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The role of parent–child communication on Chinese rural left-behind children's educational expectation: a moderated mediation analysis

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Parents are the most intimate and proximal influences on a child's development. Migration-induced parental absence in rural China might pose a considerable threat to the educational development of left-behind children because of insufficient parent–child communication. Despite growing scholarly attention, we know little of the effect of parental migration on either parent–child communication or the educational expectations of rural students of different left-behind status (i.e., left behind by two parents; left behind by one parent; or living with both parents). Drawing upon the longitudinal data of the China Education Panel Survey ($N = 2275$), this study used a two-step path analysis to examine the interrelations among Chinese rural students' left-behind status, received parent–child communication, and educational expectations. Parental migration negatively affected parent–child communication, and parent–child communication was positively correlated with rural children's educational expectations. In addition, left-behind status moderated the association between parent–child communication and rural students' educational expectations. We conclude that rural students' left-behind status affects their educational expectations through parent–child communication. These results add to the existing understanding of how parental migration affects rural children's educational expectations and indicates the protective effect of parent–child communication.

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Introduction

China's fast economic expansion and urbanization after its open-door economic reform, coupled with the lifting of domestic migration restrictions, have sparked an unprecedented rural-to-urban move. In 2021, an estimated 292 million rural workers moved to cities for employment (National Bureau of Statistics of China (2022)). Due largely to the nation's dual household registration system (*hukou*) and to the place-based public-resource distribution mechanism, rural migrants without urban citizenship are not granted access to social services in their host cities (He et al. 2022). Their rural children likewise have limited access to urban public education (Wang and Zhu, 2021; Zheng and Zhou, 2024). Thus, despite the slightly increased number of rural children moving with their migrant parents to cities, single-person or parent-only migration (with children left behind in villages) still prevails (Jin et al. 2017). Here, we define "rural left-behind children" as children under 18 years old who are left at their original registered household locations when one or both parents migrate to urban areas for work (Dong et al., 2019).

Despite rapid growth in the nation's rural economy, a substantial rural-urban disparity persists in students' development, with rural students demonstrating poorer academic achievement, socio-emotional wellbeing, cognitive scores, and non-cognitive abilities (Abbasi et al. 2022; Chen et al. 2015; Lu (2012)). Without sufficient parental involvement, rural left-behind students are more vulnerable than their non-left-behind peers on these fronts (Hannum et al. 2018; Hong, 2021; Wen et al. 2023). Rural left-behind students account for more than one-fifth of the nation's entire child population (Xiao et al. 2020), and their educational development not only defines their later career pathways and social mobility—it affects the economic sustainability and social transition of the nation as a whole (Wu and Qin, 2022).

Parents play a distinctive role in a child's all-round development. They are the most intimate and proximal influences on a child's identity and personality development (Syed and Seiffge-Krenke, 2013). Interaction, guidance, protection, and care from parents are critical to children's physical, social, cognitive, and emotional growth (Perrin et al. 2016). For educational development in particular, parents' dual identities (i.e., as caregivers and as educators) make them role models for their kids (Ceka and Murati, 2016). Their values, behavior, and interactions define the family developmental climate, which further shapes a child's developmental outcomes (Melby et al. 2008).

In rural China, although migration theories might suggest that parental migration would lead to an accumulation in family economic capital and enable an increase in family financial investment in left-behind children's formal and informal education, the absence of parental involvement as a result of migration appears to have harmed left-behind children in terms of educational development. They receive less parent–child communication, physical parenting, and parental supervision (Abbasi et al. 2023; Hu, 2019; Rozelle and Hell, 2020). For example, the study of Zhao and Chen (2022) revealed that the average score of parent–child communication among rural left-behind children is 37.8% lower than their non-left-behind peers. Some might argue that rural kids are not completely left alone because they have surrogate caregivers. However, in rural families, grandparents and relatives—who are likely to be illiterate or perceive less psychological bonding with and thus responsibilities for left-behind children—may be unable to take on parents' unique role in child educational development (Gao et al. 2019). In effect, empirical studies have consistently documented decreased parental involvement among Chinese rural left-behind children (Peng, 2021; Sun et al. 2015; Wu et al. 2015;). Other studies have further revealed a negative effect of insufficient parental involvement on students' educational outcomes (Wen and Lin, 2012). For example, left-behind children in China without sufficient parent–child communication exhibited low educational expectations and self-efficacy (Hong and Fuller, 2019).

Existing literature stresses the significance of parental involvement in rural children's educational development and suggests the negative impact of parental migration on their received parental involvement, which, in turn, is believed to harm educational development (Zhuang et al. 2024; Hong and Fuller, 2019; Jin et al. 2020; Wang, 2014). Yet, little scholarly effort has been spent on disentangling this complexity and ascertaining the interrelations between parental migration, parental involvement, and students' educational development in rural China. In addition, despite the increasing studies dedicated to investigating the educational development of left-behind students in rural China, many limit this sub-population to those who are left behind by *both* parents (e.g., Fu et al. 2024; Xiao and Liu 2023). Such a definition systematically excludes rural children left alone by one parent and living with the other parent; for these children, parental involvement and educational development might also be affected by parental migration but in ways that are less clear (Su et al. 2017; Guang et al. 2017).

For these reasons, drawing upon the longitudinal data from the nationally representative China Education Panel Survey (CEPS), this study seeks to contribute to the literature by determining the nexus between parent–child communication, an integral component of parental involvement, and educational expectations, a crucial indicator of educational outcomes, among rural adolescents with different left-behind characteristics (i.e., children left-behind by both parents, LBCB; children left-behind by a single parent, LBCS; and non-left-behind children, NLBC). To do that, we examine the relationship between parent–child communication and children's educational expectations in the rural Chinese rural context. Specifically, we study how different rural adolescent groups differ in terms of parent–child communication, with further impacts on their educational expectations. This enables us to determine the mediating effect of parent–child communication on the association between rural students' left-behind status and their educational expectations. On top of this, we also look at how the association between parent–child communication and educational expectations varies among different rural student groups. We thus examine the moderating effect of rural children's left-behind status on the association between their communication with parents and their educational expectations.

Literature review

Educational expectations. Educational expectation is defined as the intended highest educational level that one expects to attain (Wells et al. 2013). It reflects students' appraisal of their academic capabilities and past success as well as subjective evaluation of the challenges, available opportunities, and external support (Andres et al. 2007). Academic discussions of educational expectation are grounded on the *Wisconsin Model of Status Attainment*, in which its mediating effect on the association between external conditions and individuals' educational and occupational achievement is accentuated (Bozick et al. 2010; Kristensen et al. 2009). Students' educational expectation is formed through the process of self-reflection based on interaction with their significant others, consisting of their parents, teachers, and peers (Yuan and Olivos, 2023; Nurmi, 2004). Such an illustration mirrors Bourdieu's concepts of habitus and social/cultural capital to a certain extent. Parental educational values and home learning environments deeply ingrained in family dispositions construct the children's educational expectations and beliefs through the process of family

communication (Coleman, 2001). Among Chinese rural families, the high and positive parental educational expectations perceived by rural students contribute to their educational expectations and intrinsic learning motivation (Chen et al. 2023). This echoes the uniquely high expectations among migrant children worldwide (Feliciano and Lanuza, 2016; Portes et al. 2010; Goyette and Xie, 1999). For instance, the analysis of Feliciano and Lanuza (2016) pointed out that the rich cultural resources (e.g., high parental expectations, interest in school, & obligation ethos) held by children in immigrant families contribute to their high academic expectations.

In the discourse of educational expectation among Chinese rural students, while rural families' relatively low socioeconomic status constrains rural parents' concrete financial investment in their children's education, non-pecuniary familial factors (e.g., parent–child communication, parental care and time, authoritative parenting, and parental supervision) are the crucial pathways to enhance rural students' educational expectations (Xu and Montgomery, 2021; Chen et al. 2023). Furthermore, among these crucial parental factors, parent–child communication stands out when the left-behind student population is considered (Liu and Leung, 2017). Migration-induced family separation restrains migrant parents' physical involvement in their left-behind children's education; online conversations (audio/video calls or text messages) are instead how they sustain family bonding and transmit their educational values and expectations (Ye and Pan, 2011). In this light, this study scrutinizes the influence of parental migration on parent–child communication as well as the linkages between parent–child communication and educational expectation, among rural children with different left-behind characteristics.

Parent–child communication enhances students' educational expectations. Parent–child communication is the communication, either verbal or non-verbal, between parents and kids that occurs within the family system (Munz, 2015). It is an important indicator of the parent–child relationship, and its quality reflects the strength of intimacy and trust between children and their parents (Laursen and Collins, 2004). It is also one of the key family factors affecting students' educational expectations (Seginer and Vermulst, 2002). Two approaches exist in this regard. First, family conversations between two generations are crucial channels for the intergenerational transmission of attitudes, values, and practices. One common theoretical tenet, as emphasized in Albert Bandura's *Social Learning Theory* and Murray Bowen's *Family System Theory*, is the pivotal role played by family socialization in forming the worldviews and personality of a child (Bandura (1997); McGinnis and Wright, 2023). Observations and perceptions from social interactions with significant others are integral to a child's cognition (Froiland et al. 2013). Parents serve as 'expectancy socializers' and role models for children (Rumberger, 1983). Within a family setting and through family communications, parents can directly and explicitly communicate their educational expectations and thus help children establish their own educational attitudes (Fan and Chen, 2001). Communicating indirectly, they can convey their recognized educational attitudes and values and cultivate children's own educational values and notion of academic success (Nihal Lindberg et al. 2019).

Second, students' educational attitudes are not only shaped by their external sociocultural environment but vary according to their internal psychological status (Rothon et al. 2011). It is widely acknowledged in education scholarship that children with better psychological well-being exhibit higher educational expectations, self-efficacy, and learning motivation (Ma et al. 2018). In this vein, frequent open parent–child communication can deliver children parental care and warmth, which in turn stimulate self-efficacy and self-esteem in learning (Bireda and Pillay, 2018; Ying et al. 2018). Such positive parent–child communication is of particular importance to left-behind children. International studies have revealed that parental absence is likely to cause children emotional turmoil and further derail their learning efforts and make them feel disillusioned (Lu (2012); Ren and Treiman, 2016; Coe, 2014). A comparative analysis revealed that Chinese rural children with two migrating parents, compared with non-left-behind kids, experienced a lower standard of living and academic satisfaction and a greater sense of loneliness (Su et al. 2013). Yet, the authors noticed that sufficient parent–child communication could be a significant protective factor for left-behind children. It could offset the negative impact of parental migration on psychological wellbeing and life perception to some extent and improve left-behind children's academic expectations, self-esteem, school engagement, and life satisfaction (Goings and Shi, 2018; Wang et al. 2019; Su et al. 2013; Sun et al. 2015).

Such a positive correlation between parent–child communication and children's educational attitude is evident among rural Chinese families. Here, two significant aspects of the Chinese context should be noted for a better comprehension of the educational expectations among Chinese rural students. First, the ethos of filial piety still prevails in Chinese society: the intergenerational reciprocity mechanism (e.g., raising children as "insurance" for old age) persists among generations (Goh, 2011). Second, Chinese parents and kids are likely to attach significant importance to education and connect educational success with high occupational attainment and socioeconomic status due to their deeply rooted Confucian beliefs (Kong 2015). Many hold the firm belief that education is the pathway to later career success. Given that most Chinese rural parents attach great importance to education and have high expectations for their kids' education (Li and Xie, 2020), parent–child communication is their channel to transmit educational values and build up children's own educational expectations (Chen et al. 2023). Xu and Montgomery's (2021) qualitative investigation of Chinese rural students' access to elite universities is a striking example. Although rural parents are constrained in their ability to invest economically in their children's education, their verbal expression of high expectations for their kids and schooling pathways to elite universities could transform their families' financial weakness into a strength – learning motivation and aspirations for educational achievement.

In sum, parent–child communication serves as the channel for parents to deliver educational expectations, value, and care to their children. In the Chinese context, given that parents generally hold a positive attitude towards education, more parent–child communication may better facilitate the transmission of educational expectation from rural parents to their children and lead to higher educational expectations among these children. Therefore, we propose the following hypothesis (see Fig. 1):

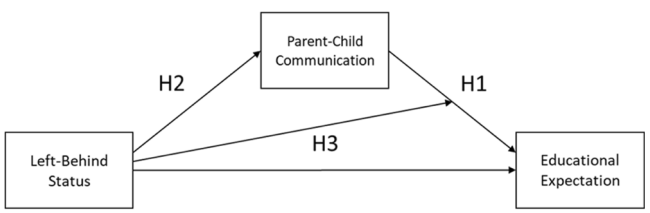

Fig. 1 The Conceptual Model About the Moderated Mediation Relationships Among Left-Behind Status, Parent–Child Communication, and Educational Expectation.

Hypothesis 1 (H_1): *Parent–child communication would be positively associated with rural students' educational expectation.*

Parent–child communication across different rural groups. While the positive relationship between parent–child communication and rural students' educational expectations is recognized, parental migration might affect rural students' educational expectations due to decreased parent–child communication. The reasons for this decrease in parent–child communication are twofold. First, migration-induced physical separation between migrant parent(s) and their left-behind children means less face-to-face contact. Especially for parents moving across provincial lines, Chinese New Year is virtually the only time of the year when they can return home and meet their kids in person (Ye and Pan, 2011). In addition, although LBCS do live with one parent, their parent–child communication tends to be scanty. Non-migrating parents residing with their kids in rural villages are often not housewives or househusbands but instead full-time laborers (e.g., agricultural work or daily paid jobs in local industry/construction) (Murphy, 2020). Their time and energy for parent–child communication after work are limited.

Second, an alternative to face-to-face conversation between migrant parent(s) and their left-behind children is online communication through the Internet. A study indicated that around ninety percent of parent–child communication between Chinese migrant parents and their left-behind children happens virtually (Duan et al. 2014). Yet, migrant parents in the cities are likely to engage in low-paying secondary and service jobs which are characterized by irregular working schedules and long working hours (Ren et al. 2017). This restricts online parent–child communication between migrant parents and their left-behind kids (Li and Li, 2007; Tong et al. 2015). In addition, there is a lack of smart devices in rural families to use for parent–child communication (Xu, 2016), but this is not only for financial reasons. Although many migrant parents are able to buy smart devices, they opt not to, for two main reasons. First, when both parents move to cities for work, elderly grandparents and the LBCB might not know how to use smart devices (Ye and Pan, 2011). Second, even though some LBCB or LBCS have mastered basic phone skills, their parents might constrain their access to smart devices because Internet addiction and related juvenile delinquency are a considerable concern among left-behind children without sufficient parental supervision and care (Xu, 2016; Ren et al. 2017).

Empirical studies have documented a lower level of parent–child communication after parental migration (Wang et al. 2019; Zhao and Chen, 2022; Su et al. 2013; Wang et al. 2015; Su et al. 2017). For example, the comparative analysis of Zhao and Chen (2022), using a national representative dataset, found that LBCBs' average score of parent–child communication was 37.8% lower than that of their non-left-behind counterparts. Wang et al. (2019) drew the same conclusion. They categorized parent–child communication into open and problem subscales and found that current and previous LBCB received less openness and less total communication from both mother and father in comparison to those who had never been left behind. Regarding the differences among left-behind children, Guang et al. (2017) found that LBCB had significantly less contact with parents compared with peers left behind by only their father or mother (LBCS). Taken together, we project that rural kids with fewer residing parents receive less parent–child communication. We thus propose the following hypothesis (see Fig. 1):

Hypothesis 2 (H_2): *Left-behind status would affect parent–child communication, in which rural students with more residing parents would receive a higher level of parental communication.*

Considering H_1 and H_2 as a whole, it is hypothesized that parent–child communication would mediate the effect of left-behind status on educational expectation.

The moderating role of left-behind status. Apart from the low extent, studies have noticed that parental migration also affects the content and depth of the communication between migrant parent(s) and their left-behind kids (Wang et al. 2015; Wang et al. 2019). Liu and Leung's (2017) survey of 378 migrant parents from southern China revealed that migrant parents' communication with their kids tended to be short, superficial, and instantaneous, often for the purposes of immediate access and reassurance, online transactions, affection, and relaxation. Ye and Pan (2011) had the same observation—that communication initiated by migrant parents focuses on health and safety. They might ask only about their daily routine and academic performance and not engage in deeper conversations with them regarding events at school. Nearly three-quarters of the left-behind student informants in Ye and Pan's (2011) survey reported that their online conversations with their migrant parents lasted <10 min. Beyond China, Filipino migrant parents in Asis's (2006) research also articulated the difficulty of engaging in deep conversations with their kids and sustaining close family relations through digital devices.

Aside from its limitations in the direct intergenerational transmission of educational values, superficial parent–child communication between migrant parents and their left-behind kids threatens relational connections. The study performed by Duan et al. (2014) suggested that 60% of migrant parents had online communication with their left-behind kids to simply inquire about school performance and ask them to obey teachers and surrogate caregivers. Left-behind children's psychology and emotions are always neglected. They are not able to articulate their emotional problems to their migrant parent(s), and they do not receive suggestions or counseling. Su et al. (2013) added that the lack of effective and affective expression of deep emotions weakens left-behind children's psychological bonding and emotional connectedness with their parents.

Online parent–child communication might threaten not only left-behind children's psychological health but also their educational perception. Children who fail to understand their migrant parents' efforts at improving the family's economic situation might feel abandoned and experience stress because they perceive a lack of support in achieving their academic goals (Liang and Ma 2004; Chen et al. 2023). Thus, on top of our first two hypotheses, we further expect that the number of residing parents may strengthen the impact of parent–child communication on children's educational expectation. Accordingly, we hypothesize that (see Fig. 1):

Hypothesis 3 (H_3): *Left-behind status would moderate the association between parent–child communication and educational expectation, in which the association would be stronger when the number of residing parents increases.*

Methodology

Data. The study draws on longitudinal data from the CEPS (waves one and two). Launched by the National Survey Research Center at Renmin University of China, the CEPS is a nationally representative longitudinal survey in China. It collects comprehensive information from middle-school students, their parents, and teachers and investigates the influence of family contexts, school processes, and community and society structures on students' educational outcomes (Shen 2020). Another crucial characteristic of CEPS is that it has two waves of data. The longitudinal data allows us to examine the temporal effect of left-

behind status on rural students' parent–child communication and educational expectation, which might be better than the concurrent effect. Details about controlling autoregressive effects are provided in the section on Analytic Strategy.

The survey applied a multistage sampling method with probabilities proportional to size. At first, 28 primary sampling units were selected from a total of 2870 counties or districts of the same level. Second, four schools were selected from all schools serving 7th and 9th grades within the 28 primary sampling units. At the third stage, two 7th-grade and two 9th-grade classrooms were randomly selected from each sample school. Finally, all students from the selected class were invited to complete the survey, which was administered in questionnaire form.

Participants. The wave one survey included 19,487 7th and 9th graders in 2013–2014. The wave two survey was conducted a year later with only the 10,279 7th graders from the wave one survey. Of these, a total of 9449 students were successfully followed up, with the remaining 830 students lost mainly to school transfer and withdrawal. In the 2013–2014 wave, 7997 of these 7th-graders were rural students, but in the 2014–2015 wave, only 3930 were. We merged the two datasets after removing the urban and rural migrant student populations from both waves and obtained 2915 matched cases. After removing the missing cases, the final sample size for data analysis is 2275. Table one details the demographic profile of the participants. The distribution of the participants by sex was even. Participants were almost all 13–15 years old (95.7%). Around one-quarter (26.9%) of the student informants were the only child of the family. As for left-behind status, the majority (72.4%) were residing with both parents, with a similar number of LBCS (14.5%) and LBCB (13.1%) Table 1.

Measures

Left-behind status. Students' left-behind status refers to the number of parents living together with them in rural villages. Rural students were categorized into non-left-behind children residing with two parents (NLBC; left-behind status = 2), left-behind children with single residing parent (LBCS; left-behind status = 1), and left-behind children with no residing parents (LBCB; left-behind status = 0).

Table 1 Demographics of Participants.

Demographic characteristics	Frequency ($N = 2275$)	Percentage (%)
Gender		
Male	1125	50.6
Female	1099	49.4
Age		
12	63	2.8
13	1009	45.2
14	938	42.1
15	187	8.4
16	31	1.4
17	1	0.04
18	1	0.04
Single child status		
Single child	612	26.9
Non-single child	1663	73.1
Left-behind status (no. of residing parent)		
0	330	14.5
1	297	13.1
2	1648	72.4

Parent–child communication. Parent–child communication in the first wave was measured with 10 items. Participants were asked to rate on a three-point Likert scale the frequency of their parents (father and mother separately; five questions for each) communicating with them regarding things that happened at school, their relationships with friends, relationships with teachers, their mood, and thoughts and troubles. The fourth question (mood) from wave one was removed in wave two. To make the measures of parent–child communication in the two waves comparable, we removed the fourth question from wave one and chose the same four questions (8 items in total) to construct the parent–child communication measure. A similar scale had been utilized in previous studies to measure parent–child communication between Chinese rural parents and children (e.g., Su et al. 2013). Our 8-item scale showed good reliability in both waves ($\alpha = 0.823$ and $\alpha = 0.864$ for waves one and two, respectively). Each item had a rating scale of 1 to 3 denoting never (1), sometimes (2), and often (3). The accumulative scores for parent–child communication were between 8 and 24. A higher score indicates a higher frequency of communication between rural children and their migrating or residing parents.

Educational expectation. Educational expectation is defined as the level individuals want to achieve in school. In both waves, adolescents' educational expectation was measured with one item (What is the highest level of education you expect to receive?), which has been widely applied in international studies (Feliciano, 2006; Rimkute et al. 2012; Yu and Daraganova, 2015). Possible answers were "drop out now", "graduate from junior high school", "go to technical secondary school or technical school", "go to vocational high school", "go to senior high school", "graduate from junior college", "get a bachelor degree", and "get a master's degree", and "get a doctoral degree". Responses were continuously coded from 1 (drop now) to 9 (get a Doctoral degree).

Control variable. First, Bourdieu's capital theory suggests a transmission of familial economic capital to students' educational expectation and further achievement (Ding and Wu, 2023). That is, students with better educational resources are likely to have higher educational expectation. Second, studies in a rural Chinese context found that girls and only children are likely to receive more communication from their parents compared with children from multiple-child families and boys, respectively (Liu and Jiang 2021). Third, research in China and beyond suggests that parents with higher educational qualifications are inclined to have more frequent interaction with their kids because they are more confident in doing so (Han 2023; Yue et al. 2017). Fourth, variations exist between students of different sexes and grades regarding their expectations of their educational attainment (Rigsby et al. 2013). Therefore, apart from controlling baseline measures in the analysis (see analysis strategy below), we further controlled for age, single-child status (0 = single child, 1 = non-single child), gender (0 = female, 1 = male), parent's educational level, educational resources (i.e., working desk, number of books, and access to computer and Internet at home), and family economic status.

Analytic strategy. To test our conceptual model in Fig. 1, path analysis was employed with a two-step procedure. In Step 1, a mediation model was tested to examine the mediating effect of parent–child communication on the association between left-behind status and educational expectation (for Hypotheses 1 and 2). Specifically, parent–child communication at Time 2 was regressed on left-behind status at Time 1, while educational expectation at Time 2 was further regressed on both parent–child

Table 2 Descriptive Statistics and Bivariate Correlations Among Variables.

	M (*SD*)	1		2		3		4	
1. LBS1	-	-							
2. PCC1	16.52 (3.87)	0.11	***	-					
3. PCC2	16.58 (3.99)	0.13	***	0.44	***	-			
4. EE1	6.90 (1.66)	0.02		0.19	***	0.14	***	-	
5. EE2	6.63 (1.60)	0.04	†	0.15	***	0.20	***	0.52	***

Note. LBS1 left-behind status at Time 1, *PCC1* parent-child communication at Time 1, *PCC2* parent-child communication at Time 2, *EE1* educational expectation at Time 1, EE2 educational expectation at Time 2. †$p < 0.10$, ***$p < 0.001$.

communication at Time 2 and left-behind status at Time 1. Step 2, built upon the mediation model, examined the moderating effect of left-behind status on the association between parent–child communication and educational expectation (for Hypothesis 3). Specifically, other than parent–child communication at Time 2 and left-behind status at Time 1, educational expectation was further regressed on the interaction term between parent–child communication at Time 2 and left-behind status at Time 1. In this step, simple slope analysis was also employed to delineate the pattern of moderation. As a whole, the model tested in Step 2 would reveal whether the mediating effect of parent–child communication would be contingent on left-behind status, yielding a moderated mediation model (see Model 74 in Hayes (2018) and Model 1 in Preacher et al. (2007)). Our model specification and the test of the index of moderated mediation followed Hayes (2018) and Preacher et al. (2007). It is noteworthy that, across Steps 1 and 2, the autoregressive effects of parent–child communication and educational expectation would be controlled in which parent–child communication and educational expectation at Time 2 would be regressed on parent–child communication and educational expectation at Time 1.

Results

Descriptive Statistics. Descriptive statistics and bivariate correlations are summarized in Table 2. Consistent with previous findings (e.g., Zhao and Chen, 2022; Wang et al. 2019; Guang et al. 2017), the extent of parent–child communication that the rural children receive at Time 2 was positively correlated with the number of parents residing with them in the villages ($r = 0.13$). In addition, the mean score of rural students' educational expectations in both waves was close to 7. It implies that, on average, student informants in this sample expect to complete junior college or obtain a bachelor's degree. Further, rural students' educational expectation at Time 2 was positively correlated with the parent–child communication they received from Time 2 ($r = 0.20$).

The Mediating Effect of Parent–Child Communication. In Step 1, a mediation model was established to examine the mediating effect of parent–child communication between left-behind status and educational expectation. Path analysis indicated that the mediation model showed a good fit to the data, $\chi2\ (2) = 8.906$, $p = 0.012$, CFI = 0.995, NNFI = 0.981, SRMR = 0.014, RMSEA = 0.039, 90% CI for RMSEA [0.016, 0.067]. The path coefficients in the mediation model are presented in the left panel of Table 3 (see also the mediation component in Fig. 2). As expected, the autoregressive effects of parent–child communication, $b = 0.449$, $\beta = 0.435$, $p < 0.001$, and educational expectation, $b = 0.489$, $\beta = 0.507$, $p < 0.001$, were positive and statistically significant. Over and above the autoregressive effects, left-behind status at Time 1 was positively associated with parent–child communication at Time 2, $b = 0.413$, $\beta = 0.076$, $p < 0.001$, which in turn was positively associated with educational expectation at Time 2, $b = 0.050$, $\beta = 0.126$, $p < 0.001$. To quantify and conduct an inferential test for the mediating effect, a 95% bias-corrected bootstrap confidence interval (BCCI) based on 5000 bootstrap samples was computed. The bootstrapping results indicated that the mediating effect of parent–child communication between left-behind status and educational expectation was significant, $b = 0.021$, BCCI [0.010, 0.035], while the direct effect of behind status on educational expectation was not significant, $b = 0.022$, $\beta = 0.010$, $p = 0.566$. These results support our first two hypotheses (H_1 and H_2) and reveal the mediating role of parent–child communication in explaining the effect of left-behind status on rural kids' educational expectation.

Table 3 Results of Path Analysis in the Mediation and Moderation Mediation Models.

	Step 1 Mediation model			Step 2 Moderated mediation model		
	b	β	*p*-value	*b*	β	*p*-value
Outcome: PCC2						
PCC1	0.449	0.435	<0.001	0.449	0.435	<0.001
LBS1	0.413	0.076	<0.001	0.413	0.076	<0.001
Outcome: EE2						
EE1	0.489	0.507	<0.001	0.487	0.505	<0.001
PCC2	0.050	0.126	<0.001	0.018	0.044	0.283
LBS1	0.022	0.010	0.566	−0.315	−0.144	0.043
LBS1* PCC2	-	-	-	0.021	0.188	0.025

Note. LBS1 left-behind status at Time 1, *PCC1* parent-child communication at Time 1, *PCC2* parent-child communication at Time 2, *EE1* educational expectation at Time 1, *EE2* educational expectation at Time 2.

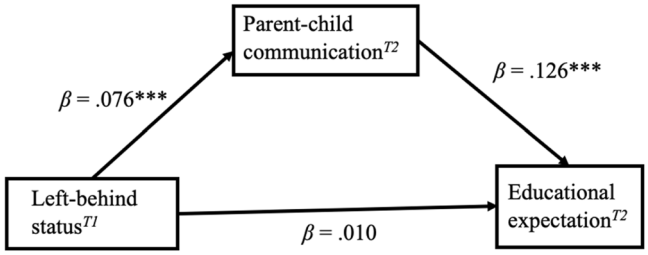

Fig. 2 The moderated mediation model among left-behind status, parent-child communication, and educational expectation. *Note.* Autoregressive effects of parent-child communication and educational expectation were controlled in the model. The bold path represents the moderating effect of left-behind status tested in Step 2. *$p < 0.05$, ***$p < 0.001$.

The moderating effect of left-behind status. In Step 2, built on the mediation model in Step 1, we further examined whether left-behind status would moderate the association between parent–child

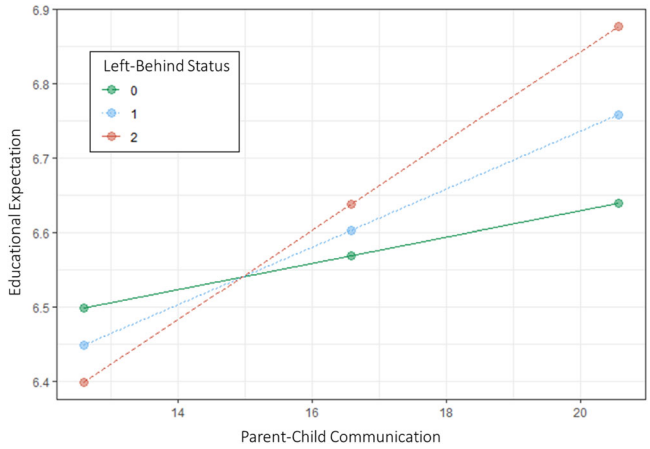

Fig. 3 Simple slope plot for the moderating effect of left-behind status on the association between parent-child communication and educational expectation.

communication and educational expectation, yielding a moderated mediation model proposed in Fig. 1. Similar to the mediation model, the moderated mediation model fitted the data well, $\chi 2$ (2) = 8.909, $p = 0.012$, CFI = 0.999, NNFI = 0.993, SRMR = 0.013, RMSEA = 0.039, 90% CI for RMSEA [0.016, 0.067], and revealed the significant autoregressive effects of parent–child communication, $b = 0.449$, $\beta = 0.435$, $p < 0.001$, and educational expectation, $b = 0.487$, $\beta = 0.505$, $p < 0.001$. Most importantly, a significant moderating effect of left-behind status on the association between parent–child communication and educational expectation was observed, $b = 0.021$, $\beta = 0.188$, $p = 0.025$ (see the right panel in Table 3 and the moderation path in Fig. 2). Simple slope analysis was then employed to examine the association between parent–child communication and educational expectation at the three levels of left-behind status, namely non-left-behind children, children left behind by a single parent, and both parents (Fig. 3). Among non-left-behind children, parent–child communication was positively associated with educational expectation, $b = 0.060$, $\beta = 0.150$, $p < 0.001$, while the positive association was weaker among children left behind by a single parent, $b = 0.039$, $\beta = 0.097$, $p < 0.001$. Among children left behind by both parents, parent–child communication was not associated with educational expectation, $b = 0.018$, $\beta = 0.045$, $p = 0.283$.

Taking Steps 1 and 2 together in the moderated mediation model, we examined whether the mediating effect of parent–child communication differed across different levels of left-behind status. Following Hayes (2018), the index of moderated mediation was computed and found to be significant, $b = 0.009$, BCCI [0.001, 0.022], indicating that the mediating effect of parent–child communication was moderated by left-behind status. Specifically, the mediating effect of parent–child communication among non-left-behind children, $b = 0.025$, BCCI [0.012, 0.041], was stronger than that among children left behind by a single parent, $b = 0.016$, BCCI [0.007, 0.030], while the mediating effect of parent–child communication was not significant among children left-behind by both parents, $b = 0.007$, BCCI [−0.006, 0.025]. Overall, these results support our Hypothesis 3 (H_3), suggesting that the effect of parent–child communication on rural students' educational expectations varies across different rural student groups.

The same sets of path analyses in Steps 1 and 2 were tested while controlling for demographic information, namely, age, gender, single child status, parents' education level, family economic status, and educational resources. The key results did not reveal a substantial change. The path coefficients in these models are presented in Table A1 in the Appendix.

Discussion

The youth are a valuable asset for a nation. The more than 70 million Chinese rural left-behind children are key to China's economic sustainability and social development (Wu and Qin, 2022). Like China, other low/middle-income countries in Asia, Africa, Eastern Europe, and Latin America also have large proportions of rural left-behind children caused by domestic and international parental migration (Zhu et al. 2023). For instance, statistics suggest that >40% of left-behind children in rural South Africa and 27% in the Philippines are separated from their parents because of international migration (Fellmeth et al. 2018; Dominguez and Hall, 2022). In developing countries, the physical separation of parents and children due to labor migration has been shown to hinder effective communication and engagement, which in turn can negatively impact the educational aspirations of left-behind children (e.g., Asis, 2006; Bennett et al. 2015). Using the CEPS data, the present study offers fresh insight into promoting rural left-behind students' educational expectations: it shows the mediating effect of parent–child communication on the association between left-behind status and rural kids' educational expectations, as well as the moderating effect of left-behind status on the association between parent–child communication and their educational expectation. Given that rural left-behind children in other cultural contexts have similar parent–child communication experiences, the findings of this research have potential implications for them.

The mediating effect of parent–child communication. Little empirical analysis has been done on the parent–child communication of rural children with different left-behind characteristics. The most relevant studies have mainly performed comparisons between left-behind students (usually LBCB) and their non-left-behind peers. Our quantitative comparative analysis categorized Chinese rural students more specifically—into three groups according to the number of parents with whom they lived. This greater level of detail led to the insight that rural children with more residing parents are likely to receive higher levels of parent–child communication. The results indicate that parental migration significantly decreases the extent of family communication between migrating parents and left-behind kids. As for LBCB, the online parent–child communication they receive is not equivalent to the physical communication received by their non-left-behind peers. In this Internet era, smart devices are easily accessible, and the lack of digital devices might not be the main reason for the impaired online parent–child communication (Xu, 2016). Rather, this may be attributed to migrant parents' irregular working schedule and their intention to limit their left-behind children's use of mobile phones and/or access to the Internet (Li and Li, 2007; Ye and Pan, 2011). As for LBCS, apart from the scant online parent–child communication from the migrating parent, they might also receive less physical communication from the residing parent than their non-left-behind counterparts receive from their parents. Domestic migration alters family structure. NLBC are likely to receive abundant parent–child communication because their parents can function as a team of two, which may give them more flexibility in handling economic activities and parenting. Conversely, the single residing parent of LBCS—living in a rural village—has to take both economic and parenting responsibilities. Often, given the economic plight of many rural families, having enough money takes priority over spending time with children (Murphy, 2020).

Nevertheless, parent–child communication plays a significant role in children's educational development. It is the channel for parents to deliver educational expectations, values, and care to their kids (Seginer and Vermulst, 2002). Such verbal and non-

verbal expressions from parents construct students' own educational attitudes and boost their mental wellbeing (Froiland et al. 2013; Bireda and Pillay, 2018). In the present analysis, we validated the positive correlation between parent–child communication and the educational expectation of the child in a Chinese rural context. Rural students who receive more parent–child communication tend to aim higher in terms of educational achievement. In Chinese rural families, by and large, although socioeconomic conditions constrain the concrete financial support rural children can receive, abundant parent–child communication is proven to be able to build up learning motivation and educational expectations (Xu and Montgomery, 2021; Chen et al. 2023). As for left-behind children in particular, while the other forms of parental involvement are largely constrained by physical separation, parent–child communication appears to be one of the only ways for migrating parent(s) to engage in children's learning and growth. In addition, international scholarship suggests that parental leave would give left-behind children a false perception of being abandoned, which further impacts their mental health and harms their learning motivation and expectation (Su et al. 2013; Coe, 2014). Our results suggest that frequent parent–child communication might mitigate this negative impact and protect left-behind children's educational expectations (Wang et al. 2019).

In this light, one contribution of the current analysis is that it authenticates the mediating effect of parent–child communication on the association between Chinese rural students' left-behind status and their educational expectations. The decrease in the number of residing parents caused by parental migration leads to a drop in parent–child communication, which further negatively affects rural students' educational expectations. Although previous studies (e.g., Su et al. 2013) have widely discussed the relationships between parental migration and parent–child communication and the one between parent–child communication and students' educational expectation, no study has examined the mediating role of parent–child communication. This study linked Chinese rural students' left-behind status and educational expectations with their received parent–child communication extent and found that parental migration harms rural students' educational expectations through the decreased extent of parent–child communication. Conversely, it highlights the protective effect of parent–child communication on rural left-behind students' educational expectations. Given the established positive relationship between parent–child communication and rural students' education expectations, one possible way to improve rural left-behind children's educational expectations is to provide them with a greater level of parent–child communication (either physical communication with residing parents or online communication with migrating parent(s)). This finding, based on a rural Chinese population, resonates with similar studies across many developing regions (e.g., Asis, 2006; Hoang and Yeoh, 2012; Graham et al. 2012). A similar conclusion, that regular and frequent parent–child communication improves left-behind students' coping capacity and preserves their positive attitude and value towards education, can also be drawn.

The moderating effect of left-behind status. On top of the mediating effect, our results reveal that rural students' left-behind status moderates the positive association between parent–child communication and their educational expectations. We noticed that the positive correlation between parent–child communication and students' educational expectation is stronger among rural students with more residing parents. This result indicates that communication with parents exerts different impacts on the educational expectation of rural students depending on their left-behind characteristics. The reason might lie in the difference in the content and depth of parent–child communication between each of the three children groups and their residing and migrating parents.

Empirical studies concerning both internal and international migration have consistently pointed out that online communication between migrating parents and their left-behind kids is not comparable to face-to-face interaction (Liu and Leung, 2017; Mahler, 2001; Hoang and Yeoh, 2012; Asis 2006). For example, Filipino migrant parents in Asis's (2006) research stressed that parent–child communication is not just talking but a channel to maintain and promote connectedness. They articulated the frustrating difficulty of engaging in deep conversation with the kids and sustaining close family relations through digital devices. In China, studies have also pointed out that online parent–child communication between left-behind children and their migrating parent(s) is limited in depth (Ye and Pan, 2011; Su et al. 2013). The content of the online dialog is reported to be superficial; it touches many aspects of rural kids' education and life but without in-depth exchanges and sharing. This virtual parent–child communication, between migrating parents and their left-behind kids, not only obstructs the intergenerational conveying of educational values and beliefs but also hinders the giving of parental care and warmth. This has a two-fold negative impact on rural students' educational expectations.

Taking the observed mediating and moderating effects together, the current findings support a moderated mediation model concerning rural children's left-behind status, their parent–child communication, and educational expectations. Our results indicate that physical separation from kids caused by parental migration not only reduces the degree of parent–child communication between migrating parent(s) and their left-behind kids but also impairs the effect of parent–child communication on rural kids' educational expectations.

Limitations. While we believe that the findings of this nationally representative analysis advance our understanding of the complicated nexus between parental expectation and adolescents' development, a few concerns regarding the research measures and conceptual framework should be noted. First, regarding educational expectation, the measure applied by CFPS relates to students' expectation of their *long*-term educational achievement. Students' expectations of their *short*-term academic attainment (e.g., examination grades) have also been widely considered in international studies and surveys and including it in our model could supplement our results. Parent–child communication is indeed likely to affect rural students' attitudes toward their academic performance over a shorter period. In addition, though the measures of parent–child communication and educational expectation used here have been widely used in international studies and their reliability and validity have been verified, they are self-reported measures that are subject to social-desirability bias and recall bias. Future studies should utilize multiple data-collection methods—such as behavioral observations, dyadic interviews, and parent reports—to generate more objective data. Qualitative interview data from either in-depth individual interviews with left-behind students or dyadic interviews with left-behind students and their parents can provide a deeper, more nuanced understanding of both the impact of parental migration on the frequency and depth of parent–child communication and the impact of parent–child communication on students' educational expectation.

Another limitation is the discrepancy in the association between parent–child communication and educational expectations among children left behind by a mother or father. We are

aware of the inconsistent effects of maternal and paternal communication on children's educational expectations. Yet, because the number of LBCS in our sample was small ($N = 297$), we did not further divide this population to perform the comparison. Instead, we looked at the broader picture and categorized the rural student population into three groups according to the number of parents residing with them, and we investigated how the extent of parent–child communication and the association between parent–child and educational expectation differed between rural children with zero, one, and two residing parents. No single study can answer all pertinent questions, but this study has achieved its research goals. Future studies might apply the model of this study to rural students left behind by one parent to scrutinize the different impacts of mother migration and father migration on the association between parent–child communication and left-behind children's educational expectation. Lastly, the CEPS data used for this analysis were collected in 2013–2015. Their relevance and applicability to the present-day situation might be limited. Future scholarly effort is needed to obtain current data.

Practical implications. The current findings have several practical implications for promoting rural left-behind children's educational expectations. Although migration-induced parental separation poses a threat to left-behind children's educational expectations, frequent and high-quality parent–child communication—either physical or online—can mitigate this negative association and safeguard left-behind children's expectations of their educational achievement.

For parent–child communication, one way for LBCB to increase their received parental communication is for migrating parents to initiate more phone calls or messages. Parents can establish stable online communication platforms to have regular online conversations with their kids. These platforms should be easy to use and accessible, and provide features like video calls, file-sharing, and task-scheduling to foster regular and meaningful interactions. They require collaboration from local caregivers and school teachers since left-behind students usually do not have their own smart devices. Migrant parents can schedule a time with grandparents, for those living at home, or school teachers, for those boarding at school, to have regular online conversations with their children. Further, local educational bureaus and NGOs should organize parenting skills workshops for migrant parents to focus on long-distance communication strategies, conflict resolution, and emotional connections with their left-behind children. These workshops could be delivered online or through local community centers. Likewise, caregiver support and training should be provided to local caregivers who are responsible for facilitating communication between migrant parents and their left-behind children. This could include guidance on monitoring children's screen time and Internet usage, troubleshooting technical issues, and creating a conducive environment for parent–child interactions. At the school level, school-based interventions integrating parent–child communication activities into the school curriculum for left-behind children are recommended. This could involve setting aside dedicated time for video calls with parents, creating letter-writing or video-message projects, or organizing family events in which migrant parents can virtually participate.

In addition to frequent and regular online communication, more frequent home visits are another possible remedy, if family finances allow. As for LBCS, apart from increasing their communication with the migrant parent, a more feasible solution might be the intensification of physical conversation with the residing parent. In addition to the extension of parent–child communication, we further suggest that both migrating parents and residing parents need to inquire deeply, through parent–child communication, about their left-behind children's school education, mental status, and interpersonal relationships. This can enable parents to give care and warmth to their left-behind children and maintain the family's psychological bonding. Likewise, parents should take the chance to express their educational values and expectations to their left-behind children to impact the next generation's educational expectations. Relevant intervention programs should be implemented to nurture rural parents' communication skills and strategies with their left-behind kids to better deliver their parental care, educational values, and attitudes (Zhuang and Wu, 2024).

Data availability

The datasets generated during and/or analysed during the current study are available in the China Education Panel Survey, [http://ceps.ruc.edu.cn/English/Overview/Overview.htm]. The dataset (in .xlsx formart) for this specific analysis is available in Dataverse repository, [https://doi.org/10.7910/DVN/ZWBRX0].

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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.

Competing interests

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

Ethical approval

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

Informed consent

The submitted work is based on open-sources data: China Education Panel Survey. Informed consent was obtained by China Education Panel Survey.

Additional information

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