

## RESEARCH ARTICLE

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# I am better because of your expectation: Examining how left-behind status moderates the mediation effect of perceived parental educational expectation on cognitive ability among Chinese rural students

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**Abstract**

**Background:** Chinese rural students have been documented to have relatively delayed cognitive development. From an ecological system perspective, empirical studies have identified the significant effect of the proximal environment on Chinese rural students' cognitive development. Yet, little do we know the mechanism behind that. More importantly, how the mechanism differs among rural students with different left-behind characteristics remains obscure.

**Methods:** Drawing longitudinal data from a nationally representative survey, this study examines the interrelations between rural students' parental educational expectation perception, their own educational expectation, and cognitive ability. Two models were examined using path analysis. The first mediation model tests the mediating effect of educational expectation between the association of parental educational expectation perception and cognitive ability, while the second moderated mediation identifies the moderating effect of rural students' left-behind status on the association between their parental educational expectation perception and educational expectation.

**Results:** The first mediation analysis reveals that rural students' perception of parental educational expectation is positively correlated with their educational expectation, which further positively correlated with their cognitive ability. The following moderated mediation analysis suggests that students' left-behind status significantly moderated the effect of their perceived parental educational expectations on their own educational expectation.

**Conclusions:** Chinese rural students' perception of parental educational expectation affects their cognitive ability through their own educational expectations. The number of migrant parents within a family further moderates the indirect effect of educational expectation.

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## KEYWORDS

Chinese rural students, cognitive ability, educational expectation, left-behind status, perceived parental educational expectation

## 1 | INTRODUCTION

Cognitive development is an important aspect of children's growth. It determines their later academic attainment and professional development (Kytala & Lehto, 2008). Despite the global pledge of equitable cultivation of adolescents from different cultural, ethnic, and socioeconomic backgrounds, the rapid economic growth in China is accompanied by a substantial rural–urban disparity in cognitive capacity (Whyte, 2010). The study by Hao and Yu (2017), for example, noticed that the cognitive ability of urban ninth graders is 24.8% and 31.6% of a standard deviation above their rural peers and those left behind by their rural migrating parents, respectively. A capital approach based on Bourdieu's reproduction theory has prevailed in explaining the prolonged cognitive developmental delay of rural population in China and worldwide (Lareau, 2003; Li & Qiu, 2018; Poon, 2020; Sheng, 2014). The volume and composition of family capital are key to its children's developmental success (Bourdieu, 1990, 1996). Rural parents, who hold less economic resources are less capable of investing in cultivating their children's cognition compared with their urban counterparts (Chen & Yang, 2009; Xiao & Liu, 2022; Xu & Montgomery, 2021).

Yet, given that the macro financial situation of rural families is unlikely to be shaken in the short term, more recent studies found on Bronfenbrenner's Ecological System Theory have shifted their focus from the distal economic context to the proximal processes in promoting rural kids' development (e.g., Gan, 2023; Peng, 2021; Su et al., 2017; Wang et al., 2019; Wu et al., 2015; Zhang et al., 2021). For example, the multivariate logistic regression by Xiao et al. (2020) revealed that perceived parental support was negatively associated with rural left-behind students' depression, which further positively correlates with their suicide ideation. Among all the proximal processes, parental factors draw the most attention because family is considered the most intimate context for a child's growth (Liao et al., 2011). In a Chinese rural context, it is also because the large-scale domestic migration alters the family structure and leaves rural left-behind students growing up without sufficient parental involvement (Wen & Lin, 2012). Family context is one of the crucial elements of children's microsystem in their development.

This present study is of the same kind as those existing studies scrutinizing the interrelations among parental factors, students' internal factors, and their development outcomes. Drawing upon the longitudinal China Education Panel Survey (CEPS) data, this study examines how rural students' perception of parental expectation towards their education (perceived parental educational expectation) affects their cognitive ability through their own educational expectations. In the context of domestic migration, this study further investigates how the hypothesized association between perceived parental expectation and rural students' own educational expectation varies

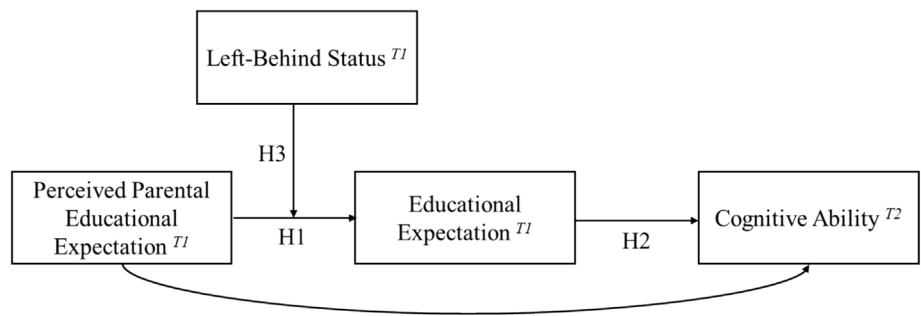
### Key Messages

- Chinese rural students' perception of parental educational expectation is positively associated with their own educational expectations.
- Chinese rural students with higher educational expectations perform better in cognitive tests.
- Rural students' left-behind status moderates the association between their perceived parental educational expectation and their own educational expectations, in which the association becomes weaker when the number of migrant parents of a family increases.

among students of different left-behind characteristics (i.e., non-left-behind, left behind by one parent, and left-behind by both parents).

This study pays special attention to the moderating effect of parental migration on the correlation between rural students' perceived parental educational expectation and their own educational expectation. The reason for this focus lies in rural parents' incapability of offering concrete support in their kids' cognitive or educational development, as empirical studies consistently suggest (Chen et al., 2023; Xu & Montgomery, 2021; Yu, 2020). First, existing scholarly discussion abounds in accentuating the importance of residing parents in fostering children's internalization of parental educational values. As manifested in both Cognitive Learning theory and Status Attainment theory, parents serve as role models for their kids (Bandura, 2014; Sewell et al., 1970). Children receive parental influence through direct parent–child interactions or by observing and comprehending their parents' behaviors, both of which might be facilitated by parents' physical accompaniment (Ceka & Murati, 2016). Regarding the correlation between left-behind students' educational expectation and their cognitive development, it might also be contingent on parental migration. This is mainly because the educational support from the residing parents promotes the translation of children's educational expectation to developmental outcomes. However, this might not be the case among Chinese rural students, since rural migrant parents are likely to have a low education themselves and are incompetent to render academic support to their kids, whether they live with them or not (Murphy, 2020; Xu & Montgomery, 2021; Ye & Pan, 2011). For the same token, parental migration might affect rural students' perception of parental educational expectation but have limited impacts on rural students' translation of their perceived parental educational expectation into cognitive development. In this light, this study aims to ascertain the moderating effect of parental migration on the relationship between rural students' perceived parental migration and their own educational expectations and identify the protective

**FIGURE 1** The conceptual model about the moderated mediation relationships among perceived parental educational expectation, left-behind status, educational expectation, and cognitive ability.



role of residing parents in fostering rural students' educational expectations and further cognitive ability. The conceptual model of the study is depicted in Figure 1. It tests three hypotheses:

**Hypothesis 1.** Perceived Parental Educational Expectation would be positively associated with rural students' Educational Expectation.

**Hypothesis 2.** Rural students' Educational Expectation would be positively associated with their Cognitive Ability.

**Hypothesis 3.** Left-Behind Status would moderate the association between Perceived Parental Educational Expectation and Educational Expectation, in which the association would be weaker when the number of migrant parents increases.

## 2 | METHOD

### 2.1 | Data & participant

The data used for this analysis is drawn from the China Education Panel Survey (CEPS), a national education survey conducted by Renmin University of China. CEPS employs a stratified multistage sampling design with a probability proportional to size method and collects comprehensive information from individual, family, and school levels. The wave one survey in 2013–2014 collected information from approximately 20 000 school students (7th & 9th graders) of 112 junior high schools across 28 county-level units. The 10 279 grade 7 students in wave one were invited for the wave two survey a year later, and 9449 were successfully followed up.

After removing the urban student population from both waves, we merged the two datasets and obtained a matched sample size of 2915. After removing the missing values, the final sample size for model analysis is 2373. Table 1 details the demographic profile of the participants. The distribution of the participants in each sex group is almost even. Participants were in grade seven when surveyed. Their age mainly ranges from 13 to 15 (95.8%). Around one-quarter (26.7%) of the student informants were the only child of the family. As for

**TABLE 1** Demographics of participants.

Demographic characteristics	Frequency (N = 2373)	Percentage (%)
Gender		
Male	1213	51.1
Female	1160	48.9
Age		
12	62	2.6
13	1062	44.8
14	1009	42.5
15	202	8.5
16	35	1.5
17	2	.1
18	1	.0
Only-child status		
Only-child	634	26.7
Non-only-child	1739	73.3
Left-behind status (no. of residing parent)		
0	376	15.8
1	337	14.2
2	1660	70
Writing desk		
Yes	1602	67.5
No	771	32.5
Books		
1 (little)	446	18.8
2 (A few)	381	16.1
3 (somewhat)	915	38.6
4 (much)	441	18.6
5 (A great deal)	190	8.0
Computer & WIFI		
0 (neither)	1128	47.5
1 (only computer)	225	9.5
2 (both)	1020	43.0

left-behind status, the majority (70%) were living with both parents. 67.5% of the student informants in this study had their own writing desks. Over half (65.2%) of them reported having sufficient books at

home. Further, while nearly half of them (47.5%) did not have access to computers or the Internet, 9.5% of them reported only having computers, and 43% of them had access to both computers and the Internet at home.

## 2.2 | Measures

### 2.2.1 | Cognitive ability

In CEPS, individuals' cognitive ability was assessed by a cognitive scale of 20 items. The scale measures children's logical thinking and problem-solving abilities, and the content of the 20 items is irrelevant to students' in-class learning (Wang & Li, 2015). In wave one, the cognitive ability test of CEPS consists of three dimensions and 11 factors. The first dimension of language is comprised of verbal analogy and verbal reasoning. The second dimension of non-verbal and space reasoning is constituted by figure analysis, geometric figure application, and Origami folding. The last dimension is quantitative reasoning, which mainly examines participants' mathematical calculation ability. In total, 20 questions were generated based on the three dimensions for 7th graders in the wave one survey. The Cronbach's alpha of the scale, as provided by CEPS, is 0.69 (Wang & Li, 2015), which is considered moderately acceptable. Three sets of cognitive tests were applied in wave two. Students were assigned to different tests based on their cognitive score in wave one, with those scoring higher in wave one doing the more difficult test in wave two.

### 2.2.2 | Educational expectation

Educational expectation is assessed by the extent to which individuals want to achieve in school (i.e., what is the highest level of education you expect yourself to receive?). Response categories consist of "drop now" (coded as 1), "graduate from junior high school" (coded as 2), "go to technical secondary school or technical school" (coded as 3), "go to vocational high school" (coded as 4), "go to senior school" (coded as 5), "graduate from junior college" (coded as 6), "get a bachelor degree" (coded as 7), and "get a Master's degree" (coded as 8), and "get a Doctoral degree" (coded as 9). Similar to the measure of their own educational expectation, student's perceived parental educational expectation is assessed by one item (i.e., what is your parents' expectation on you in terms of your educational achievement?). The same response categories and coding were applied from the educational expectation measure.

### 2.2.3 | Left-behind status

In this study, rural left-behind children are rural children who are under 16 and left behind by one or both migrant parents (Lei et al., 2018; Zhou et al., 2020). Rural students' left-behind status is measured by the number of parents residing together with them in

rural villages. They are categorized into three groups: non-left-behind-children (NLBC, left-behind status = 2); children left behind by a single parent (LBCS, left-behind status = 1); & children left behind by both parents (LBCB, left-behind status = 0).

### 2.2.4 | Covariates

The autoregressive effect of cognitive ability was controlled in all analyses through regressing cognitive ability at Time 2 on cognitive ability at Time 1. In addition, all analyses were performed with the control of participants' demographic features (i.e., age, gender, only-child status), family educational resources (i.e., possession of writing desks, number of books, and access to computer and Internet), and parental involvement (i.e., parental time, parental homework involvement, and parents' education level). Among them, parental time was measured with six items regarding parents' frequency of spending time having dinner, reading, watching TV, playing sports, visiting museums and zoos, and going out for movies, shopping, and sports games with their children. Each item was rated on a six-point scale, consisting of never, once a year, biannually, once a month, once a week, and more than once a week. Parental homework involvement was measured with two items about parents' frequency of checking students' homework and providing instruction on students' homework in the past week. Each item was rated on a four-point scale, consisting of never, one to two days, three to four days, and almost every single day. Finally, information about the highest level of education attained by the mother and the father was provided in CEPS. In line with international practice (e.g., National Center for Children in Poverty, 2007), we operationalized parents' education level as the highest education level obtained by either the mother or father of the children.

## 2.3 | Analytic strategy

To examine our hypotheses, two models were tested using path analysis, namely a mediation model and a moderated mediation model. For Hypotheses 1 and 2, a mediation model was established to examine whether students' perceived parental educational expectation would affect their cognitive ability through their own educational expectation. Specifically, students' educational expectation at Time 1 was regressed on their perceived parental educational expectation at Time 1, while students' cognitive ability at Time 2 was further regressed on their educational expectation at Time 1 and their perceived parental educational expectation at Time 1. For Hypothesis 3, built upon the above mediation model, a moderated mediation model was further established to examine whether the mediation effect of students' perceived parental educational expectation on cognitive ability would be contingent on their left-behind status, yielding a moderated mediation effect. Particularly, based on the above mediation model, students' educational expectation at Time 1 was further regressed on their left-behind status as well as an interaction term between students' perceived parental educational expectation at Time

1 and left-behind status. In both models, there are three noteworthy issues. First, the autoregressive effect of cognitive ability was controlled in all analyses through regressing cognitive ability at Time 2 on cognitive ability at Time 1. Second, all analyses were performed with the control of demographic information, namely, age, gender, only-child status, and parents' education level. Finally, following Hayes (2015), a 95% bias-corrected bootstrap confidence interval (BCCI) based on 5000 bootstrap samples was computed to test the mediation effects and the index of moderated mediation.

### 3 | RESULTS

Descriptive statistics and bivariate correlations are summarized in Table 2. On average, parental educational expectation perceived by students in this study is between junior college and a bachelor's degree ( $M = 6.7$ ,  $SD = 1.67$ ). Students' average educational expectation is similar but slightly higher than their perception of parental educational expectation ( $M = 6.87$ ,  $SD = 1.70$ ). Rural students' average educational expectation in this study is consistent with the ones documented in previous studies (e.g., Chang et al., 2016). Rural students' cognitive ability at Time 2 is positively correlated with their cognitive ability at Time 1 ( $r = .295$ ) perceived parental educational expectation ( $r = .236$ ) and their own educational expectation ( $r = .280$ ). In addition, rural students' perceived parental educational expectation is positively correlated with their educational expectations ( $r = .64$ ).

#### 3.1 | A mediation model about the effect of students' perceived parental educational expectation on their cognitive ability

To examine Hypotheses 1 and 2, path analysis was used to test whether the effect of students' perceived parental educational expectation on their cognitive ability would be mediated by their own educational expectation. As shown in Figure 2, students' perceived parental educational expectation at Time 1 was positively associated with their own educational expectation at Time 1,  $b = .628$ ,  $\beta = .617$ ,  $p < .001$ , supporting Hypothesis 1. Over and above the autoregressive

**TABLE 2** Descriptive statistics and bivariate correlations among variables.

	M (SD)	1	2	3	4
1. LBS	-	-			
2. PPEE1	6.70 (1.67)	.034	-		
3. EE1	6.87 (1.70)	.017	.634***	-	
4. CA1	10.53 (3.20)	.041*	.210***	.266***	-
5. CA2	22.57 (6.55)	.041*	.236***	.280***	.295***

Abbreviations: CA1, cognitive ability at Time 1; CA2, cognitive ability at Time 2; EE1, educational expectation at Time 1; LBS, left-behind status; PPEE1, perceived parental educational expectation at Time 1.

\* $p < 0.05$ , \*\* $p < 0.01$ , and \*\*\* $p < 0.001$ .

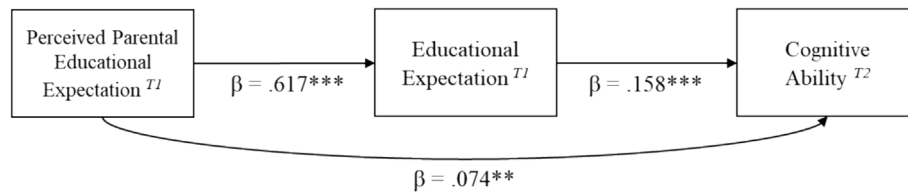
effect of cognitive ability at Time 1,  $b = .372$ ,  $\beta = .183$ ,  $p < .001$ , student's educational expectation at Time 1 was positively associated with their own cognitive ability at Time 2,  $b = .610$ ,  $\beta = .158$ ,  $p < .001$ , supporting Hypothesis 2. Taken together, the bootstrapping results indicated that the mediation effect of students' educational expectation between their perceived parental educational expectation and their cognitive ability was significant,  $b = .383$ , BCCI [.257, .515]. This suggests that rural students' perceived parental educational expectation affects their cognitive ability through their own educational expectation. All the path coefficients in the mediation model were presented on the left panel in Table 3.

#### 3.2 | A moderated mediation model about the conditioning effect of left-behind status

To examine Hypothesis 3, path analysis was used to examine whether the mediation effect identified above would be contingent on students' left-behind status, yielding a moderated mediation effect. Overall, the moderated mediation model (Figure 3) yielded a good fit to the data,  $\chi^2(2) = 4.1252$ ,  $p = .127$ , CFI = 0.999, NNFI = .984, SRMR = .002, RMSEA = .021, 90% CI for RMSEA [.000, .051]. Similar to the mediation model, students' perceived parental educational expectation at Time 1 was positively associated with their own educational expectation at Time 1,  $b = .530$ ,  $\beta = .521$ ,  $p < .001$ , which in turn was positively associated with their cognitive ability at Time 2,  $b = .610$ ,  $\beta = .158$ ,  $p < .001$ . Most critically, students' left-behind status significantly moderated the effect of their perceived parental educational expectation at Time 1 on their own educational expectation at Time 1,  $b = .064$ ,  $\beta = .220$ ,  $p = .003$ . Taken together, the index of moderated mediation was significant,  $b = .039$ , BCCI [.001, .090], indicating that the mediation effect of students' perceived parental educational expectation on their cognitive ability through their own educational expectation was contingent on their left-behind status. Specifically, the mediation effect of perceived parental educational expectation on cognitive ability exhibited a hierarchical pattern of strength, with the strongest effect observed among non-left-behind children,  $b = .401$ , BCCI [.270, .544], followed by children left-behind by a single parent,  $b = .362$ , BCCI [.242, .485], and subsequently by children left-behind by both parents,  $b = .323$ , BCCI [.212, .459]. This suggests a moderating effect of left-behind status on the association between rural students' perceived parental educational expectation and their own educational expectation, in which the association becomes weaker when the number of migrant parents of a rural family increase. All the path coefficients in the moderated mediation model were presented on the right panel in Table 3.

### 4 | DISCUSSIONS

From an ecological system perspective, children's development is by no means individual but largely shaped by their external environment. It mirrors the complex interplay between individuals' characteristics



**FIGURE 2** The mediation model testing the effect of students' perceived parental educational expectation on their cognitive ability through their educational expectation. Note. The autoregressive effect of cognitive ability was controlled in the model. \*\* $p < .01$ , \*\*\* $p < .001$ .

	Mediation model			Moderated mediation model		
	<i>b</i>	$\beta$	<i>p</i> -value	<i>b</i>	$\beta$	<i>p</i> -value
<i>Outcome: EE1</i>						
Age1	−0.118	−.052	.002	−0.121	−.054	.001
Gender1	0.141	.042	.009	0.141	.042	.009
Only-child status1	0.030	.008	.634	0.025	.007	.688
Parents' education level1	0.018	.016	.334	0.016	.014	.402
Writing desk1	0.071	.020	.271	0.069	.019	.238
Book1	0.056	.039	.033	0.058	.040	.027
Computer & WIFI1	−0.002	−.001	.944	0.002	.001	.947
Parental involvement1	0.000	.000	.981	0.001	.001	.970
Parental time1	0.008	.031	.101	0.010	.038	.052
PPEE1	0.628	.617	<.001	0.530	.521	<.001
LBS1	-	-	-	−0.486	−.216	.001
LBS1 × PPEE1	-	-	-	0.064	.220	.003
<i>Outcome: CA2</i>						
Age1	−1.255	−.144	<.001	−1.255	−.144	<.001
Gender1	−0.622	−.048	.012	−0.622	−.048	.012
Only-child status1	0.332	.022	.247	0.332	.022	.247
Parents' education level1	0.192	.044	.024	0.192	.044	.024
Writing desk1	0.442	.032	.134	0.442	.032	.134
Book1	0.349	.063	.004	0.349	.063	.004
Computer & WIFI1	0.562	.082	<.001	0.562	.082	<.001
Parental involvement1	−0.330	−.104	<.001	−0.330	−.104	<.001
Parental time1	0.004	.004	.860	0.004	.004	.860
CA1	0.375	.183	<.001	0.375	.183	<.001
EE1	0.610	.158	<.001	0.610	.158	<.001
PPEE1	0.290	.074	.002	0.290	.074	.002

Abbreviations: CA1, cognitive ability at Time 1; CA2, cognitive ability at Time 2; EE1, educational expectation at Time 1; LBS, left-behind status; PPEE1, perceived parental educational expectation at Time 1.

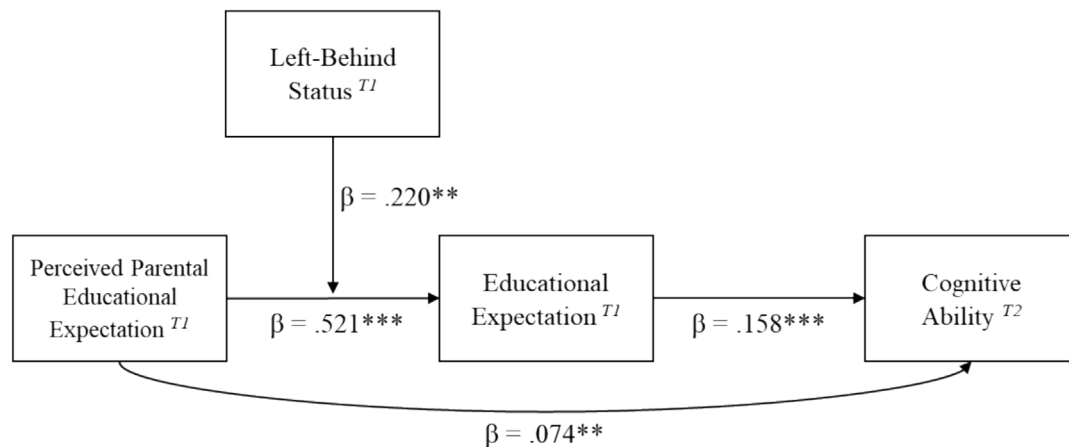
and the environmental factors. Drawing upon the longitudinal data from CEPS, this study explores the interrelations among rural students' perception of parental educational expectation, their own educational expectation, and cognitive outcomes. It further investigates how the association between perceived parental educational expectation and educational expectation varies among rural children with different left-behind features.

#### 4.1 | Educational expectations: from parents to children

Our analysis found that Chinese rural students' perception of parental educational expectation positively correlates with their own educational expectation. That is, those who perceive a high academic expectations from parents exhibit high expectation toward their educational

**TABLE 3** Results of path analysis in the mediation and moderated mediation models.





**FIGURE 3** The moderated mediation model testing the conditioning effect of left-behind status. Note: The autoregressive effect of cognitive ability was controlled in the model. \*\* $p < .01$ , \*\*\* $p < .001$ .

achievement. This piece of finding is supported by established theories; it also echoes existing empirical findings. The early theoretical discussions pertaining to students' educational expectation are found on the *Status Attainment Theory*, which proposes a pathway of family socioeconomic reproduction through the intergenerational transmission of educational attitudes (Sewell et al., 1970). Parents play a critical role in moulding a kid's value system. The internalization of parental values and attitudes constructs children's own expectation which further determines their educational and occupational achievement (Kristensen et al., 2009). The linkage between environmental factors (e.g., parental influence) and individuals' cognitive factors (e.g., knowledge, expectations, and attitudes) and behaviour is also demonstrated in Albert Bandura's *Social Cognitive Theory* (Bandura, 2014; Gauvain, 2001).

In effect, a bulk of educational studies in a Chinese context have verified the positive correlation between perceived parental expectation and students' educational expectation (e.g., Liu et al., 2023; Song et al., 2023; Wu et al., 2018). For example, Song et al. (2023) investigated the developmental transition of around 600 high school students in Chinese urban and rural schools. Latent transition analysis revealed that students with high parental educational expectation perception exhibit high educational future orientation. In a rural context, two recent qualitative studies also observed that rural children perceiving high parental educational expectations tend to have high educational aspiration and learning motivation (Chen et al., 2023; Xu & Montgomery, 2021). Yet, to the best of our knowledge, this study is the first endeavor to quantitatively test such correlation within the Chinese rural student population.

## 4.2 | Educational expectation and cognitive ability

While Empirical evidence of the positive correlation between students' educational expectations and their educational achievement abounds, the correlation between student's educational expectations

and cognitive ability remains obscure. Our analysis shed some light on this. Rural students with higher educational expectation scored higher on the cognitive test. Such a positive correlation might be attributed to rural students' educational attitudes and learning efforts. High educational expectations are always fraught with a strong sense of purpose in education and a great learning enthusiasm in both formal and informal settings (Masten & Coatsworth, 1998). Likewise, students' determination of academic attainment derived from their aspirations drives them to put extra effort in learning and prevents them from early school dropouts (Wigfield & Eccles, 2002). These positive gestures toward education not only lead to positive educational outcomes, as previous studies demonstrated, but also foster students' cognitive growth (Bandura, 1993). For example, Buchmann et al. (2022) noticed in their longitudinal study with Swiss adolescents that a strong academic self-concept is correlated with better cognitive competence. Taken together, we observed a mediating effect of educational expectation on the association between rural students' perceived parental educational expectations and their cognitive ability. Rural children who perceive high parental expectation are likely to have a high educational expectation, which, in turn, positively affect their cognitive growth.

## 4.3 | The moderating effect of left-behind status

Given that rural students' perception of parental expectation positively correlates with their educational expectation, we further observed that their left-behind status moderates this association, which becomes weaker when the number of migrant parents in a family increases. The underlying reason might lie in the negative impact of parental migration on left-behind children's educational perception. We suggest that the reason behind this is twofold. First, the lack of parental support and involvement in their learning would cause left-behind students the feeling of being left alone, which would obstruct their internalization of parental expectation (Su et al., 2013). Studies on parental migration worldwide have noticed that, despite

the economic return in the form of remittance, parental leave always leads to left-behind children's emotional turmoil and a disillusioned feeling toward the future, which further derail their learning attitude and effort (Coe, 2014; Lu et al., 2019; Parreñas, 2005; Wu & Cebotari, 2018). The comparative study of Su et al. (2013) might lend some evidence to this argument. It shows that rural children left behind by both parents exhibited the lowest level of school satisfaction compared with their non-left-behind peers. Second, we suggest that insufficient parental educational involvement and support given to rural left-behind students would prevent them from converting their perception of parental educational expectations to their own educational expectations. Rural left-behind children are likely to receive less parental educational involvement and companionship compared with their non-left-behind peers (Lu et al., 2019). That is, despite their reception of parental educational expectation, left-behind children who receive relatively insufficient parental educational involvement and companionship might perceive more challenges and less support in achieving their educational goals and, therefore, exhibit low educational expectation.

## 5 | CONCLUSIONS

The deficient support from parents increases rural left-behind adolescents' vulnerability to educational and cognitive growth. Research concerning the promotion of Chinese rural left-behind adolescents' cognitive growth should take into consideration the role of parental expectations in shaping their children's internal assets. Although migration-induced parental separation makes it difficult for migrant parents to be physically involved in their left-behind children's education and cognitive development, this study found that rural parents' high and positive educational expectations perceived by their children might enhance their educational expectations and further foster their cognitive growth. It also revealed a moderating effect of left-behind feature on the correlation between perceived parental educational expectations and rural children's own educational expectations. Compared with those residing with both parents, it is more difficult for rural left-behind children to internalize the educational expectations from their parents and convert them into positive cognitive outcomes. The findings of this study offer an alternative approach for policy-makers to improve Chinese rural left-behind students' cognitive outcomes. In addition to the central government's current macro-level policy reforms to increase the educational resources to rural left-behind children, perhaps it is imperative to enhance rural left-behind children's educational attitude through their proximal environment, such as improving migrant parents' educational expectation toward their rural left-behind children revealed in this study. On top of this, relevant intervention programs should be implemented to foster positive communication between migrant parents and their left-behind children and to equip migrant parents with critical skills in delivering their positive expectations to their left-behind kids.

Our study has several limitations. First, although this analysis is based on longitudinal data, the causality between educational

expectation and cognitive ability cannot be inferred even with cognitive ability at Time 1 being controlled in the model because the measurements of cognitive ability in the two waves are associated but inconsistent. Hence, consistent measures of cognitive ability are recommended for future studies in this regard. Along the same line, the second concern is that this study fails to determine a causal relationship between parental educational expectation perception and rural students' own educational expectations because the longitudinal data is limited to two waves. The interpretation of research findings could only be based on associations among the variables of the variables instead of causal relationships. Altogether, it is recommended that three waves of longitudinal data should be collected for future studies concerning the causality among students' perception of parental expectation, students' own educational expectation, and their cognitive ability. Third, the current analysis examines the effect of parental migration on rural students' educational expectations and further cognitive ability. Its focus centers on the quantity of migrant parents without further considering the difference between maternal and paternal migration, given the sample size of rural children left behind by one parent is small ( $n = 337$ ). Future studies might divide this population into two and perform the comparison with scrutinize the different impacts of mother migration and father migration on the association between perceived parental educational expectations and left-behind children's own educational expectations.

## AUTHOR CONTRIBUTIONS

**Jia Zhuang:** Conceptualization; investigation; validation; formal analysis; project administration; writing—original draft; writing—review and editing; methodology; data curation. **Jacky C. K. Ng:** Methodology; software; conceptualization; writing—original draft; writing—review and editing; formal analysis; investigation. **Qiaobing Wu:** Supervision; writing—review and editing; conceptualization.

## CONFLICT OF INTEREST STATEMENT

The authors did not receive support from any organization for the submitted work. The authors declare they have no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in China Education Panel Survey at <http://ceps.ruc.edu.cn/index.htm>.

## ETHICAL APPROVAL STATEMENT

The submitted work is based on open-sources data. No ethical approval was obtained.

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