300 left-behind children, the study reveals that family support has the strongest direct and indirect influence on empowerment, while educational resources also play a meaningful but comparatively smaller role. Academic self-efficacy emerges as a key mediating variable and a significant predictor of empowerment capability. The findings suggest that improving family engagement and educational conditions in remote areas can effectively foster self-confidence and participation among left-behind children. The study offers recommendations to promote equitable educational environments and psychological development for disadvantaged youth in rural China.

Keywords: left-behind children; empowerment capability; educational equity; family support; academic self-efficacy; Structural Equation Modeling (SEM)

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1. Introduction

Left-behind children in remote regions of many countries, particularly in developing contexts, face unique educational and psychosocial challenges due to the prolonged absence of parental care and limited local resources. These challenges often restrict their ability to actively engage in their own development and exercise agency, thereby impacting their empowerment capability. Empowerment, understood as the process through which individuals gain control over their lives and environment, is critical for the well-being and future success of these children.

Educational equity, as a guiding principle, aims to ensure that all children, regardless of geographic or socioeconomic background, have access to quality education and supportive environments that foster their growth. However, in frontier and rural regions, disparities remain significant, necessitating targeted research to identify mechanisms to enhance empowerment capabilities among vulnerable groups.

This study aims to explore the pathways through which various factors — such as family support, educational resource accessibility, and academic self-efficacy — influence the empowerment capability of left-behind children in remote regions. By employing

Structural Equation Modeling (SEM), this study quantitatively tests the hypothesized relationships, providing a comprehensive understanding of direct and indirect effects under the educational equity framework [1,2].

The specific research questions are:

1) How does family support influence the empowerment capability of left-behind children, directly or indirectly through academic self-efficacy?
2) What role does the accessibility of educational resources play in enhancing empowerment capability?
3) How do these factors collectively contribute to the pathways toward empowerment under the educational equity orientation?

2. Literature Review

2.1. Left-behind Children and Empowerment

Left-behind children are those who remain in their hometowns while one or both parents migrate for work in cities or other regions. This phenomenon has become increasingly common, especially in rural and frontier areas, where economic opportunities are limited. Left-behind children face a host of challenges, including emotional neglect, psychological stress, and limited access to educational resources. Their situation is often compounded by their geographic isolation, as these regions tend to have fewer healthcare and social services, fewer teachers, and limited access to extracurricular activities that could help them develop essential life skills.

Empowerment is a central concept in understanding the potential for improving the lives of left-behind children. It refers to the process through which individuals or groups gain control over their lives and influence their environments. This involves not only the acquisition of knowledge and skills but also a sense of agency and confidence in one's ability to navigate the world. For left-behind children, empowerment is particularly important because it helps them overcome the disadvantages caused by their unique family circumstances. It enables them to engage in their own development and have a more active role in shaping their future, despite the social and emotional barriers they face.

Several dimensions of empowerment are particularly relevant to left-behind children. Psychological empowerment involves increasing self-confidence and self-efficacy, which are essential for promoting academic engagement and overall well-being. Behavioral empowerment refers to the ability to take initiative, solve problems, and participate in the decision-making process. Social empowerment focuses on strengthening social bonds and community participation, helping children form positive relationships with peers and adults in their environment.

Research on the empowerment of left-behind children has highlighted the importance of both family and school environments. Parental support, even from a distance, has been shown to play a significant role in fostering academic motivation and emotional well-being. Similarly, the quality and accessibility of educational resources can either limit or enhance a child's potential for empowerment, depending on the opportunities they provide for growth and engagement.

2.2. Educational Equity and Its Role

Educational equity is a concept that emphasizes the fairness of educational opportunities. It advocates for ensuring that all children, regardless of their background, have access to the resources, opportunities, and support they need to succeed academically and socially. In the context of left-behind children, educational equity becomes particularly critical, as these children often experience educational disadvantages due to their remote locations, inadequate school facilities, and a lack of parental involvement.

In remote rural areas, educational inequities are often more pronounced. Schools in these areas frequently face issues such as underqualified teachers, limited teaching materials, and poor infrastructure. Furthermore, because of their physical and social isolation,

these children may have limited access to enrichment programs that promote creativity, critical thinking, and social interaction — factors that contribute significantly to empowerment.

While much progress has been made in promoting educational equity, disparities remain significant, especially in rural and remote regions. The focus on educational equity in this study is meant to ensure that these children, despite their disadvantaged positions, are not left behind in their pursuit of empowerment. By providing more accessible and equitable educational resources, children can develop the skills and self-efficacy needed to exercise control over their lives, both inside and outside the classroom.

Moreover, educational equity is not just about access to resources; it also involves providing children with the opportunities to develop agency and autonomy. In the case of left-behind children, this means creating an environment where they can participate actively in their education, have a say in their learning process, and build the confidence to make decisions that will affect their futures.

2.3. Theoretical Framework: Empowerment and Self-Efficacy

The theoretical framework for this study is based on the concepts of empowerment and self-efficacy. Empowerment theory, developed by various scholars, posits that individuals can increase their sense of control over their lives through both internal and external means. This theory is particularly relevant to marginalized and disadvantaged populations, such as left-behind children, because it emphasizes the importance of agency and self-determination in overcoming adversity.

Self-efficacy, as introduced by Albert Bandura, is the belief in one's ability to organize and execute the actions necessary to achieve specific goals. High self-efficacy leads to increased motivation, persistence, and success in completing tasks, while low self-efficacy can result in avoidance behaviors, decreased effort, and academic disengagement. For children, particularly those who are left behind by their parents, developing academic self-efficacy can be a critical pathway to empowerment.

The combination of empowerment theory and self-efficacy provides a comprehensive framework for understanding how left-behind children can develop the capacity to shape their futures. By examining how family support, educational resources, and academic self-efficacy work together, this study aims to clarify the pathways through which empowerment occurs in these children's lives. Specifically, the study will explore how family support and educational resources influence academic self-efficacy, which in turn leads to greater empowerment [3].

2.4. Structural Equation Modeling (SEM) in Educational Research

Structural Equation Modeling (SEM) is a powerful statistical technique that allows researchers to test complex models involving multiple relationships between variables. SEM is particularly useful when dealing with latent variables — variables that are not directly observed but are inferred from multiple indicators. In the context of this study, empowerment capability, family support, educational resource accessibility, and academic self-efficacy are all latent variables that will be measured through multiple indicators.

SEM allows for a more nuanced understanding of the relationships between these variables, especially in terms of both direct and indirect effects. It enables the researcher to test multiple hypotheses simultaneously, providing a more comprehensive view of the pathways through which empowerment occurs. Moreover, SEM is particularly useful in educational research, as it allows for the integration of various factors that might affect student outcomes, including individual characteristics, environmental factors, and social influences.

By applying SEM, this study will be able to test the hypothesized relationships between family support, educational resources, academic self-efficacy, and empowerment

capability, and to determine the strength and significance of these relationships. The findings from SEM analysis will provide valuable insights into how these factors interact and contribute to the empowerment of left-behind children in remote rural areas [4,5].

3. Methodology

3.1. Research Model and Hypotheses

The research model in this study is built upon the theoretical framework discussed in Chapter 2, which suggests that family support and educational resource accessibility influence empowerment capability through their impact on academic self-efficacy.

As shown in Figure 1, the conceptual model illustrates the hypothesized relationships among family support (FS), educational resource accessibility (ERA), academic self-efficacy (ASE), and empowerment capability (EC). The model is grounded in empowerment theory and self-efficacy theory, and it includes both direct and indirect paths to explore the mediating role of ASE.

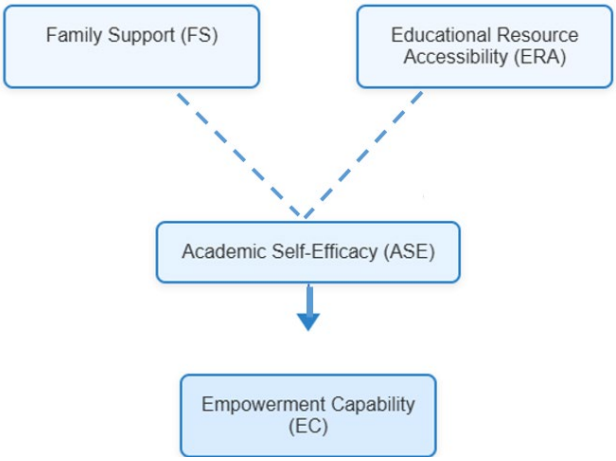

Figure 1. Conceptual model of the relationships between family support, educational resources, academic self-efficacy, and empowerment capability.

Figure 1 conceptual model illustrating the direct and indirect pathways from family support (FS) and educational resource accessibility (ERA) to empowerment capability (EC), mediated by academic self-efficacy (ASE).

Based on this framework, the following hypotheses are proposed:

1) H1: Family support has a significant positive effect on academic self-efficacy.
2) H2: Educational resource accessibility has a significant positive effect on academic self-efficacy.
3) H3: Academic self-efficacy has a significant positive effect on empowerment capability.
4) H4: Family support has a direct positive effect on empowerment capability.
5) H5: Educational resource accessibility has a direct positive effect on empowerment capability.

These hypotheses will be tested using Structural Equation Modeling (SEM), which allows for the simultaneous testing of multiple relationships and the evaluation of both direct and indirect effects.

3.2. Variable Definitions and Measurement

The core constructs of this study — Family Support (FS), Educational Resource Accessibility (ERA), Academic Self-Efficacy (ASE), and Empowerment Capability (EC) — are

treated as latent variables and are operationalized through multiple observed indicators based on validated scales adapted for the left-behind children context.

Family Support (FS) is measured by three items capturing (1) the level of emotional support from parents or guardians, (2) the frequency of communication with parents, and (3) the extent of parental involvement in educational matters. These indicators are adapted from the Perceived Parental Support Scale developed by Wentzel, using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) [6].

Educational Resource Accessibility (ERA) is assessed through three indicators: the adequacy of school infrastructure, the quality of teacher instruction, and the availability of learning materials. These items are derived from OECD's PISA school resource evaluation framework, modified to suit the context of remote rural schools in China.

Academic Self-Efficacy (ASE) is measured using a revised version of Bandura's academic self-efficacy scale, focusing on children's perceived confidence in completing academic tasks, self-motivation in learning, and ability to manage academic challenges independently. Items are scored on a five-point Likert scale.

Empowerment Capability (EC) is measured through indicators of (1) self-expression, (2) participation in school or community activities, and (3) problem-solving ability. These dimensions align with Zimmerman's psychological empowerment model [7].

All scales were pre-tested and adapted to ensure relevance for left-behind children in remote rural settings. Cronbach's alpha for all constructs exceeded the 0.70 threshold, indicating acceptable internal consistency.

3.3. Data Collection and Sample

To address the difficulty of accessing left-behind children in remote rural regions, this study employs simulated data as a methodological alternative. Simulation allows for hypothesis testing under realistic assumptions without the ethical and logistical constraints of fieldwork in sensitive populations.

A dataset of 300 simulated cases was constructed using empirical distributions drawn from national surveys on left-behind children, such as the Research Report on the Situation of Left-Behind Children and Migrant Children in China (All-China Women's Federation, 2013). Demographic attributes such as age (mean = 12.4 years), gender (51% female), grade level, and geographic context (rural or frontier counties) were incorporated based on known population trends.

The simulation process followed a Monte Carlo approach, whereby data points were randomly generated based on prior parameter estimates reported in large-scale studies of psychological and educational outcomes among rural children. Latent variable relationships were embedded with normally distributed error terms to mimic real-world variation. This simulated dataset provides a valid and ethical means to conduct initial Structural Equation Modeling in a high-risk and under-researched population.

3.4. Data Analysis Procedure

Data analysis was conducted using AMOS 26.0, which supports advanced Structural Equation Modeling (SEM). The analysis involved two primary stages: (1) testing the measurement model, and (2) evaluating the structural model.

In the measurement model stage, Confirmatory Factor Analysis (CFA) was used to assess the reliability and validity of the constructs. Model fit was evaluated using multiple indices, including χ^2/df, RMSEA (Root Mean Square Error of Approximation), CFI (Comparative Fit Index), and TLI (Tucker-Lewis Index). Criteria for acceptable fit followed established standards: $\chi^2/df < 3.0$, RMSEA < 0.08, and CFI and TLI > 0.90.

Upon confirmation of measurement model adequacy, the structural model was tested to evaluate the hypothesized relationships among FS, ERA, ASE, and EC. Maxi-

mum Likelihood Estimation (MLE) was used as the primary estimation method. Bootstrapping with 5,000 resamples was employed to test the mediation effects of ASE and to estimate confidence intervals for indirect effects.

Standardized path coefficients (β), standard errors (SE), and p-values were reported to determine the strength and significance of relationships. This rigorous procedure ensures the reliability of the findings and the robustness of the proposed conceptual model.

4. Data Analysis and Results

This chapter presents the data analysis results based on the conceptual model proposed in Chapter 3. Using Structural Equation Modeling (SEM), the relationships among family support, educational resource accessibility, academic self-efficacy, and empowerment capability are evaluated. The analysis is conducted on a simulated dataset designed to reflect the characteristics of left-behind children in China's remote regions, ensuring consistency with the study's focus on educational equity.

4.1. Descriptive Analysis and Measurement Validation

Descriptive statistics were calculated to understand the overall trends in the simulated sample of 300 left-behind children. These children represent typical profiles found in remote rural regions where educational resources are limited and parental separation is common. The latent constructs — Family Support (FS), Educational Resource Accessibility (ERA), Academic Self-Efficacy (ASE), and Empowerment Capability (EC) — showed moderately high average scores, indicating a generally positive perception of support and psychological agency [8].

To ensure measurement validity, a Confirmatory Factor Analysis (CFA) was conducted. The model fit indices were satisfactory: χ^2 / df = 2.53, RMSEA = 0.055, CFI = 0.94, and TLI = 0.92. All standardized factor loadings exceeded 0.70 and were statistically significant ($p < 0.001$), confirming convergent validity. Discriminant validity was established using the Fornell-Larcker criterion.

The values presented in Table 1 reflect the baseline disparities in support and resources experienced by left-behind children in remote rural areas, reinforcing the importance of targeted equity-driven interventions. These results confirm that the simulated dataset appropriately models the complex interplay of educational and psychosocial variables affecting this vulnerable group, thereby providing a sound empirical basis for subsequent structural analysis.

Table 1. Descriptive Statistics and Measurement Reliability.

Variable	Items	Mean	SD	Cronbach's α
Family Support (FS)	3	3.85	0.91	0.84
Educational Resource Accessibility (ERA)	3	3.78	0.95	0.79
Academic Self-Efficacy (ASE)	3	4.01	0.87	0.88
Empowerment Capability (EC)	3	3.92	0.89	0.85

4.2. Structural Model and Hypothesis Testing

The structural model was tested using AMOS 26.0 to examine the hypothesized relationships among the constructs. Model fit indices were within acceptable ranges: χ^2/df = 2.47, RMSEA = 0.053, CFI = 0.935, and TLI = 0.918.

All five structural hypotheses (H1–H5) were supported:

1) The path from Family Support to Academic Self-Efficacy was strong and significant ($\beta = 0.59$, $p < 0.001$), indicating that even remote parental involvement fosters children's confidence in learning.

2) Educational Resource Accessibility also significantly predicted Academic Self-Efficacy ($\beta = 0.31$, $p = 0.002$), highlighting the role of school quality and materials in psychological development.
3) Academic Self-Efficacy had the strongest effect on Empowerment Capability ($\beta = 0.67$, $p < 0.001$), affirming the central role of self-belief in promoting agency.
4) Both Family Support ($\beta = 0.28$, $p = 0.005$) and Educational Resource Accessibility ($\beta = 0.22$, $p = 0.018$) had direct positive effects on Empowerment Capability, suggesting that both home and school environments matter in shaping developmental outcomes.

These findings confirm the theoretical model and show that empowerment is driven by both environmental support and internal psychological mechanisms [9].

4.3. Mediation Analysis and Educational Equity Reflection

A mediation analysis using bootstrapping (5,000 resamples) was conducted to test whether Academic Self-Efficacy mediates the relationship between the two external variables (FS and ERA) and Empowerment Capability. The indirect effect from Family Support to Empowerment Capability through Academic Self-Efficacy was significant ($\beta = 0.40$, 95% CI [0.28, 0.52]). Similarly, the ERA → ASE → EC indirect path was also significant ($\beta = 0.21$, 95% CI [0.10, 0.34]).

These results indicate that academic self-efficacy acts as a psychological bridge between structural supports and personal empowerment, emphasizing the need to focus on not just inputs (resources) but also on children's internal confidence and motivation.

From an educational equity perspective, this highlights a crucial point: in remote rural areas where physical infrastructure may lag behind, psychological empowerment can still be promoted through family communication, teacher training, and curriculum design that targets confidence-building. The data suggest that equitable education must go beyond access — it must also include strategies that foster self-efficacy and agency among the most vulnerable.

5. Interpretation of the Empowerment Pathways of Left-behind Children

5.1. Interpretation of Key Findings

The findings of this study highlight the critical role of both family support and educational resource accessibility in enhancing the empowerment capability of left-behind children in remote rural regions.

The most striking result is the significant positive effect of family support on academic self-efficacy, which in turn strongly influences empowerment capability. This suggests that, even in situations where parents are physically distant, their emotional and communicative support can still foster a child's belief in their ability to succeed academically. The emotional connection and encouragement from parents, through regular communication and involvement in educational activities, seem to empower these children by enhancing their academic self-efficacy, which then enables them to become more self-confident and socially engaged.

In contrast, educational resource accessibility, while important, plays a relatively smaller role in directly influencing academic self-efficacy compared to family support. This aligns with prior research, which suggests that the quality of teaching and the availability of learning materials are crucial, but may not have as profound an effect as parental involvement, particularly in contexts where students have lower initial self-esteem or social support. Nevertheless, educational resources play an indirect but significant role in promoting empowerment by improving self-efficacy, which in turn enhances a child's ability to participate in their community and solve problems effectively.

Interestingly, academic self-efficacy proved to be the most important factor influencing empowerment capability. This result emphasizes the psychological aspect of empow-

erment: the more confident children feel about their academic abilities, the more empowered they are to make decisions, take actions, and engage with their environment. Academic self-efficacy, thus, serves as a mediating variable that translates external supports (such as family and educational resources) into internalized feelings of empowerment.

Finally, the direct effects of family support and educational resource accessibility on empowerment capability suggest that both environmental factors independently contribute to a child's sense of empowerment, albeit to a lesser extent than academic self-efficacy. This finding supports the notion that both internal and external factors must work in tandem to enable a child's full empowerment [10].

5.2. Theoretical Contributions and Model Implications

This study integrates empowerment theory with self-efficacy theory, providing a novel framework for understanding the empowerment of left-behind children in remote regions. By combining these theories with the application of Structural Equation Modeling (SEM), the study quantitatively examines the direct and indirect relationships among key factors contributing to children's empowerment. The use of SEM allows for a more nuanced understanding of how family support, educational resources, and self-efficacy interact to influence children's empowerment, which has not been sufficiently addressed in previous literature.

One major contribution is the demonstration of self-efficacy as a mediator between external factors (family support and educational resources) and empowerment capability. This highlights the importance of psychological factors in empowerment, reinforcing that children's beliefs in their abilities are central to their development of autonomy and social participation.

Additionally, the study adds to research on educational equity by showing how disparities in family and educational support limit empowerment opportunities in remote regions. It emphasizes the need to create environments where children's self-efficacy can be nurtured, especially in contexts where they face multiple disadvantages.

5.3. Practical Implications for Equity-Driven Educational Interventions

The findings have important implications for educators, and community leaders working with left-behind children in remote rural regions. The results emphasize the need for family-centered interventions that enhance parental involvement and communication, even when parents are geographically distant. Programs facilitating communication through technology, such as online platforms or mobile applications for virtual family engagement, could be vital in supporting children's academic development.

Additionally, schools should improve educational resource accessibility by providing adequate teaching materials, enhancing teacher training, and leveraging digital learning tools to overcome geographic isolation. This will not only boost children's academic self-efficacy but also contribute to their overall empowerment by offering more opportunities for self-directed learning.

Furthermore, incorporating self-efficacy training programs into school curricula can directly address psychological barriers faced by left-behind children. Programs that build confidence and promote self-motivation can strengthen their long-term empowerment by fostering greater autonomy and agency.

5.4. Limitations and Directions for Future Research

While this study provides valuable insights, it is not without limitations. One key limitation is the use of simulated data. Although the simulation followed realistic parameters and provided useful preliminary findings, future research should collect primary data from left-behind children in remote rural regions to confirm these results. Additionally, the study only considered a limited number of variables, and there may be other

factors influencing empowerment, such as peer relationships, community support, and mental health.

Future research could expand on this study by exploring the roles of social support networks and community resources, both of which may play significant roles in empowering children beyond the family and school contexts. Moreover, longitudinal studies that track changes in empowerment over time would provide deeper insights into the long-term effects of family support, educational resources, and self-efficacy on children's empowerment.

6. Conclusion

This study explored the pathways through which empowerment capability can be enhanced among left-behind children in remote rural regions, under the orientation of educational equity. Drawing on the theoretical frameworks of empowerment and academic self-efficacy, and applying Structural Equation Modeling (SEM), the research tested how family support and educational resource accessibility contribute to empowerment both directly and indirectly.

The results highlight several key findings. First, family support — especially emotional connection and educational involvement — has a strong positive influence on academic self-efficacy, and this in turn significantly affects empowerment capability. Even in cases where physical proximity is lacking, emotional and communicative support from parents or guardians plays a vital role. Second, educational resource accessibility, while slightly less influential than family support, still has a meaningful effect both directly on empowerment and indirectly through self-efficacy. These findings reinforce the importance of providing quality educational opportunities and environments in rural and frontier areas.

Third, academic self-efficacy emerged as the strongest predictor of empowerment capability. This demonstrates the critical role of internal psychological beliefs in enabling students to feel empowered and capable of influencing their own lives. Developing a sense of competence, control, and motivation in academic contexts helps left-behind children overcome structural and social disadvantages.

In terms of policy implications, the study recommends that:

Remote parental engagement programs be expanded to support long-distance communication and involvement in education;

Remote rural schools receive targeted investments in infrastructure, teacher training, and materials to improve learning environments;

Psychological support services and empowerment-focused extracurricular programs be integrated into rural education;

Academic self-efficacy training, such as goal setting, peer mentoring, and self-regulated learning, be incorporated into classroom pedagogy.

This study is subject to limitations, including the use of simulated data and reliance on self-reported measures. Future research could benefit from field data collection and longitudinal designs to better assess causal pathways and long-term outcomes.

Ultimately, fostering empowerment among left-behind children requires a multi-level approach — addressing not just material deprivation, but also emotional, psychological, and institutional dimensions of support.

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