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Does parental migration impede the development of the cooperative preferences in their left-behind children? Evidence from a large-scale field experiment in China

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ABSTRACT

In human capital theory, noncognitive abilities play an essential role in individual and societal success. Parents' migration for work purposes may inhibit the development of children's noncognitive abilities, but its influence on children's cooperation preferences remains unclear. Using three one-shot public goods games, we examine the impacts of parental migration on the development of children's cooperation preferences and whether introducing punishment mechanisms could partly exacerbate or offset the effects. We conducted a large-scale field experiment with more than 1600 rural students aged 6–16. Our main findings are as follows. First, the cooperation level of non-left-behind children increases significantly with age, while being left behind may affect this stable development track. Specifically, we find that paternal migration significantly decreases children's cooperation levels, while maternal or both parents' migration does not. Second, punishment mechanisms can significantly promote children's cooperation levels and offset the negative effect of paternal migration. Exogenous punishments work across ages, while endogenous punishments work only among middle school students. However, as the extent to which children were left-behind deepens, the offsetting effects of the punishment mechanisms gradually weaken.

1. Introduction

Investments in cognitive and noncognitive abilities in the early stage are crucial, as they could significantly predict an individual's future income (Heckman, 2000; Heckman & Rubinstein, 2001; Heckman, Stixrud, & Urzua, 2006). Compared with cognitive abilities, noncognitive abilities are more plastic during late childhood and should be considered an investment priority in human capital (Heckman, 2000; Kautz, Heckman, Diris, Ter Weel, & Borghans, 2014; OECD, 2015). Investment and intervention in an individual's early noncognitive abilities can promote individual performance in the future labor market at the microlevel and help alleviate many macrolevel issues, such as structural unemployment, poverty, and crime (Carneiro, Crawford, & Goodman, 2007; Xu, 2018).

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As an important component of noncognitive abilities, cooperation preferences are gradually formed in the process of child socialization, in which the family environment and parental education play nonnegligible roles. Previous research has found that an intact family in which both parents live with their children is the most conducive family structure to children's development, while the long-term absence of either parent may adversely affect children's development (Wu, Wang, & Du, 2018). However, it remains unclear how parental absence influences children's cooperation preferences. Our study attempts to fill this gap by utilizing the phenomenon of the numerous migrant workers in China's urbanization process to examine the impact of parental absence caused by migration on the development of children's cooperation preferences.

The massive number of left-behind children (LBC) in China has led to far-reaching impacts on the rural population's development and the whole nation. Since the reform and opening-up, China's urban–rural structure and unbalanced regional economic development have led to the largest historical migration of farmers for work. Because of the strict *hukou* system, these migrant workers are not entitled to welfare services similar to those of local residents regarding children's education, housing, and medical care. They, therefore, must leave their children behind in their hometowns, resulting in a massive number of LBC. As early as 2010, the number of LBC in rural China exceeded 60 million, more than one-fifth of its total children, of whom 29.48 million were in the compulsory education stage.[1] Although migrant parents can improve their families' financial conditions, LBC are in a disadvantaged position in the accumulation of human capital, such as education level and physical and mental health (Bai et al., 2018; Lei, Liu, & Hill, 2018; Zhao, Wang, Li, Zhou, & Hesketh, 2016; Zhao, Yu, Wang, & Glauben, 2014). Their offspring also tend to become vulnerable. This vicious circle may not only exacerbate urban–rural inequality in the future labor market but also have a profound impact on social harmony due to an increasing crime rate (Zhang, Cameron, & Meng, 2021).

Although abundant empirical studies have investigated the potential effects of parental migration on children's development outcomes, there are gaps in understanding how parental migration influences children's cooperation preferences. Most of the current literature is based solely on questionnaires and focuses on children's physical or mental health and academic performance. In addition, most existing experimental studies use intact family structures and small experimental samples (e.g., Cipriani, Giuliano, & Jeanne, 2013; Harbaugh & Krause, 2000; Hermes et al., 2020), making it difficult to infer the effects of parental migration on children's noncognitive abilities. Recently, a few emerging experimental studies using value elicitation incentives have investigated the effects of parents' migration on LBC's noncognitive abilities, such as other-regarding preferences (Cadsby, Song, & Yang, 2020), lying behavior (Cadsby, Song, & Yang, 2019) and competitive preferences (Dong & Zhao, 2019), but the effects on cooperation remain to be revealed.

The aim of this paper is to explore the impact of parental migration on the development of LBC's cooperation preferences and answer the following questions. First, what is the overall picture of children's cooperation preference development in rural China? Second, would parental migration influence children's cooperation preferences? Third, does paternal and maternal migration have asymmetric effects on LBC's cooperation preferences? Finally, can punishment exacerbate or alleviate the possible effects caused by parental migration? To answer these questions, we conducted a large-scale lab-in-the-field experiment including three public goods games with more than 1600 rural children in Sichuan and surveys about the students' characteristics, family backgrounds, parents' migration status and caregivers' characteristics.

Our study contributes to the literature in four ways. First, we provide new insights into the empirical studies of human capital theory by exploring the impact of parents' migration on children's cooperation preferences utilizing economic experiments. To our knowledge, this study is one of the largest field experiments in the literature on children's cooperation preferences. Second, we analyze the asymmetric impacts of paternal and maternal migration on children's cooperation preferences and find the essential role of paternal accompaniment. Additionally, we analyze the cooperation-enhancing effect of punishment among children in China and distinguish its potential differences between LBC and non-LBC. Finally, we reveal the offsetting effect of the punishment mechanism on the negative impact of paternal migration and provide policy-makers with robust empirical evidence.

The remainder of this paper is structured as follows. Section 2 reviews the related literature and proposes the hypotheses. Then, in Section 3, we introduce the experimental design and surveys. We further show the experimental results in Section 4 before we finally conclude on our main findings and discuss the policy implications in Section 5.

2. Related work and hypotheses

2.1. Development of children's cooperation preferences

Experiments on children are essential for exploring and improving the *homo economicus* postulate and providing evidence for a policy decision. Theoretically, traditional economic experiments based on adult subjects have studied their formed and stable preferences and developed social preference theories, such as inequality aversion (Fehr & Schmidt, 1999) and reciprocal preferences (Rabin, 1993). However, whether these theories are applicable before adulthood or how preferences form and develop before maturity remains to be analyzed by employing children as subjects (Sutter, Zoller, & Glätzle-Rützler, 2019). Practically, understanding children's development is a prerequisite for policy interventions designed to improve children's well-being and other life outcomes in the long term (List, Petrie, & Samek, 2021). Some experimental studies have focused on the development of economic preferences in childhood, such as children's altruism (Brocas, Carrillo, & Kodaverdian, 2017; Fehr, Glätzle-Rützler, & Sutter, 2013), egalitarianism (Fehr et al., 2013; Fehr, Bernhard, & Rockenbach, 2008), contingent reciprocity (House, Henrich, Sarnecka, & Silk, 2013), and trust

[1] All-China Women's Federation, "Report on Rural Left-behind and Rural-Urban Migrant Children in China", 2013. The figures vary substantially across different institutions because of the different definitions of LBC, but the large number of LBC is an undeniable fact.

and trustworthiness (Sutter & Kocher, 2007). Sutter et al. (2019) conducted a comprehensive review of the experimental economics research on children, including time preferences, risk preferences, competitiveness and social preferences such as cooperation.

As one of the key social preferences, topics on children's cooperation development tracks and their determinants have received increasing attention. Based on public goods games, an early study found that, like adults, children contribute a certain amount to public goods games, and older children are more generous in the first round of the games (Harbaugh & Krause, 2000). As indicated by the subsequent experimental literature, children's cooperation may be affected by factors such as moral education (Fan, 2000), group size (Alencar, Deoliveirasiqueira, & Yamamoto, 2008), gender (Cárdenas, Dreber, von Essen, & Ranehill, 2014), third-party punishment (Lergetporer, Angerer, Glatzle-Rutzler, & Sutter, 2014), and group differences (Angerer, Glätzle-Rützler, Lergetporer, & Sutter, 2016).

Most experimental studies have found that older children are more likely to cooperate (Angerer et al., 2016; Fan, 2000; Harbaugh & Krause, 2000; Sutter et al., 2019). In addition, the upward development trends of reciprocity, altruism, and inequality aversion could account for the development of children's cooperative behaviors (Brocas et al., 2017; Fehr et al., 2008; Fehr et al., 2013; House et al., 2013). In terms of psychological fields, the theory of cognitive development and theory of mind provide further explanations for children's prosocial behavior development (Kohlberg, 1969; Piaget, 1962; Wellman, Cross, & Watson, 2001). In early childhood, individuals are self-centered. As they mature, they gradually learn to consider other people's views and infer others' beliefs through the accumulation of social experiences (Selman, 1980). Experiments have proven that people's belief in others is significantly related to their cooperation levels (Dufwenberg, Gächter, & Hennig-Schmidt, 2011; Lergetporer et al., 2014). A meta-analysis conducted on 125 papers also found that children's prosocial behavior is positively correlated with age (Eisenberg & Fabes, 1998).

Although the cultural backgrounds of these studies differ from those of rural China, cooperation is an important social norm that these differences cannot offset. Since older children are better at understanding and integrating into this social norm (Dutra et al., 2018; Zarbatany, Hartmann, & Gelfand, 1985), we conjecture that the cooperation levels of children in rural China may increase with age and propose **Hypothesis 1** as follows:

Hypothesis 1. Rural children's cooperation levels without punishment gradually increase with age.

2.2. Parental absence and children's cooperation development

A large body of empirical literature has discussed the impacts of parental migration on children's various outcomes. Parental absence leads to a change from traditional both-parent care to single-parent care or even grandparent care, and most grandparents in rural China are uneducated and lack knowledge about good care (Lei et al., 2018). Thus, compared with non-LBC, LBC's development of cognitive and noncognitive abilities may be negatively affected by their disadvantage in educational supervision and physical and mental guardianship. Evidence has shown that parental migration reduces children's educational attainment (Lu, 2014; Wang, 2014) and harms LBC's academic performance (Zhao et al., 2014). In addition, it results in children having a higher probability of getting sick or developing chronic diseases (Li, Liu, & Zang, 2015) and has negative impacts on LBC's height and weight (Lei et al., 2018). Regarding mental health, LBC are disadvantaged in emotional adjustment (He et al., 2012; Sun et al., 2015).

Although most empirical research is based on questionnaire surveys, a few recent experimental studies based on induced value theory (Smith, 1976) have provided evidence that LBC are distinct from non-LBC in economic preferences. For example, LBC avoid competing more significantly than non-LBC do (Dong & Zhao, 2019). Being left behind is correlated with higher risk-seeking, which results in a higher probability of crime when combined with lower access to education (Zhang et al., 2021). However, some other studies do not support that staying behind necessarily leads to a negative impact. Cadsby et al. (2020) found that the development of altruism is the most pronounced among LBC for whom both parents migrated.

Regarding the influence of parents on children's cooperation levels, existing studies have not yet reached consensus. Cipriani et al. (2013) used standard public goods games on children and parents and found no correlation between intergenerational cooperation levels.[2] However, Ben-Ner, List, Putterman, and Samek (2017) used a dictator experiment to measure the prosocial imitation behavior of 147 children aged 3–5 and found that the generosity of the parents affected the extent of sharing by the children in subsequent experiments, although the initial degrees of sharing of children and parents were unrelated.

However, to the best of our knowledge, little experimental literature investigates the developmental differences in cooperation preferences between rural LBC and non-LBC. The existing experimental literature on children's cooperation is based on an intact family structure, and it is difficult to separate the heterogeneous paternal and maternal effects. Thus, our aim is to explore the influence of parental migration on children's cooperation levels, utilizing a lab-in-field experiment with a sample of migrant parents and their LBC during the process of urbanization in China.

One of our fundamental conjectures is that a lack of parent–child interaction and family care may lead to different trajectories in cooperation preference development between LBC and non-LBC. In addition, since mothers and fathers play different roles in the process of raising children, i.e., mothers provide physiological upbringing, while fathers bear the responsibility for social education (Fei, 1992), we speculate that paternal and maternal migration have asymmetric influences on the cooperation preferences of LBC. Hence, we propose the following two hypotheses:

Hypothesis 2. LBC and non-LBC have different development trajectories of cooperation preferences.

[2] However, the sample size of Cipriani et al. (2013) is very small, only 38, so the conclusion needs to be interpreted with caution.

Hypothesis 3. Paternal and maternal migration have asymmetric effects on children's cooperation preferences.

2.3. Punishment and children's cooperation

If parental absence inhibits the development of LBC's cooperation preferences, can any institution offset the adverse impact? Many studies have shown that punishment, as an external institution, can effectively maintain people's cooperation levels (Chaudhuri, 2011; Fehr & Gachter, 2000). Similar to adults, children negatively evaluate and punish free riders (Alencar et al., 2008; Yang, Choi, Misch, Yang, & Dunham, 2018). Lergetporer et al. (2014) employed a prisoner's dilemma game among 1120 students aged 7–11 and found that punishment greatly increased children's cooperation ratio. To our knowledge, little literature introduces punishment mechanisms into children's public goods games, and there is no evidence on the difference in performance under punishment between LBC and non-LBC. Thus, we designed experiments using rural students and speculate that punishments could improve both LBC and non-LBC's cooperation levels.

Hypothesis 4. Punishments can significantly promote the cooperation levels of both LBC and non-LBC.

Exogenous punishment is defined as a rule by which a third party reduces the subject's payoff if the subject contributes less than a certain prescribed amount of endowment. Endogenous punishment is a rule under which a group member votes whether to implement the punishment rule. Implementation will occur if a majority of group members vote for it. Endogenous punishment can enhance individuals' cooperation and even produce a higher level of cooperation than that under the exogenous punishment rule (i.e., endogenous premium) because it may better convey the cooperation signal of the collaborators (Dal Bó, Foster, & Putterman, 2010). Vollan, Landmann, Zhou, Hu, and Herrmann-Pillath (2017) found endogenous premiums in a college student sample but not in a worker sample. Given that Chinese students in primary and junior high school usually follow strict rules and management guidelines, we speculate the effect of exogenous punishment to be better than that of endogenous punishment and propose the following hypothesis:

Hypothesis 5. Exogenous punishment has a stronger effect than endogenous punishment.

The final question we are interested in is the combined effect of punishment and parental migration. Assuming that parental migration has a negative effect on children's cooperation preferences, we wonder whether external punishments amplify or mitigate the negative effect. If punishment reduces the negative effects, external institutional norms can play a certain compensatory role in guiding LBC's socialization behavior. In contrast, if punishments amplify the negative effects, being left behind may be problematic. Because the literature does not adequately discuss this issue, we propose the following two competing hypotheses.

Hypothesis 6a. Punishment can exacerbate the negative impacts of parental migration on children's cooperation preferences.

Hypothesis 6b. Punishment can mitigate the negative impacts of parental migration on children's cooperation preferences.

3. Experimental design and surveys

In 2018, we conducted the experiment in three counties (Dujiangyan, Santai, and Beichuan) of Sichuan Province in China, a province with a massive number of rural residents transitioning into migrant workers.[3] We sampled schools from different distances to the county center to ensure sample representativeness. After a pilot survey, we selected classes with a moderate number of LBC from the first, third, and fifth grades (primary school in China) and the eighth grade (the second year of junior high school) in each school. From 38 classes in 11 schools, 1632 subjects participated in the experiment.

Each experimental session was based on a class. We chose rooms as spacious as possible for the experimental sites, such as large conference rooms and classrooms, to ensure that the subjects were separated from one another by at least one empty seat. The seating was randomized, and the subjects were not allowed to communicate with each other. Additionally, all experimenters and assistants were well trained about the experimental procedure and requirements.

The experiments were in paper-and-pen format, and the subjects needed to note their decisions in a game booklet. The whole experiment consisted of public goods games and games regarding risk, time and competition preferences. In this paper, we mainly used the data from the public goods games, which were designed as cartoons to be more comprehensible to primary school students. The experimenter showed these cartoon slides to explain the games in detail. If a subject did not understand the instruction or did not pass the control questions, the assistants would explain the game again to him or her in person. Monetary incentives were used in the public goods games, while the payoff of the other games was candy and stationery. To ensure that the subjects took each game seriously, we informed them before the experiments that one of the public goods games would be randomly selected to pay. The payoff was given to the subjects onsite after the experiment. Subjects in the first, third, fifth and eighth grades had average payoffs of RMB 9.8, 10.6, 11.2, and 16.6, respectively, for the entire experiment (including other games such as the risk and competition games), which were approximately equal to the mean value of the weekly pocket money in each grade.

Our public goods games consisted of three one-shot anonymous games, namely, the standard public goods game without punishment (*NoLaw*), with exogenous punishment (*ExoLaw*), and with endogenous punishment (*EndoLaw*). *NoLaw* was used to test

[3] Statistics from the Department of Human Resources and Social Security in Sichuan (Available at http://rst.sc.gov.cn) show that in September 2018, there were 25,335,600 rural labor migrants, of whom 14,254,900 worked within the province and 1,180,700 worked outside of it.

Hypotheses 1, 2, and 3, while *ExoLaw* and *EndoLaw* were designed to test Hypotheses 4–6.

(1) *NoLaw*. In this setting, participants anonymously played the voluntary contributions mechanism (VCM) game in a group with two other classmates randomly selected in the same class by computer.

To help the children better understand the game, we called the public goods games "magician games". Each student had ten tokens as their endowments and determined how many to give to the magician. The magician turned every two tokens he collected into three and then distributed them equally to three group members, i.e., the marginal rate of return on the public goods contribution was 0.5. An individual's final payoff equaled the remaining tokens (private account) plus those returned from the magician (public account).

The average return function for individual i is

$$\pi_i = 10 - g_i + 0.5\sum_{j=1}^{3} g_j \tag{1}$$

where π_i is the payoff of subject i, g_i is i's contribution to the public account, and g_j represents the contribution of member j in the group. To alleviate the computational burden for lower grade subjects, g_i and g_j were constrained to even numbers within 10. Given the difference in pocket money levels between the grades (Harbaugh & Krause, 2000), the conversion rates of each token were set to 0.2 RMB for the 1st and 3rd grades, 0.3 RMB for the 5th grade, and 0.4 RMB for the 8th grade. In this game, zero contribution was the dominant strategy for maximizing individual benefits, while contributing 10 tokens maximized the social benefit.

(2) *ExoLaw*. This setting added a "subtraction rule" to *NoLaw*. If an individual contributed less than 10 points to the public account, 2 tokens were deducted from his or her payoff. The punishment rate followed the mild law in Tyran and Feld (2006). The payoff for subject i is

$$\begin{aligned} \pi_i &= 10 - g_i + 0.5\sum_{j=1}^{3} g_j, g_i = 10 \\ \pi_i &= 8 - g_i + 0.5\sum_{j=1}^{3} g_j, g_i < 10 \end{aligned} \tag{2}$$

Under *ExoLaw,* the social welfare maximizing option for the whole group remained the same as in *NoLaw,* i.e., each member contributed his or her entire endowment to the public account, and the final payoff per person was 15. However, a zero contribution remained the subjects' dominant strategy.

(3) *EndoLaw*. In addition to the "subtraction rule," *EndoLaw* added a "voting rule" to *NoLaw*; that is, the subjects voted on whether to implement the "subtraction rule." The rule took effect if more than two group members voted for it. Because this was a one-shot experiment, the subjects did not receive feedback on the voting results, so they did not know whether the subtraction rule would be implemented when they made their contribution decisions.

Given that the *EndoLaw* may be difficult for students in lower grades to understand, it was implemented only in the senior grades (the fifth and eighth grades). To avoid round effects, we randomized the order of *ExoLaw* and *EndoLaw*. Half of the classes were randomly selected to conduct *ExoLaw* first and then *EndoLaw*, and the other half were in the opposite order. The experimental arrangement of each grade is shown in Table A1 in Appendix A1, while a detailed experimental protocol is provided in Appendix A2.

In addition to experiments on the children, we also conducted questionnaire surveys for the students and their parents/caregivers. The students' questionnaire collected information about the children's demographic characteristics, parent–child interactions, personality, and other factors. The parents/caregivers' questionnaire included questions about basic family background, socioeconomic status, parents/caregivers' working status, demographic information, values, and other factors.

4. Results

4.1. The development of children's cooperation preferences

Overall, the average cooperation level of the 1632 children who completed the public goods games under *NoLaw* was 5.66. This result indicates children show cooperative behaviors that deviate from the self-interest hypothesis, similar to adult subjects. Fig. 1 illustrates that the children's unconditional average contribution without punishment increased with age. The average contribution of the first-grade children was 4.51, and the average contribution of the third, fifth and eighth grades was higher than that of the adjacent lower grade, i.e., 1.13 ($p = 0.000$), 0.22 ($p = 0.305$) and 0.66 ($p = 0.002$), respectively. Moreover, we plotted the trend of the level of cooperation between boys and girls with age. As shown in Fig. 1, both boys and girls showed a gradual rise in their cooperation levels with age. Boys' cooperation levels appear to be higher than those of girls, but the difference is not statistically significant.[4]

Furthermore, Fig. 2 depicts the distribution of children's cooperation under *NoLaw*. As age increased, the overall proportion of free

[4] The levels of cooperation in the first, third, fifth, and eighth grades for boys were 4.59, 5.88, 6.09 and 6.63, while for girls these figures were 4.40, 5.40, 5.62 and 6.44, respectively. None of the mean differences pass the significance test (p = 0.5420, 0.1487, 0.1206 and 0.5483, respectively).

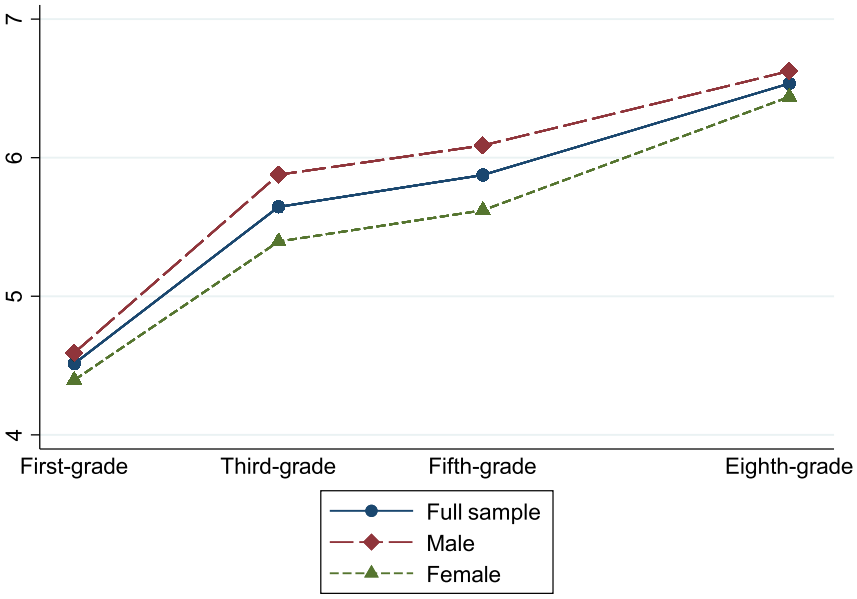

Fig. 1. Development of children's cooperation.

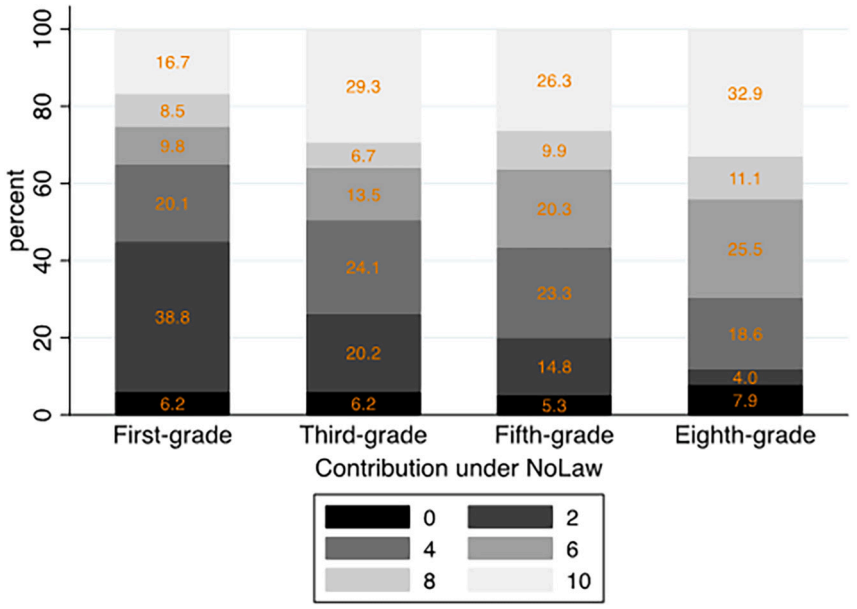

Fig. 2. Distribution of children's cooperation.

riders and low-level cooperators gradually decreased,[5] from 45% (=6.2% + 38.8%) in the first grade to 11.9% in the eighth grade,[6] while the proportion of moderate and high cooperators gradually increased.[7] This result is consistent with most of the literature (Angerer et al., 2016; Fan, 2000; Harbaugh & Krause, 2000).

The effects discussed above are unconditional differences, which could be attributed to the differences in the demographic backgrounds among the subsamples other than age. To identify the impact of age on children's cooperation level, we used ordinary least squares (OLS) while controlling for a set of observable child and family characteristics. The OLS regression model is as follows:

$$y_i = \alpha + \beta_1 Grade3_i + \beta_2 Grade5_i + \beta_3 Grade8_i + \boldsymbol{\gamma}' \boldsymbol{X}_i + \varepsilon_i \quad (3)$$

where the dependent variable y_i is the contribution level of subject i in the public goods games. $G3_i$, $G5_i$, and $G8_i$ denote the binary variables for the grade to which subject i belongs. $\boldsymbol{X}_i$ is a vector of control variables, including parental absence status, gender, whether the child is an only child, weekly allowance, and family socioeconomic status. ε_i is a random disturbance term. We also control for the subjects' risk preference, as they may regard the public goods game as an investment or adventure.[8] A summary of the descriptive statistics is shown in Figures. B1 and B2 in Appendix B.[9]

Table 1 shows the estimation results of *Eq. 3*, taking as the dependent variable the contribution level of public goods without punishment ($Contri_{NoLaw}$). Column (1) is the benchmark regression without controlling for risk preferences and school fixed effects, Column (2) controls for risk preferences, and Column (3) further controls for school fixed effects. As Column (1) shows, the coefficients of the third-grade (1.081), fifth-grade (1.346), and eighth-grade (2.115) students increased in turn compared with their first-grade counterparts, with a slight and insignificant change in Columns (2) and (3). Thus, the result of an upward trend in children's cooperation level by age is robust.[10]

We also report differences in the development of cooperation preferences between boys and girls in Columns (4) and (5). As they show, both cooperation preferences show a gradual increase with age. Moreover, the magnitude of the coefficient of the grade variable is larger for boys than for girls, suggesting that boys' cooperation levels increased slightly faster than those of girls.

Therefore, we have results supporting Hypothesis 1.

Result 1: *As age increases, the level of children's cooperation without punishment presents an upward trend.*

4.2. The effects of parental migration on children's cooperation

4.2.1. Definition of LBC, sample and descriptive statistics

The definitions of LBC in previous studies are inconsistent. Some of the literature regards children whose parents are both migrant workers as LBC (Tang, Choi, Deng, Bian, & Hu, 2019). Another part of the literature regards children with either or both migrant parents as LBC (Cadsby et al., 2020). In this paper, rural children under the age of 16 are defined as LBC if they have one or both parents migrating to work for more than one year in the last ten years, allowing us to identify the net effect of parental migration and the asymmetric effect between paternal and maternal migration. Therefore, we divide the subjects into four different categories: non-LBC, mother-migrant children, father-migrant children, and both-parent-migrant children. To mitigate the confusion between the impacts of parental migration and family misfortunes rendered by divorce or death, we use a sample without families suffering such misfortune. Thus, we obtain 1299 observations.

As shown in Tables 2, 38.65% of the children were non-LBC, while 26.94%, 2.93%, and 31.49% were paternal-migrant, maternal-migrant, and both-parent-migrant LBC, respectively. Staying behind was evenly distributed among the different grades, and the proportion of father-migrant and both-parent-migrant LBC in the senior grades was slightly lower than that in the junior grades.

Table 3 summarizes the descriptive statistics of the dependent variables, independent variables, control variables, and the mediators. The average contribution level of the father-migrant LBC was 5.24, which was lower than that of non-LBC (5.60, $p = 0.117$). The cooperation level of the mother/both-parent-migrant LBC was slightly higher than that of the non-LBC and not statistically significant. Regarding personal and family variables, 47.8% of the participants were girls and 28.2% were only children. An average age of 10.29

[5] Based on the concern that free-riders may increase with age, which may contradict the intuition from the first hypothesis, we test the mean difference in the proportion of free-riders between the adjacent grades. The results show that there is no difference between grade 1 (6.2%) and grade 3 (6.2%) ($p = 0.9944$) or between grade3 and grade 5 ($p = 0.5986$). Although the proportion of free-riders shows an increase from grade 5 (5.3%) to grade 8 (7.9%) in Fig. 2, the difference is also not significant at the 10% level ($p = 0.1282$). Therefore, we believe that there is not trend of a higher proportion of free-riders with age.

[6] We classified the subjects as free riders (contributing 0), low-level cooperators (contributing 2), moderate cooperators (contributing 4 or 6), and high cooperators (contributing 8 or 10).

[7] We also test the mean differences in the proportions of moderate and high cooperators between the adjacent grades. The results show that the proportion of moderate cooperators increased gradually from grade 1 to grade 5, while there is no difference between grade 5 (43.6%) and grade 8 (44.1%) ($p = 0.5986$). The proportion of high cooperators increased from 25.2% in grade 1 to 36% in grade 3 ($p = 0.0010$), increased from 37.2% in grade 5 to 44% in grade 8 ($p = 0.0213$), although there was no significant difference between grade 3 and Grade 5 ($p = 0.9285$).

[8] Risk preference was determined by the number of tokens given by the students in another experiment. For each contributed token, there is a 50% probability of it being tripled and then returned, and another 50% probability that it will disappear.

[9] Among these, the parental absence variable includes all the subjects with family misfortune (divorce or widowhood), while the later analysis in the next section excludes these subjects.

[10] We also used a continuous variable, children's age, as the independent variable, and the regression results remained robust.

Table 1
Effects of age on children's cooperation: OLS regression.

Dependent variable: $Contri_{NoLaw}$	Full sample			Male	Female
	(1)	(2)	(3)	(4)	(5)
Third grade	1.081***	1.096***	1.066***	1.247***	0.863**
	(0.237)	(0.238)	(0.238)	(0.338)	(0.337)
Fifth grade	1.346***	1.366***	1.202***	1.448***	0.877***
	(0.229)	(0.227)	(0.232)	(0.327)	(0.333)
Eighth grade	2.115***	2.117***	2.019***	2.297***	1.742***
	(0.231)	(0.274)	(0.276)	(0.400)	(0.378)
Father-absent LBC	−0.450**	−0.544**	−0.542**	−0.311	−0.660**
	(0.228)	(0.228)	(0.227)	(0.323)	(0.324)
Mother- absent LBC	0.372	0.283	0.267	0.808**	−0.441
	(0.303)	(0.300)	(0.296)	(0.408)	(0.426)
Both-parent-absent LBC	0.191	−0.012	−0.059	−0.211	0.167
	(0.259)	(0.263)	(0.261)	(0.374)	(0.371)
Female	−0.266*	−0.232	−0.191		
	(0.161)	(0.161)	(0.160)		
Only child	−0.472***	−0.211	−0.234	−0.231	−0.198
	(0.181)	(0.195)	(0.194)	(0.279)	(0.270)
Allowance	0.003	0.004	0.004	0.004	0.003
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Family SES	−0.281	−0.159	−0.177	−0.236	−0.110
	(0.186)	(0.189)	(0.187)	(0.264)	(0.269)
Risk preference		0.423***	0.387**	0.536***	0.423***
		(0.115)	(0.152)	(0.177)	(0.115)
School fixed effect	No	No	Yes	Yes	Yes
Constant	4.748***	4.312***	3.652***	3.372***	3.634***
	(0.263)	(0.335)	(0.370)	(0.499)	(0.511)
Adjusted R^2	0.063	0.077	0.086	0.091	0.097
Observations	1547	1547	1547	810	737

Note: Robust standard errors are shown in parentheses. *, ** and *** represent significance at the 10%, 5% and, 1% level, respectively.

Table 2
Sample size across family structures and grades.

Classification of left-behind status		1st Grade	3rd Grade	5th Grade	8th Grade	Total	Proportion
Non-LBC	Children who are not left behind	121	118	123	140	502	38.65%
Father-migrant LBC	Children whose father migrated for work and whose mother stayed	94	84	95	77	350	26.94%
Mother-migrant LBC	Children whose mother migrated for work and whose father stayed	9	15	7	7	38	2.93%
Both-parent-migrant LBC	Children who had both parents migrate for work	97	114	113	85	409	31.49%
Total		321	331	337	309	1299	100%

years and an average weekly pocket money of 14.3 yuan were observed among the sample students.[11] Following Wu et al. (2018), we ran a factor analysis to build a variable of family socioeconomic status using the self-reported family relative economic status, parents' occupation and educational level, and caregiver's occupation and educational level.[12]

To analyze the channel by which parents' migration affects children's cooperation preferences, we investigated the separation effect in three different forms: parental migration distance, migration duration, and reunion interval. The distance was divided into three grades from near to far; the duration was the total time migrating from May 2008 to May 2018; and the interval was defined by the longest period between two reunions.

4.2.2. Development difference in cooperation preferences between LBC and non-LBC

Fig. 3 illustrates that the unconditional contribution of the non-LBC gradually increased with age, while the LBC exhibited a different development trend. The cooperation level of the father-migrant LBC was lower than that of the non-LBC in the first grade ($p = 0.0872$). Then, it gradually increased, reaching a higher level in the fifth grade, and remained stable in the eighth grade, where it was still lower than that of the non-LBC, albeit not significantly so ($p = 0.1847$). The group size of the mother-migrant children was very small and much smaller when scattered across four grades (only 9, 15, 7, and 7), so we did not plot the figure. The cooperation levels of

[11] We perform a 98% winsorization on the weekly allowance.
[12] Main caregivers refer to guardians who supervise students' educations and lives during their parents' migration.

Table 3
Descriptive statistics (excluding family misfortune observations).

Variables	Definition	Obs.	Mean	S. D.	Min	Max
Dependent variable: cooperation level						
$Contri_{NoLaw}$	Contribution in the public goods game without punishment	1299	5.567	3.259	0	10
$Contri_{ExoLaw}$	Contribution in the public goods game with exogenous punishment	1159	7.990	3.207	0	10
$Contri_{EndoLaw}$	Contribution in the public goods game with endogenous punishment	574	7.272	3.472	0	10
Key independent variables: family structures						
Non-LBC	1 = non-LBC, 0 = other left-behind status	1299	0.386	0.487	0	1
Father-migrant LBC	1 = father migrated for work and mother stayed, 0 = other left-behind status	1299	0.269	0.444	0	1
Mother-migrant LBC	1 = mother migrated for work and father stayed, 0 = other left-behind status	1299	0.029	0.169	0	1
Both-parent-migrant LBC	1 = both parents migrated for work, 0 = other left-behind status	1299	0.315	0.465	0	1
Individual and household variables						
Female	1 = female, 0 = male	1298	0.478	0.500	0	1
Age	Years of age	1294	10.29	2.618	6	16
Only child	1 = only child , 0 = non only child	1294	0.282	0.450	0	1
Allowance	Weekly allowance (yuan)	1296	14.292	22.746	0	150
Risk preference	increase from 0 to 4	1299	1.902	0.780	0	4
Family SES	Family socioeconomic status, obtained by factor analysis	1257	0.044	0.563	−1.350	1.724
Separation effect related variables						
Fathers' migrant distance	1 = in the county, 2 = other cities within the province, 3 = outside the province	1284	1.967	0.857	1	3
Mothers' migrant distance	Same as above	1270	1.546	0.799	1	3
Fathers' migrant duration	0 = no migration, 0.5 = less than one year, 1 = one year, 2 = two years, 3 = three years, 4 = four years, 5 = five years, 6 = more than five years	1202	3.055	2.177	0	6
Mothers' migrant duration	Same as fathers' migrant duration	1223	2.013	2.323	0	6
Fathers' reunion interval	0 = no migration, 1 = once a week, 2 = once a month, 3 = once a quarter, 4 = half a year, 5 = once a year, and 6 = more than one year	1236	3.129	2.621	0	6
Mothers' reunion interval	Same as fathers' reunion intervals	1253	1.856	2.457	0	6

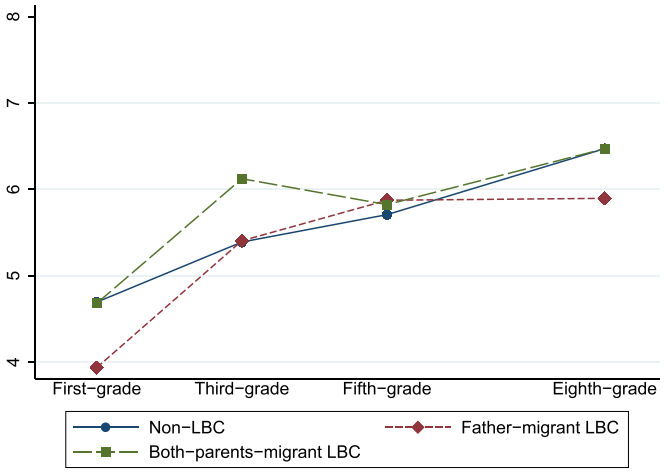

Fig. 3. Development difference in cooperation preferences between LBC and non-LBC.

the children with both migrant parents showed a fluctuating pattern, which was very close to that of the non-LBC in the first, fifth and eighth grades but significantly higher than that of the non-LBC in the third grade ($p = 0.0976$).

4.2.3. Regression results

Furthermore, we employed OLS as the basic estimation strategy to identify the impact of parental migration on children's cooperation level, controlling for a number of observable child and family characteristics, as shown in Table 3. The OLS regression model is

as follows:

$$y_i = \alpha + \theta_1 FatherLBC_i + \theta_2 MotherLBC_i + \theta_3 BothLBC_i + \varepsilon_i \quad (4)$$

where the dependent variable y_i is the contribution level of subject i in the public goods games under *NoLaw*. The key binary explanatory variables—$FatherLBC_i$, $MotherLBC_i$, and $BothLBC_i$—represent the different left-behind statuses. X_i is a vector of control variables, including risk preference, gender, whether the child is an only child, grade, weekly allowance, and family socioeconomic status. ε_i is a random disturbance term.

Table 4 displays the estimation results of *Eq. 4*, taking the dummy variable group of parents' migration status as the key independent variable. Column (1) is the benchmark regression, Column (2) controls for risk preferences, and Column (3) further controls for school fixed effects. The regression results showed asymmetric impacts of paternal or maternal migration on children's cooperation level. Compared with the non-LBC (base group), the father's migration significantly lowered children's cooperation levels. After controlling for the risk preference and school fixed effect, paternal migration decreased children's cooperation levels by 0.477, accounting for 14.58% of the standard deviation change (Column 3, Table 4), which was both statistically and economically significant. This nonnegligible proportion of the father migrant children (26.94%) further highlights the father's pivotal role in the development of children's cooperation preferences. Maternal migration had a positive but insignificant effect on children's cooperation, but the sample size was too small (38 observations, 2.93%). We also observed that the cooperation levels of both parent migrant children did not significantly differ from that of the non-LBC.

The other observable variables—specifically, the dummy variables for grades—also showed an increasing trend in coefficients, which further verified Hypothesis 1. Only children were more uncooperative than non-only children (Column 1). Risk preference had a significant positive impact on children's contribution to public accounts (Column 2). However, female sex, weekly allowance, and family SES were not significant.

To understand the different effects of parents' migration on boys and girls, we further ran OLS regressions on male and female subsamples. The results in Columns (4) and (5) of Table 4 show that paternal migration had a significant negative impact on girls but not on boys.

Therefore, we obtained the following results in support of Hypotheses 2 and 3:

Result 2: *The level of cooperation development of children under different left-behind conditions is different.*

Result 3a: *Paternal and maternal migration have asymmetric influences on children's cooperation preferences. Specifically, paternal migration has a negative influence, while maternal migration and both parents' migration have no significant influence.*

Table 4
Effects of age and parents' migration on children's cooperation: OLS regression.

Dependent variable: $Contri_{NoLaw}$	Full sample			Male	Female
	(1)	(2)	(3)	(4)	(5)
Father-migrant LBC	−0.408*	−0.420*	−0.477**	−0.291	−0.609*
	(0.243)	(0.241)	(0.242)	(0.341)	(0.351)
Mother-migrant LBC	0.349	0.231	0.144	0.296	−0.093
	(0.503)	(0.483)	(0.496)	(0.716)	(0.679)
Both-parent-migrant LBC	0.033	−0.035	−0.215	−0.468	0.059
	(0.284)	(0.281)	(0.288)	(0.414)	(0.408)
Third grade	1.059***	1.032***	1.061***	1.224***	0.838**
	(0.260)	(0.260)	(0.261)	(0.366)	(0.381)
Fifth grade	1.310***	1.150***	1.186***	1.366***	0.903**
	(0.254)	(0.258)	(0.258)	(0.364)	(0.368)
Eighth grade	1.972***	1.841***	1.760***	2.104***	1.489***
	(0.256)	(0.259)	(0.309)	(0.443)	(0.422)
Female	−0.150	−0.114	−0.078		
	(0.180)	(0.179)	(0.179)		
Only child	−0.512**	−0.516**	−0.208	−0.140	−0.249
	(0.205)	(0.204)	(0.224)	(0.324)	(0.314)
Allowance	0.002	0.002	0.004	0.006	−0.001
	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Family SES	−0.261	−0.286	−0.170	−0.218	−0.113
	(0.212)	(0.209)	(0.215)	(0.311)	(0.307)
Risk preference		0.449***	0.408***	0.377**	0.532***
		(0.129)	(0.131)	(0.174)	(0.201)
School fixed effect	No	No	Yes	Yes	Yes
Constant	4.764***	4.000***	3.785***	3.410***	4.052***
	(0.281)	(0.343)	(0.409)	(0.551)	(0.589)
Adjusted R^2	0.050	0.060	0.069	0.079	0.075
Observations	1250	1250	1250	653	597

Note: Robust standard errors are shown in parentheses. *, ** and *** represent significance at the 10%, 5% and, 1%, level, respectively.

4.3. Separation effect of parental migration: a mediation analysis

Studies from psychology, pedagogy and sociology provide us with evidence for the negative impact of father–child separation on children's social behavior development. Bowlby (1969, 1973) believed that parent–child separation led to the attachment needs of LBC being unsatisfied, rendering them more likely to evaluate themselves negatively. Subsequent evidence has shown that paternal absence may cause children's cognitive impairment and criminal behavior in adolescence (Amato & Gilbreth, 1999). Children who are more closely connected with their fathers can better manage themselves in social interactions (Vogel, Bradley, Raikes, Boller, & Shears, 2006).

To further analyze whether parental migration affects children's cooperation levels through the "separation effect", we took the parents' migration distance, migration duration and reunion interval as proxy variables for parent–child separation. We first tested whether the independent variable can influence the mediating variable, and the results are reported in Table 5. Columns (1), (3) and (5) in Table 5 show that paternal migration was positively associated with the migration distance, migration duration and reunion interval. Columns (2), (4) and (6) show a positive correlation between maternal migration and the mediators. The variable coefficients of both parents' migration in each column were also positive and significant. These results illustrate that the independent variables significantly affect the mediators, and the signs align with expectations.

Then, the mediators were included in *Eq.* 4, and the results are presented in Table 6. Compared with the benchmark regression in Column (1), Table 6, the significance level of the variable of paternal migration decreased to a greater extent after adding the variables for parent–child separation. Columns (2) and (3) show that the distance and duration of the father's migration negatively affect the children's cooperation levels, but the effects are limited. Column (4) indicates that when the fathers' reunion interval was longer, the children's cooperation levels decreased by more. These results reveal the importance of migrant fathers returning home more often. Regardless of migration duration or distance, the father frequently returning home and communicating with his children could avoid the decline of their noncognitive abilities, such as cooperation preferences.

Result 3b: *Parents' migration influences children's cooperation preferences through the channel of the separation effect. When the reunion interval is longer for fathers returning home, the negative impact on children's cooperation preferences is greater, but the distance and duration of migration have no significant impact.*

4.4. Endogeneity and propensity score matching

The above results might not be interpreted as causal since parental migration is a self-selection process. Lower-income households may need to migrate to raise their income levels. Therefore, the initial conditions of the LBC group and the non-LBC group were not identical. To mitigate selection bias, following Bai et al. (2018) and Liu, Chang, Corn, Zhang, and Shi (2021), we used propensity score matching (PSM). PSM requires the conditional independence and common support assumptions. We therefore included as many covariates as possible that may affect children's cooperation levels and parents' migration, such as children's individual characteristic variables (gender, only child, grade, cognitive ability[13]) and family socioeconomic status. We also control for school fixed effects. As the left-behind status of children in this paper includes the three categories of father-migrant, mother-migrant, and both-parent-migrant, we take the non-LBC as the control group and the different left-behind statuses as the corresponding treatment groups. After matching the propensity score, PSM requires that the mean values of the covariates between the control and the treatment groups be similar. We performed the balance test and found that the results were acceptable, as reported in Table C1 (Appendix C).

PSM requires common support. We report three figures (Figs. 4–6) of the distribution of the propensity score of the treatment and control groups under 1:4 nearest neighbor matching, with a caliper of 0.05 chosen according to the propensity score. The results in Figs. 4–6 show substantial overlap in the matchings. In the first matching, where 397 participants were classified into the treatment group (father-migrant LBC) and 490 into the control group (non-LBC), only 8 of them were off support. In the second matching, where 125 participants are mother-migrant LBC, only 9 out of 615 were off support. In the final matching with both-migrant LBC as the treatment group, the number of participants off support increases, but 82.8% of the sample is still on support.

Table 7 reports the estimated results of the average treatment effect based on the one-to-four matching within a caliper of 0.05. Before matching, the cooperation level of the father-migrant group was not significantly lower than that of the non-LBC group (Row 1, Table 7). After matching, it became significant (Row 2). The coefficient of the father-migrant LBC was 0.68 lower than that of the non-LBC, indicating that the OLS regression coefficient (0.477) was underestimated. Similar to the OLS results, neither maternal nor both parents' migration had significant effects on children's cooperation level (Rows 4 and 6). To ensure the robustness of the results, we also used other methods, such as one-to-one matching (Table C2, Appendix C), one-to-four matching (Table C3, Appendix C) and kernel matching (Table C4, Appendix C). The estimated processing effects were slightly different across the various methods, but in the matching methods except one-to-one matching,[14] the average treatment effect of paternal migration was significantly negative, while neither maternal migration nor both parents' migration had any significant effect on children's cooperation level. Overall, the PSM results were basically consistent with the previous OLS conclusions.

[13] Children's cognitive ability is measured by two parts (C and D) of the Raven's Standard Progressive Matrices. Each part consists of 12 questions. The numbers of each participant's correct answers are used as their scores representing cognitive ability.

[14] Although the effect of paternal migration in one-to-one matching was not significant, its p value was close to 0.1.

Table 5
Separation effect of parents' migration: Do the independent variables affect the mediators?

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Father's distance	Mother's distance	Father's duration	Mother's duration	Father's reunion interval	Mother's reunion interval
Father-migrant LBC	1.389***		3.269***		1.984***	
	(0.036)		(0.154)		(0.140)	
Mother-migrant LBC		1.133***		2.493***		2.058***
		(0.103)		(0.378)		(0.327)
Both-parent-migrant LBC	1.412***	1.535***	3.464***	3.600***	2.225***	2.844***
	(0.040)	(0.031)	(0.174)	(0.151)	(0.159)	(0.137)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.701	0.794	0.536	0.540	0.481	0.502
Observations	1240	1231	1196	1216	1164	1187

Note: (1) Robust standard errors are shown in parentheses, and *, ** and *** represent significance at the 10%, 5% and 1%, level, respectively. (2) The reference group is non-LBC. (3) The above regression controls for variables such as risk preference, female, only child, grade, weekly pocket money, family SES and school fixed effects.

Table 6
Separation effect of parents' migration on children's cooperation levels: OLS regression.

Dependent variable: $Contri_{NoLaw}$	(1)	(2)	(3)	(4)
Father-migrant LBC	−0.477**	−0.344	−0.488	−0.306
	(0.242)	(0.366)	(0.315)	(0.282)
Mother-migrant LBC	0.144	0.457	0.004	0.007
	(0.496)	(0.568)	(0.528)	(0.543)
Both-parent-migrant LBC	−0.215	0.153	−0.359	−0.198
	(0.288)	(0.504)	(0.379)	(0.356)
Father's migration distance		−0.061		
		(0.201)		
Mother's migration distance		−0.179		
		(0.278)		
Father's migration duration			−0.024	
			(0.058)	
Mother's migration duration			0.044	
			(0.058)	
Father's reunion interval				−0.154**
				(0.066)
Mother's reunion interval				0.097
				(0.061)
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.069	0.068	0.070	0.072
Observations	1250	1224	1179	1127

Note: (1) Robust standard errors are shown in parentheses. *, **and *** represent significance at the 10%, 5% and 1%, level, respectively. (2) The base group is non-LBC. (3) Control variables include risk preference, female, only child, grade dummy variable, weekly pocket money, family income status and school fixed effects.

4.5. Can punishment mechanisms offset the negative effect of paternal migration?

Next, we investigate whether *ExoLaw* or *EndoLaw* can improve children's cooperation levels. Furthermore, we examine whether *ExoLaw* or *EndoLaw* can alleviate the negative impact of paternal migration on children's cooperation preferences.

Table 8 shows the unconditional mean difference test results among *NoLaw*, *ExoLaw*, and *EndoLaw* across the different groups of children, measured by the Wilcoxon signed-rank sum test without controlling for the observable demographic characteristics of the participants. Both exogenous and endogenous punishment significantly improved the cooperation levels of the non-LBC, father-migrant LBC, and both-parent-migrant LBC. Under exogenous punishment, the cooperation levels of the non-LBC, father-migrant LBC and both-parent-migrant LBC increased by 2.47, 2.77 and 2.09 ($p = 0.000$, $p = 0.000$, $p = 0.000$), respectively. Moreover, endogenous punishment increased the cooperation levels of the non-LBC, father-migrant and both-parent-migrant LBC by 1.03, 1.14 and 1.27 ($p = 0.000$, $p = 0.005$, $p = 0.000$), respectively. By comparison, exogenous punishment had a stronger effect on cooperation levels than endogenous punishment ($p = 0.000$, $p = 0.005$, $p = 0.000$). Thus, there is no "endogenous premium" for children in rural China, which suggests that the top-down normative system from schools and society is more important to the development of children's cooperation preferences. Therefore, we have the following results supporting Hypotheses 4 and 5.

Result 4. *The introduction of punishment can significantly promote children's cooperation levels.*

Result 5. *Exogenous punishment has a stronger effect than endogenous punishment.*

To measure the extent to which punishment could offset the cooperation difference between the LBC and non-LBC, we report the

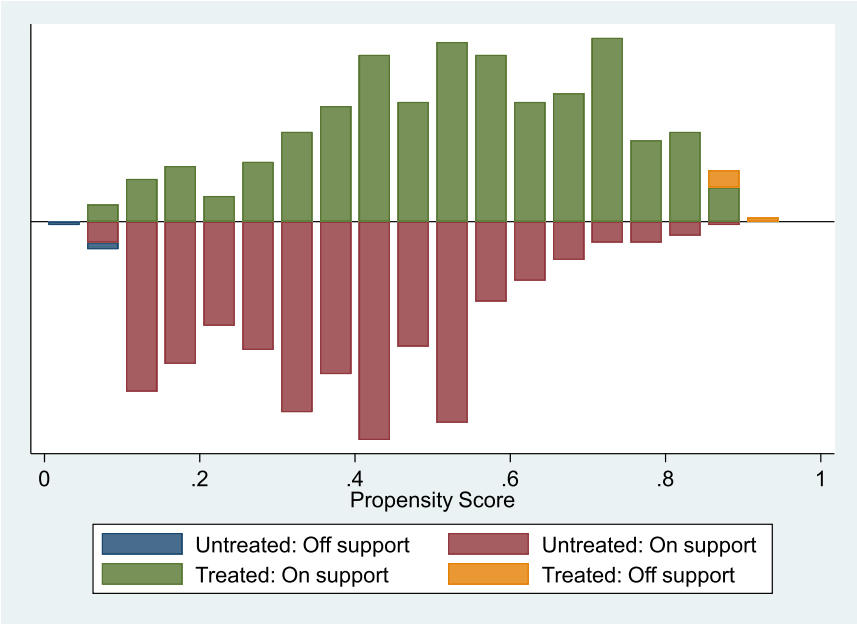

Fig. 4. Common support test with father-migrant children as the treatment group.

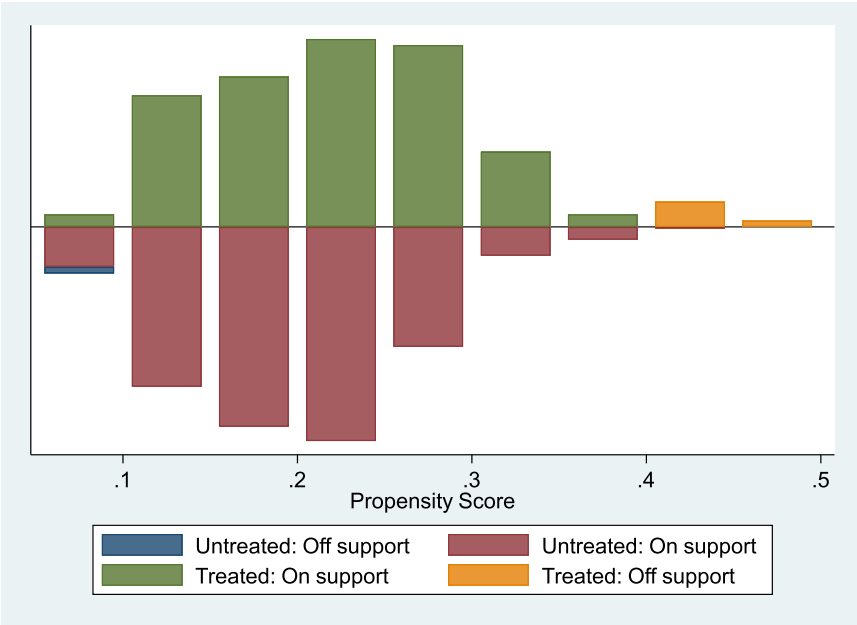

Fig. 5. Common support test with mother-migrant children as the treatment group.

grouped unconditional mean cooperation levels of the children in Table 9. Panels A, C and E exhibit the mean cooperation level of the sample completing the public goods game under *NoLaw* ($N = 1299$), *ExoLaw* (1159) and *EndoLaw* ($N = 574$), excluding participants with family misfortune. For precise comparisons, we also report the unconditional means of children's cooperation levels under *NoLaw* in Panels B and D with the same samples of *ExoLaw* and *EndoLaw* in Panels C and E, respectively.

By comparing *NoLaw* with *ExoLaw* (B and C, Table 9), we examined the effect of exogenous punishment on counteracting the negative influence of paternal migration. The $Contri_{NoLaw}$ of the father-migrant LBC was 0.46 lower than that of the non-LBC ($p = 0.064$), while exogenous punishment raised their cooperation levels from 5.22 to 7.99, which was not significantly different from the non-LBC's 8.15 ($p = 0.502$). The results indicated that exogenous punishment could substantially offset the negative influence of paternal migration. However, this result does not apply to the mother-migrant or the both-parent-migrant LBC. This finding may partly

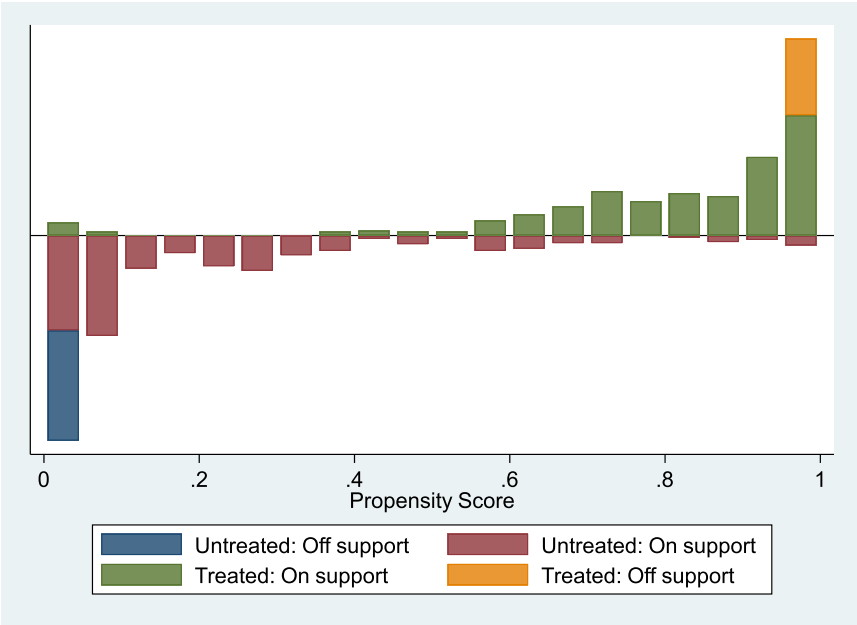

Fig. 6. Common support test with both-migrant children as the treatment group.

Table 7
Influence of parents' migration on children's cooperation levels (one-to-four matching, within a caliper of 0.05).

Sample			Average cooperation levels			S.E.	Common support samples	
			Treatment group	Control group	ATT		Treatment group	Control group
Control group: Non-LBC	Treatment group: Father-migrant LBC	Unmatched	5.23	5.57	−0.34	0.23	345	490
		Matched	5.23	5.91	−0.68**	0.31	339	478
	Treatment group: mother-migrant LBC	Unmatched	5.89	5.57	0.33	0.55	38	431
		Matched	5.89	5.55	0.34	0.51	35	419
	Treatment group: Both-parent-migrant LBC	Unmatched	5.78	5.57	0.21	0.22	377	490
		Matched	5.72	6.49	−0.77	0.61	311	334

Table 8
Children's cooperation across different institutions.

Left-behind status	*ExoLaw* vs. *NoLaw*		*EndoLaw* vs. *NoLaw*		*ExoLaw* vs. *EndoLaw*	
	Mean diff.	*P* value	Mean diff.	P value	Mean diff.	P value
Non-LBC	2.47***	0.000	1.03***	0.000	0.96***	0.000
Father-migrant	2.77***	0.000	1.14***	0.000	0.82***	0.005
Mother-migrant	1.10	0.115	−0.72	0.625	0.36	1.000
Both-parent-migrant	2.09***	0.000	1.27***	0.000	0.89***	0.000

Note: Wilcoxon's signed-rank sum test was used for the difference in the children's average contributions to public goods across different institutions, and *, ** and *** represent significance at the10%, 5% and 1%, level, respectively.

be attributed to the fact that the average cooperation levels without punishment for these two types of children were not significantly different from those of the non-LBC, and the sample size of the mother-migrant LBC was too small to exhibit statistical significance.

A parallel comparison between children's cooperation levels under NoLaw and EndoLaw (D and E, Table 9) revealed a smaller effect of endogenous punishment. Although the cooperation level of the father-migrant LBC was lower than that of the non-LBC without punishment, the difference was not statistically significant ($p = 0.533$). Endogenous punishment reduced the difference in the cooperation levels from 0.21 to 0.09, but it was still not statistically significant ($p = 0.799$). The average cooperation levels of the other two types of LBC also did not significantly differ from that of the non-LBC.

We further used OLS regressions to investigate the influence of left-behind status on the contribution level with punishment, controlling for students' individual and family characteristics. The results under *ExoLaw* and *EndoLaw* are shown in Table 10 and Table 11, respectively.

Table 9
Mean difference in cooperation level between LBC and non-LBC across punishment mechanisms.

Experiments and samples	Types of LBC	LBC's cooperation	Obs.	Non-LBC's cooperation	Obs.	Mean Diff.	P value
A: *NoLaw*	Father-migrant	5.24	350	5.60	502	−0.36	**0.117**
(Sample without family misfortunes)	Mother-migrant	5.89	38			0.38	0.593
	Both-parent-migrant	5.77	409			0.12	0.603
B: *NoLaw*	Father-migrant	5.22	314	5.68	424	−0.46*	**0.064**
(Sample same as C)	Mother-migrant	6.19	31			0.51	0.408
	Both-parent-migrant	5.79	390			0.11	0.636
C: *ExoLaw*	Father-migrant	7.99	314	8.15	424	−0.16	**0.502**
	Mother-migrant	7.29	31			−0.86	0.149
	Both-parent-migrant	7.88	390			−0.27	0.228
D: *NoLaw*	Father-migrant	6	152	6.21	223	−0.21	**0.533**
(Sample same as E)	Mother-migrant	7.45	11			1.24	0.204
	Both-parent-migrant	6.18	188			−0.03	0.936
E: *EndoLaw*	Father-migrant	7.14	152	7.24	223	−0.09	**0.799**
	Mother-migrant	6.73	11			−0.51	0.628
	Both-parent-migrant	7.45	188			0.21	0.537

Note: 1) In the same experiment, we used a t test to examine the difference between the LBC and non-LBC's average cooperation levels, and *, ** and *** represent significance at the 10%, 5% and 1% level, respectively.

Table 10
Effects of parents' migration on children's cooperation under *ExoLaw*: OLS regression.

Dependent variables: $Contri_{NoLaw}$ / $Contri_{ExoLaw}$	*NoLaw*	*ExoLaw*
	(1)	(2)
Father-migrant	−0.689***	−0.192
	(0.262)	(0.257)
Mother-migrant	0.337	−0.689
	(0.578)	(0.706)
Both-parent-migrant	−0.453	−0.303
	(0.302)	(0.285)
Controls	Yes	Yes
Observations	1119	1119

Note: (1) Robust standard errors are shown in parentheses, and *, ** and *** represent significance at the 10%, 5% and 1%, level, respectively. (2) The base group is the non-LBC. (3) Control variables include risk preference, female, only child, grade dummy variable, weekly pocket money, family income status and school fixed effects.

Table 11
Effects of parents' migration on cooperation under *EndoLaw*: OLS regression.

Dependent variable: $Contri_{NoLaw}$/$Contri_{EndoLaw}$	Full sample		Fifth Grade		Eighth Grade	
	NoLaw	*EndoLaw*	*NoLaw*	*EndoLaw*	*NoLaw*	*EndoLaw*
	(1)	(2)	(3)	(4)	(5)	(6)
Father-migrant	−0.514	−0.652	−0.145	−0.532	−0.930*	−0.728
	(0.357)	(0.416)	(0.478)	(0.538)	(0.512)	(0.644)
Mother-migrant	1.005	−0.498	0.644	−1.940	1.694	1.533*
	(1.014)	(1.179)	(1.599)	(1.814)	(1.134)	(0.846)
Both-parent-migrant	−0.460	−0.649	−0.469	−1.246**	−0.420	0.112
	(0.406)	(0.446)	(0.537)	(0.586)	(0.625)	(0.680)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	552	552	292	292	260	260

Note: (1) Robust standard errors are shown in parentheses, and *, ** and *** represent significance at the 10%, 5% and 1%, level, respectively. (2) The base group is the non-LBC. (3) The control variables in each column are the same as those in Table 10.

Column (1) in Table 10 indicates that paternal migration has a strong and significant negative impact on children's levels of cooperation under *NoLaw*. Their cooperation level was 0.689 lower than that of the non-LBC. However, the influence of paternal migration became insignificant under exogenous punishment (Column 2, Table 10), which suggests that exogenous punishment rules promote cooperation by offsetting the negative influence of paternal migration.

Columns (1) and (2) in Table 11 show that paternal migration does not show a statistically significant negative impact in *EndoLaw*, and endogenous punishment cannot offset the difference between the LBC and non-LBC. Considering the disparity between junior high

school (8th grade) and primary school (5th grade) students, we further report the regression results of subsamples by grade. Columns (3) and (5) show that without punishment, the paternal migration variable is not significant in the fifth-grade sample, but it is significant in the eighth-grade sample. However, it becomes insignificant after applying endogenous punishment to the eighth-grade students, which means that endogenous punishment can offset the negative impact of paternal migration (Columns 4 and 6, Table 11). A possible reason may be that eighth-grade students are in rebellious period of adolescence, as their fathers' migration has a deeper negative impact on their cooperation levels and their authoritarian norms are not strong compared with those of primary students.

According to the above analysis, we conclude the following in support of Hypothesis 6b:

Result 6. *Exogenous punishment can offset the negative impact of paternal absence on children, while endogenous punishment works only for junior high school students.*

We further checked the robustness through four approaches: using the new definitions of LBC, employing the full sample with families suffering misfortune included, excluding the outliers in family socioeconomic status, and estimating *Eq. 4* with a Tobit model. The results of the robustness checks are presented in Appendix D. In summary, Hypotheses 1–5 and 6b are supported by the corresponding experimental and regression analysis results.

5. Conclusion and discussion

Building on an increasing body of literature focusing on the development of preferences in childhood and adolescence, we explore the impacts of parental migration on children's cooperation preferences using a large-scale field experiment and survey data. Our main results suggest that children's cooperation level in rural China increases with age; however, LBC's increasing trend is less pronounced than that of non-LBC. Categorizing the participants into four groups—i.e., non-LBC, father-migrant LBC, mother-migrant LBC and both-parent-migrant LBC—we find that paternal migration alone leads to a significant decrease in children's cooperation levels, while maternal or both parents' migration does not significantly affect it.

Why do paternal and maternal migration have asymmetric influences? One possible explanation is that fathers and mothers have different responsibilities in raising children. Mothers, paying more attention to children's health and safety protections, may impose more restrictions on children's activities. In contrast, fathers are responsible for securing the external social capital of the family (Wu et al., 2018) and encouraging children to explore and cooperate with the team, which plays a pivotal guiding role in children's social interaction. This result is similar to Dong and Zhao (2019), who found that paternal companionship is more critical than that of mothers in the formation of children's competitive preferences, another important noncognitive ability in the process of children's socialization.

Our finding that both parents' migration would not lower children's cooperation level is unexpected but still explainable. Compared with father-migrant LBC who have only one caregiver (mother), both-parent-migrant children might still have two caregivers (grandmother/grandfather, or aunt/uncle). These children may lack their mothers' protection and restrictions, which may lower their cooperation level; thus, the negative effect of paternal migration is offset. Another reason may be that this kind of LBC has more free time to turn to schools, communities, and other places for social interaction. External protective factors such as compulsory education, the care of the neighborhood and good relationships with peers and teachers can, to a certain extent, compensate for the negative impact of parental absence on LBC (Cadsby et al., 2020). Additionally, living in a crisis environment develops children's resilience, which is a protective factor for restraining their depression (Wu et al., 2017).

In addition to these new findings, our results suggest the potential efficiency of punishments. Employing two public goods games with endogenous and exogenous punishments, we find that punishments can statistically and economically significantly promote the cooperation levels of both LBC and non-LBC. Exogenous punishment can almost offset the negative effects of paternal migration, while endogenous punishment works only among junior high school students. However, the offsetting function weakens as the extent to which children were left behind deepens.

Our study enriches the literature on the measurement of noncognitive abilities within a human capital framework. Unlike the Big Five personality trait measurement in psychology, economists in recent years have sought to measure noncognitive abilities using economic preferences (Becker, Deckers, Dohmen, Falk, & Kosse, 2012). We measure cooperation through experiments, which contributes to the current literature primarily focusing on time and risk preferences (e.g., Humphries & Kosse, 2017). In terms of the input–output analysis of noncognitive abilities, paternal companionship can be used as a household input term for human capital and can play an essential role in the development of children's cooperation preferences. Moreover, the increase in family income from paternal migration work cannot offset the negative impacts of separation effects on children's cooperation preferences. Instead, more family reunions with the father, and thus more frequent communication with children, can promote the development of LBC's noncognitive abilities. This practice would be suggestive of the family's human capital investment strategy and meaningful for policy decisions.

Our findings also provide experimental evidence for policies related to the development of LBC's noncognitive skills. Fathers commonly work outside of the home to economically support the family in rural China, while mothers remain at home to care for children. The absence of social guidance, which is usually undertaken by fathers, may have a negative impact on children's development of noncognitive skills, such as cooperation, which may further exert far-reaching effects on societal success through income disparities and economic development. Given fathers' essential role in guiding their children's social interactions, policy-makers should carefully consider measures to keep the family structure of migrants intact. One suggestion is to promote urban integration to ensure the right to education for migrant workers' children in cities. Another is to provide more jobs or entrepreneurial opportunities in rural areas to attract migrant workers to return to their hometowns. In addition, it is crucial to adopt mandatory external rules

or norms from society and schools to guide children's behavior and compensate for the negative effects of paternal absence.

The topic of this paper can be further expanded and deepened. First, future work could explore the role of family socioeconomic status in children's cooperation or other prosocial behaviors. To our knowledge, only a few studies are related to altruistic behavior (Benenson, Pascoe, & Radmore, 2007; Chen, Zhu, & Chen, 2013). We tested the "remittance effect" but did not find it a channel influencing children's cooperation preferences. This could be an interesting topic, and we expect it to be studied more deeply in the future. In addition, further studies can examine the possible differences in noncognitive abilities between rural left-behind and urban migrant children and study the underlying reasons for any such differences observed.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chieco.2022.101826.

References

Alencar, A., Deoliveirasiqueira, J., & Yamamoto, M. (2008). Does group size matter? Cheating and cooperation in Brazilian school children. *Evolution and Human Behavior, 29*(1), 42–48.
Amato, P. R., & Gilbreth, J. G. (1999). Nonresident fathers and children's well-being: A meta-analysis. *Journal of Marriage and the Family, 61*(3), 557–573.
Angerer, S., Glätzle-Rützler, D., Lergetporer, P., & Sutter, M. (2016). Cooperation and discrimination within and across language borders: Evidence from children in a bilingual city. *European Economic Review, 90*, 254–264.
Bai, Y., Zhang, L., Liu, C., Shi, Y., Mo, D., & Rozelle, S. (2018). Effect of parental migration on the academic performance of left behind children in north western China. *The Journal of Development Studies, 54*(7), 1154–1170.
Becker, A., Deckers, T., Dohmen, T., Falk, A., & Kosse, F. (2012). The relationship between economic preferences and psychological personality measures. *Annual Review of Economics, 4*(1), 453–478.
Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior, 28*(3), 168–175.
Ben-Ner, A., List, J. A., Putterman, L., & Samek, A. (2017). Learned generosity? An artefactual field experiment with parents and their children. *Journal of Economic Behavior and Organization, 143*, 28–44.
Bowlby, J. (1969). *Attachment and Loss: Volume I: Attachment*. New York: Basic Books.
Bowlby, J. (1973). *Attachment and loss: Volume II: Separation, anxiety and anger*. New York: Basic Books.
Brocas, I., Carrillo, D., & Kodaverdian, N. (2017). Altruism and strategic giving in children and adolescents. In *CEPR Discussion Paper No. DP12288*.
Cadsby, C. B., Song, F., & Yang, X. (2019). Dishonesty among children: Rural/urban status and parental migration. In *Dishonesty in Behavioral Economics*. Academic Press.
Cadsby, C. B., Song, F., & Yang, X. (2020). Are 'left-behind' children really left behind? A lab-in-field experiment concerning the impact of rural/urban status and parental migration on children's other-regarding preferences. *Journal of Economic Behavior & Organization, 179*, 715–728.
Cárdenas, J. C., Dreber, A., von Essen, E., & Ranehill, E. (2014). Gender and cooperation in children: Experiments in Colombia and Sweden. *PLoS One, 9*(3), Article e90923.
Carneiro, P., Crawford, C., & Goodman, A. (2007). *The impact of early cognitive and non-cognitive skills on later outcomes*.
Chaudhuri, A. (2011). Sustaining cooperation in laboratory public goods experiments: A selective survey of the literature. *Experimental Economics, 14*(1), 47–83.
Chen, Y., Zhu, L., & Chen, Z. (2013). Family income affects children's altruistic behavior in the dictator game. *PLoS One, 8*(11), Article e80419.
Cipriani, M., Giuliano, P., & Jeanne, O. (2013). Like mother like son? Experimental evidence on the transmission of values from parents to children. *Journal of Economic Behavior and Organization, 90*, 100–111.
Dal Bó, P. D., Foster, A., & Putterman, L. (2010). Institutions and behavior: Experimental evidence on the effects of democracy. *American Economic Review, 100*(5), 2205–2229.
Dong, Z., & Zhao, J. (2019). Left-behind experience and competition preference of children: A field experimental study from central rural China. *Economic Perspectives, 4*, 33–48 (in Chinese).
Dufwenberg, M., Gächter, S., & Hennig-Schmidt, H. (2011). The framing of games and the psychology of play. *Games and Economic Behavior, 73*(2), 459–478.
Dutra, N. B., Boccardi, N. C., Silva, P. R., Siqueira, J. D., Hattori, W. T., Yamamoto, M. E., & De Alencar, A. I. (2018). Adult criticism and vigilance diminish free riding by children in a social dilemma. *Journal of Experimental Child Psychology, 167*, 1–9.
Eisenberg, N., & Fabes, R. A. (1998). Prosocial development. In *Handbook of Child Psychology: 3. Social, Emotional, and Personality Development* (5th ed., pp. 701–778). Wiley.
Fan, C.-P. (2000). Teaching children cooperation: An application of experimental game theory. *Journal of Economic Behavior and Organization, 41*(3), 191–209.
Fehr, E., & Gachter, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review, 90*(4), 980–994.
Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics, 114*(3), 817–868.
Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature, 454*(7208), 1079–1083.
Fehr, E., Glätzle-Rützler, D., & Sutter, M. (2013). The development of egalitarianism, altruism, spite and parochialism in childhood and adolescence. *European Economic Review, 64*, 369–383.
Fei, X. (1992). *From the soil*. University of California Press.
Harbaugh, W. T., & Krause, K. (2000). Children's altruism in public good and dictator experiments. *Economic Inquiry, 38*(1), 95–109.
He, B., Fan, J., Liu, N., Li, H., Wang, Y., Williams, J., & Wong, K. (2012). Depression risk of 'left-behind children' in rural China. *Psychiatry Research, 200*(2–3), 306–312.
Heckman, J. J. (2000). Policies to foster human capital. *Research in Economics, 54*(1), 3–56.
Heckman, J. J., & Rubinstein, Y. (2001). The importance of noncognitive skills: Lessons from the GED testing program. *American Economic Review, 91*, 145–149.
Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics, 24*(3), 411–482.
Hermes, H., Hett, F., Mechtel, M., Schmidt, F., Schunk, D., & Wagner, V. (2020). Do children cooperate conditionally? Adapting the strategy method for first-graders. *Journal of Economic Behavior & Organization, 179*, 638–652.
House, B., Henrich, J., Sarnecka, B., & Silk, J. B. (2013). The development of contingent reciprocity in children. *Evolution and Human Behavior, 34*(2), 86–93.

Humphries, J. E., & Kosse, F. (2017). On the interpretation of non-cognitive skills: What is being measured and why it matters. *Journal of Economic Behavior and Organization, 136*, 174–185.
Kautz, T., Heckman, J. J., Diris, R., Ter Weel, B., & Borghans, L. (2014). Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. In *Technical Report*. National Bureau of Economic Research.
Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In *Handbook of Socialization Theory and Research*. Rand-McNally.
Lei, L., Liu, F., & Hill, E. (2018). Labour migration and health of left-behind children in China. *The Journal of Development Studies, 54*(1), 93–110.
Lergetporer, P., Angerer, S., Glatzle-Rutzler, D., & Sutter, M. (2014). Third-party punishment increases cooperation in children through (misaligned) expectations and conditional cooperation. *Proceedings of the National Academy of Sciences USA, 111*(19), 6916–6921.
Li, Q., Liu, G., & Zang, W. (2015). The health of left-behind children in rural China. *China Economic Review, 36*, 367–376.
List, J. A., Petrie, R., & Samek, A. (2021). *How experiments with children inform economics*. National Bureau of Economic Research. No. w28825.
Liu, H., Chang, F., Corn, H., Zhang, Y., & Shi, Y. (2021). The impact of parental migration on non-cognitive abilities of left behind children in northwestern China. *Journal of Asian Economics, 72*, Article 101261.
Lu, Y. (2014). Parental migration and education of left-behind children: A comparison of two settings. *Journal of Marriage and Family, 76*(5), 1082–1098.
OECD. (2015). *Skills for social progress: The power of social and emotional skills*. OECD Publishing.
Piaget, J. (1962). The stages of the intellectual development of the child. *Bulletin of the Menninger Clinic, 26*(3), 120–128.
Rabin, M. (1993). Incorporating fairness into game theory and economics. *American Economic Review, 83*(5), 1281–1302.
Selman, R. L. (1980). *Growth of interpersonal understanding*. Academic Press.
Smith, V. L. (1976). Experimental economics: Induced value theory. *The American Economic Review, 66*(2), 274–279.
Sun, X., Tian, Y., Zhang, Y., Xie, X., Heath, M. A., & Zhou, Z. (2015). Psychological development and educational problems of left-behind children in rural China. *School Psychology International, 36*(3), 227–252.
Sutter, M., & Kocher, M. G. (2007). Trust and trustworthiness across different age groups. *Games and Economic Behavior, 59*(2), 364–382.
Sutter, M., Zoller, C., & Glätzle-Rützler, D. (2019). Economic behavior of children and adolescents: A first survey of experimental economics results. *European Economic Review, 111*, 98–121.
Tang, D., Choi, W. I., Deng, L., Bian, Y., & Hu, H. (2019). Health status of children left behind in rural areas of Sichuan Province of China: A cross-sectional study. *BMC International Health and Human Rights, 19*(1), 1–11.
Tyran, J. R., & Feld, L. P. (2006). Achieving compliance when legal sanctions are non-deterrent. *Scandinavian Journal of Economics, 108*(1), 135–156.
Vogel, C. A., Bradley, R. H., Raikes, H. H., Boller, K., & Shears, J. K. (2006). Relation between father connectedness and child outcomes. *Parenting, 6*(2–3), 189–209.
Vollan, B., Landmann, A., Zhou, Y., Hu, B., & Herrmann-Pillath, C. (2017). Cooperation and authoritarian values: An experimental study in China. *European Economic Review, 93*, 90–105.
Wang, S. X. (2014). The effect of parental migration on the educational attainment of their left-behind children in rural China. *The BE Journal of Economic Analysis & Policy, 14*(3), 1037–1080.
Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development, 72*(3), 655–684.
Wu, Y. L., Zhao, X., Ding, X. X., Yang, H. Y., Qian, Z. Z., Feng, F., … Sun, Y. H. (2017). A prospective study of psychological resilience and depression among left-behind children in China. *Journal of Health Psychology, 22*(5), 627–636.
Wu, Y., Wang, P., & Du, S. (2018). The changing Chinese family structure and adolescent development. *Social Sciences in China, 2*, 98–120 (in Chinese).
Xu, D. (2018). From poverty to prosperity: College education, noncognitive abilities, and first-job earnings. *Chinese Sociological Review, 50*(1), 53–82.
Yang, F., Choi, Y. J., Misch, A., Yang, X., & Dunham, Y. (2018). In defense of the commons: Young children negatively evaluate and sanction free riders. *Psychological Science, 29*(10), 1598–1611.
Zarbatany, L., Hartmann, D. P., & Gelfand, D. M. (1985). Why does children's generosity increase with age: Susceptibility to experimenter influence or altruism? *Child Development, 56*(3), 746–756.
Zhang, D., Cameron, L., & Meng, X. (2021). *"Parental absence in childhood and migrants' crime: Evidence from an individual prisoner data in China", working paper series E2021005 of China*. Center for Economic Research, Peking University.
Zhao, Q., Yu, X., Wang, X., & Glauben, T. (2014). The impact of parental migration on children's school performance in rural China. *China Economic Review, 31*, 43–54.
Zhao, C., Wang, F., Li, L., Zhou, X., & Hesketh, T. (2016). Persistent effects of parental migration on psychosocial wellbeing of left-behind children in two Chinese provinces: A cross-sectional survey. *The Lancet, 388*, S6.