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Intergenerational reproduction of educational advantage: Parental educational assortative mating, cultural capital, and academic achievement among Chinese secondary school students

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Abstract:
Parental education is widely recognized as a key predictor of children's academic achievement, yet most research treats it as an individual characteristic rather than a combined family-level resource. This study examines the association between parental educational assortative mating and adolescents' academic performance, with particular attention to the mediating role of family cultural capital in the Chinese context. Employing data from the China Education Panel Survey and a sample of N=8,873 middle and high school students, this study applies structural equation modelling (SEM) to test the proposed relationships. The findings reveal that students from families where both parents possess higher educational qualifications exhibit demonstrably superior academic performance compared to those from less educated or educationally heterogeneous families. Family cultural capital partially mediates this association, indicating that alignment in parental educational backgrounds contributes to academic advantage by cultivating home environments that are both culturally and educationally conducive. This research extends the scholarly conversation by shifting the focus from individual parental attainment to couple-level educational matching and by illuminating a potential pathway through which educational advantage is transmitted across generations.

1. Introduction

Children's academic success is widely recognised as arising from a complex interplay of individual, family, school, and societal factors. Within this intricate web, parental involvement has consistently been identified as a significant predictor of children's academic outcomes. More specifically, within the broader domain of family influence, parents' educational attainment is widely regarded as a key determinant of children's academic outcomes (Bhandari & Timsina, 2024). As a child's earliest educators, parents are instrumental in shaping nascent learning experiences, fostering educational values, and establishing expectations that, in turn, influence later schooling trajectories (Cabus & Ariës, 2017). Consequently, parents' own educational experiences and qualifications are likely to play a substantial role in structuring the academic opportunities and, ultimately, the achievements of their children.

A substantial body of research documents a positive association between parental education and children's academic performance. Parents possessing higher educational attainment are typically more inclined to cultivate home environments conducive to learning, monitor progress at school, engage effectively with teachers, and provide educational resources that foster robust academic development (Lehrl et al., 2020). Furthermore, these more highly educated parents may also

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be better positioned to navigate complex school systems, accurately interpret academic expectations, and effectively convey attitudes and behaviours that align with school success (Nihal Lindberg et al., 2019). Thus, parental education exerts its influence on children's learning not merely through direct instructional support, but also through the broader cultural and social resources embedded within the family.

Prior research in this area remains fragmented. Existing studies differ considerably in terms of the populations examined – for example, by individual factors such as age, race, ethnicity, and gender – as well as school contexts, including elementary, middle, and high schools, and public versus private institutions. Methodological approaches also vary widely, ranging from qualitative interviews and large-scale quantitative analyses. As a result, findings are not always fully comparable, and the mechanisms by which parental education influences academic performance remain insufficiently clarified across different social and cultural settings (Costa et al., 2024).

Moreover, although many studies have emphasised the educational advantages associated with higher socioeconomic status and greater parental involvement, relatively little attention has been paid to the role of parental educational assortative mating – that is, the educational pairing patterns between mothers and fathers – and how such family structures may shape children's academic outcomes. This gap is significant and the omission matters, because parental education is not merely an individual attribute but also a relational and family-level resource (Mare & Schwartz, 2006). Families in which both parents have high educational attainment may possess greater cumulative educational resources, stronger academic expectations, and more consistent childrearing practices than families with lower or mixed parental education levels (Li & Xie, 2020).

This issue is especially crucial in the Chinese context, where the intergenerational transmission of advantage has often been interpreted through the lens of cultural reproduction theory (Bourdieu & Passeron, 1990). According to this perspective, families with greater cultural capital are better positioned to transmit norms, dispositions, language practices, and educational strategies that align with school-valued knowledge, thereby contributing to children's academic success. However, the empirical evidence remains mixed. These inconsistencies point to the need for a more nuanced examination of how parental educational backgrounds translate into academic outcomes, and of whether family cultural capital functions as a mediating pathway.

While some studies indicate that family cultural capital is an important mechanism linking social advantage to student achievement (Jheng et al., 2023), others report limited or inconsistent effects, particularly at the middle- and high-school level (Byun et al., 2012). Secondary schooling represents a critical stage in students' educational trajectories. At this stage, students encounter more demanding curricula, intensified academic competition, and increasingly consequential educational selection. These conditions may amplify the role of family resources, particularly parents' capacity to provide academic guidance, mobilise supplementary learning opportunities, interpret school expectations, and make strategic educational decisions. For these reasons, secondary schooling provides a theoretically and empirically valuable setting for examining how parental educational assortative mating and family cultural capital are associated with students' academic performance.

Against this background, the present study investigates the relationship between parental educational assortative mating and children's objective academic performance in middle and high school. It further examines whether family cultural capital mediates this relationship. By focusing on the combined educational profiles of both parents rather than treating parental education as an isolated characteristic, this study aims to deepen our understanding of family-based educational inequality and to contribute to ongoing discussions of intergenerational transmission in education.

2. Literature review

Parental education has long been identified as a significant predictor of children's academic achievement. Parents with higher levels of education generally tend to be more familiar with school expectations, better placed to support learning at home, and more inclined to hold high educational aspirations for their children (Lehrl et al., 2020; Nihal Lindberg et al., 2019). These advantages may shape children's academic outcomes through both material and non-material pathways, including access to educational resources, cognitively stimulating home environments, and school-aligned parenting practices. However, much of the existing literature treats parental education as an individual attribute of either the mother or the father, thereby overlooking the possibility that the combined educational profile of both parents may give rise to qualitatively different family environments.

One useful framework for addressing this limitation is the concept of assortative mating, which refers to the non-random pattern through which individuals select partners with similar social characteristics. In the sociological literature, assortative mating is often understood as an important indicator of social closure, social mobility, and the reproduction of inequality (Mare & Schwartz, 2006). Rather than occurring randomly, marriage formation is shaped by social structure, cultural norms, and individual preferences within particular historical contexts (Xie et al., 2015). Schwartz (2013) distinguishes between homogamy, in which spouses are similar in key demographic or socioeconomic characteristics, and heterogamy, in which spouses differ substantially on such characteristics.

In the Chinese context, traditional marriage norms have long emphasised compatibility between families, often captured in the notion of being a "good match" (Tian et al., 2026). With the expansion of education and the rising returns to educational credentials, educational homogamy, that is similarity in spouses' educational levels, has become increasingly common (Yeung, 2013). At the same time, educationally heterogeneous marriages remain important and may be distinguished as educational hypergamy, where the husband is more highly educated than the wife, and educational hypogamy, where the wife is more highly educated than the husband (Mu & Hu, 2024).

A growing body of scholarship suggests that educational assortative mating has implications not only for household inequality but also for the intergenerational transmission of advantage. When highly educated individuals form partnerships, educational resources tend to become concentrated within the household, potentially generating cumulative advantages for children (Blossfeld, 2009). Such advantages are not limited to economic resources, educational resources, and parenting styles. They may also include forms of cultural capital that are especially valued in school settings. In this sense, parental educational assortative mating could be understood as a family-level mechanism through which educational inequality is reproduced across generations.

The concept of cultural capital, as developed by (Bourdieu, 2005), offers an important theoretical lens for understanding this process. Bourdieu argued that children's academic success is shaped not only by individual ability but also by the cultural resources transmitted within the family, including language practices, dispositions, tastes, and familiarity with dominant educational norms (Bourdieu, 2018). Families endowed with greater cultural capital are better positioned to align children's behaviour and competencies with school expectations, thereby increasing the likelihood of academic success. Cultural capital may take embodied, objectified and institutionalised forms, manifesting in communication and parenting styles, books and other educational materials, and in parent–child engagement (Zang & Chen, 2026).

Existing studies suggest that parental education is strongly associated with the production and transmission of family cultural capital. More highly educated parents are more likely to cultivate literacy-rich home environments, encourage intellectually oriented activities, and provide forms of academic guidance that closely align with school expectations (Yu et al., 2022). They may also be better placed to interpret curricular demands, communicate effectively with teachers, and model attitudes and behaviors conducive to school success.

In the Chinese context, studies of educational inequality have increasingly emphasized the role of social stratification in shaping students' educational trajectories (Liu, 2008). This literature suggests that children's academic outcomes are not determined solely by individual ability or direct family resources, but are also influenced by indirect mechanisms associated with family social position, including parental educational expectations, school choice, access to extracurricular learning opportunities, and differential capacities to navigate the education system. From the perspective of social reproduction, parental education may therefore influence children's academic performance both directly and indirectly, through the accumulation of cultural capital within the household (Liu, 2014).

Importantly, family cultural capital may be shaped by the interaction of both parents' educational backgrounds. Educationally homogamous couples appear more likely to share cognitive orientations, educational beliefs, and parenting strategies, which can facilitate consistent expectations and coordinated investments in their children's education (Wang et al., 2020). By contrast, educationally heterogamous couples may display greater divergence in educational values, communication styles, or understandings of school demands, potentially undermining the coherence of parental support and involvement (Yu et al., 2022). Nevertheless, the existing evidence on these dynamics remains limited, and some common assumptions about the effects of homogamy and heterogamy require further empirical testing rather than being taken for granted.

To advance the existing debate on the intergenerational reproduction of educational advantage, this study departs from conventional approaches that treat maternal and paternal education as separate predictors. Instead, it focuses on parental educational assortative mating and investigates how different patterns of parental educational pairing are associated with children's academic performance in middle school. Drawing on data from the Chinese secondary school context, the study further examines family cultural capital as a potential mediating mechanism linking parental educational assortative mating to students' objective academic outcomes. Accordingly, this study proposes two hypotheses for testing:

Hypothesis 1 (H1): Children from highly educated homogamous families will demonstrate higher academic performance than children from other parental educational pairing types.

Hypothesis 2 (H2): Family cultural capital mediates the relationship between parental educational assortative mating and children's objective academic performance.

3. Method

3.1 Data and sample

This study uses data from the China Education Panel Survey (CEPS), the first nationally representative longitudinal survey designed to track students from the middle-school stage. The CEPS adopts a stratified, multistage probability-proportional-to-size sampling design. The baseline survey, conducted in the 2013–2014 academic year, sampled 19,487 middle-school students from 28 county-level units. The first follow-up survey was administered in the 2014–2015 academic year and successfully followed 9,449 students, with a follow-up rate of 91.9%.

For the purposes of this study, student questionnaires were matched with corresponding parent questionnaires across the baseline and follow-up surveys. The analytic sample was restricted to Grade 7 students at baseline and had valid cognitive ability scores in the follow-up survey of Grade 8 (N = 9,366). Cases were then excluded if parents responded "I don't care" to the item on educational expectations (N = 290), if parental education information was missing (N = 17), or if parental educational pairing could not be clearly classified into the predefined categories (N = 203). After applying these exclusion criteria, the final analytic sample included 8,873 students with valid parental information.

3.2 Measurements

3.2.1 Outcome variable

Children's academic performance was measured using a composite score derived from standardized test scores in three core subjects in the Chinese middle-school curriculum:

Chinese, mathematics, and English (Canaan et al., 2025; Qin et al., 2026). To account for differences in curriculum coverage and assessment standards across schools, each subject score was standardized within schools to have a mean of zero and a standard deviation of one. The three school-standardized z-scores were then averaged to construct the final academic performance measure. Higher values indicate better relative academic achievement within the school context.

3.2.2 Key predictor variable

Parental educational assortative mating was constructed from mothers' and fathers' educational attainment. Following prior research (Schwartz, 2013; Schwartz & Mare, 2005) on educational assortative mating, this study adopted a continuous measure of parents' highest educational attainment based on approximate years of schooling. Specifically, we use 0 years for no schooling, 6 for primary school, 9 for junior high school, 11 for secondary or technical school, 12 for general high school, 15 for junior college, 16 for a bachelor's degree, and 19 for a master's or doctoral degree.

High educational homogamy was defined as both parents having at least a bachelor's degree, equivalent to 16 or more years of schooling. A difference of three or more years of schooling between parents was used to identify educationally heterogamous pairings. This threshold follows common practice in the literature on educational assortative mating (Schwartz, 2013), which often treats a difference of three or more years as indicative of heterogamy. Based on these criteria, parental educational pairing was classified into four categories:

1)**High homogamy:** both parents had completed at least 16 years of schooling, equivalent to a bachelor's degree or higher.

2)**Low homogamy:** both parents had completed fewer than 16 years of schooling, with an educational difference of no more than two years.

3)**Educational hypergamy:** the father had completed at least three more years of schooling than the mother.

4)**Educational hypogamy:** the mother had completed at least three more years of schooling than the father.

3.2.3 Mediating variable

Family cultural capital refers to the non-economic resources within the family that can be converted into educational advantage (Bourdieu, 2005). In this study, it was operationalised with two indicators: the number of non-textbook books in the household and parents' educational expectations for the child. The book count captures the availability of reading materials that may support language development, knowledge acquisition, and cognitive stimulation. Parents' educational expectations reflect the aspirational dimension of cultural capital, which may shape parental investment in children's learning and children's academic motivation.

3.2.4 Control variables

The analyses controlled for three student-level characteristics: gender, only-child status, and cognitive ability. Gender was coded as a binary variable, with male coded as 0 and female as 1. Only-child status was coded as 1 for only children and 0 for students with siblings. The cognitive ability was measured using the standardised cognitive test score from the baseline survey and was included to adjust for pre-existing differences in students' cognitive skills that may be associated with both family background and subsequent educational outcomes.

3.2.5 Alternative measures for robustness checks

Two alternative measures were employed in robustness analyses. First, Grade 8 cognitive ability was used as an alternative outcome. This score is derived from standardised cognitive test items calibrated using a three-parameter logistic model and is designed to assess logical reasoning and problem-solving skills rather than curriculum-specific knowledge. Second, the absolute difference in mothers' and fathers' years of schooling was used as an alternative predictor to capture the degree of educational heterogeneity between parents. These supplementary analyses assess whether the results are sensitive to alternative outcome and predictor specifications.

3.3 Analytical model

This study employed structural equation modeling (SEM) to examine both the direct association between parental educational pairing and children's academic performance and the indirect association operating through family cultural capital. SEM is appropriate for this study because it allows the simultaneous estimation of direct and mediating pathways while accounting for measurement error in latent constructs, thereby providing a coherent test of the hypothesized mediation model (Bowen & Guo, 2011; Byrne, 2001). The analytical model can be expressed as follows, where Y_{ij} denotes the academic performance of student i in school j, X_{ij} represents parental educational pairing, and M_{ij} denotes family cultural capital.

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + \beta_{2j}M_{ij} + r_{ij} \quad (1)$$

$$M_{ij} = \alpha_{0j} + \alpha_{1j}X_{ij} + e_{ij} \quad (2)$$

In Equation (1), β_{1j} estimates the direct association between parental educational pairing and academic performance, while β_{2j} estimates the association between family cultural capital and academic performance. In Equation (2), α_{1j} estimates the association between parental educational pairing and family cultural capital. The indirect effect of parental educational pairing on academic performance through family cultural capital is estimated as $\alpha_{1j}\beta_{2j}$. The terms r_{ij} and e_{ij} represent residuals. Control variables were included in the model to reduce potential confounding.

4. Findings

4.1 Descriptive analysis

In terms of demographic characteristics, 47.97% of students were female, and 43.67% were only children (see Table 1). The distribution of parental educational assortative mating shows that low homogamy was the most common family type, accounting for 53.8% of the sample, followed by hypergamy

Table 1. Descriptive analysis results of outcome, predictor, and control variables (N=8873).

Variable	N	Mean (SD) or n (%)	Min	Max
School-standardized subject score	8758	0.01 (0.87)	-4.94	2.42
Baseline cognitive ability	8873	0.03 (0.86)	-2.03	2.33
Grade-8 cognitive ability	8873	0.30 (0.82)	-3.14	2.06
Household book collection	8839	3.23 (1.22)	1	5
Parental educational expectations	8792	6.77 (1.61)	1	9
Gender				
Female	8873	4256 (47.97%)		
Male	8873	4617 (52.03%)		
Only child status				
Yes	8873	3875 (43.67%)		
No	8873	4998 (56.33%)		

at 28.6%, hypogamy at 13.1%, and high homogamy at 4.6%. The relatively large standard deviations observed for the family cultural capital indicators suggest considerable variation across students in terms of household book collection and parental educational expectations.

Table 2 illustrates the distribution of key outcome and predictor variables by parental educational assortative mating. Students from high-homogamy families displayed the highest average levels of academic performance, Grade 8 cognitive ability, household book collection, and parental educational expectations. In contrast, students from low-homogamy families generally showed the lowest, or among the lowest, levels across these indicators. The hypergamy and hypogamy groups tended to occupy intermediate positions, with relatively small differences between them. Taken together, these descriptive patterns suggest that high parental educational homogamy is associated with more advantaged academic and cultural-capital profiles.

4.2 Correlation analysis

Table 3 presents the Pearson correlation matrix for the variables included in the structural equation model. Specifically, academic performance was positively correlated with household book collection ($r = 0.086, p < 0.001$); parental educational expectations ($r = 0.328, p < 0.001$); and baseline cognitive ability ($r = 0.352, p < 0.001$). High parental educational homogamy was positively associated with both cultural capital indicators and baseline cognitive ability ($r = 0.11$ to $0.19, p < 0.001$); and weakly, but significantly associated with academic performance ($r = 0.033, p < 0.01$). Hypergamy was negatively associated with household book collection, whereas hypogamy showed only a weak positive association with household book collection. Gender and only-child status were correlated with several key variables, supporting their inclusion as controls in the SEM.

4.3 Structural equation model

A structural equation model was employed to present the standardized path coefficients from the structural equation model examining the relationships among parental educational pairing, family cultural capital, and students' school-standardized subject scores (see Fig. 1). Low educational homogamy served as the reference category. The model controlled for student gender, only-child status, and baseline cognitive ability.

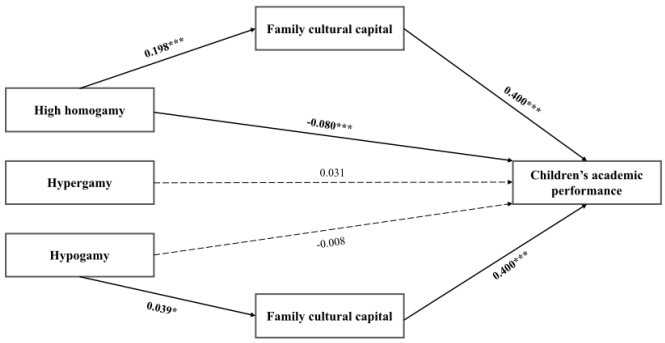

Fig. 1. Relationship among parental educational assortative mating, family cultural capital, and students' academic performance.

The measurement model indicates that both observed indicators loaded significantly on the latent construct of family cultural capital. Specifically, household book collection and parental educational expectations were both positively and significantly associated with cultural capital, with standardized loadings of 0.481 and 0.526, respectively. These results suggest that the two indicators capture meaningful dimensions of family cultural capital (see Table 4).

Hypothesis 1 predicted that children from highly educated homogamous families would demonstrate higher academic performance than children from other parental educational

Table 2. Descriptive analysis results of parental educational assortative mating (N=8873).

Variables	High-homogamy(N=408)		Low-homogamy(N=4773)		Hypergamy(N=2534)		Hypogamy(N=1158)	
	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
School-standardized subject score	0.14 (0.87)	40	-0.02 (0.88)	470	0.03 (0.85)	25	0.01 (0.86)	11
Grade-8 cognitive ability	0.73 (0.69)	40	0.26 (0.82)	477	0.30 (0.82)	34	0.33 (0.82)	58
Household book collection	4.27 (0.93)	40	3.18 (1.16)	474	3.14 (1.28)	25	3.31 (1.25)	52
Parental educational expectations	7.66 (1.06)	40	6.70 (1.62)	472	6.75 (1.62)	25	6.83 (1.63)	11

Table 3. Descriptive analysis results of parental educational assortative mating (N=8873).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) School standardized subject score									
(2) Household book collection	0.086***								
(3) Parental educational expectations	0.328***	0.252***							
(4) High-homogamy	0.033**	0.187***	0.121***						
(5) Hypergamy	0.018	-0.050***	-0.009	-0.139***					
(6) Hypogamy	0.003	0.024*	0.013	-0.085***	-0.245***				
(7) Student gender	-0.270***	-0.050***	-0.090***	-0.02	0.005	0.003			
(8) Only child	-0.009	-0.288***	-0.145***	-0.182***	0.097***	-0.046***	-0.058***		
(9) Baseline cognitive ability	0.352***	0.245***	0.280***	0.109***	-0.018	0.009	-0.022*	-0.167***	

Notes: ***p $<$ 0.001, ** p $<$ 0.01, * p $<$ 0.05; Reference group for matching dummies is Low-homogamy.

pairing types. The results provide limited support for this hypothesis. Compared with children from low educational homogamous families, children from highly educated homogamous families did not show a significant positive total association with school-standardized subject scores. The direct effect of high homogamy on academic performance, after accounting for family cultural capital and control variables, was negative and statistically significant (β = -0.080, p $<$ .001). This suggests that net of cultural capital, students from highly educated homogamous families did not outperform students from low educational homogamous families. Therefore, H1 is not supported when academic performance is examined through the total effect of parental educational pairing.

The results for other parental educational pairing types were also mixed. Hypergamy showed a small positive total association with academic performance (β = 0.047, p $<$ .05), although its direct association with academic performance was not statistically significant. Hypogamy was not significantly associated with academic performance in either direct or total effects. These findings suggest that parental educational pairing does not have a simple or uniform association with children's academic achievement. In particular, the expected advantage of high educational homogamy is not directly reflected in higher school-standardized subject scores once family cultural capital and student characteristics are taken into account.

Hypothesis 2 predicted that family cultural capital mediates the relationship between parental educational assortative mating and children's academic performance. The results provide stronger support for this hypothesis.

First, family cultural capital was positively and significantly associated with students' school-standardized subject scores (β = 0.400, p $<$ .001). This indicates that students with higher levels of family cultural capital tended to achieve higher academic performance, net of gender, only-child status, and baseline cognitive ability.

Second, parental educational assortative mating was associated with family cultural capital in meaningful ways. Compared with low educational homogamy, high educational homogamy was positively and significantly associated with cultural capital (β = 0.198, p $<$ .001). This suggests that highly educated homogamous families tend to provide more educational resources and stronger educational expectations. Hypogamy also showed a small but statistically significant positive association with cultural capital (β = 0.039, p $<$ .05). By contrast, hypergamy was not significantly associated with cultural capital.

Third, the mediation results showed that high educational

Table 4. Standardized path coefficients of structural equation model.

Path	Coefficient
Measurement model	
Cultural capital → Household book collection	0.481***
Cultural capital → Parental educational expectations	0.526***
Direct effects	
Cultural capital → School-standardized subject score	0.400***
High-homogamy → Cultural capital	0.198***
Hypergamy → Cultural capital	0.021
Hypogamy → Cultural capital	0.039*
High-homogamy → School-standardized subject score	-0.080***
Hypergamy → School-standardized subject score	0.031
Hypogamy → School-standardized subject score	-0.008
Indirect effects (via Cultural capital)	
High-homogamy → Cultural capital → School-standardized subject score	0.328***
Hypergamy → Cultural capital → School-standardized subject score	0.016
Hypogamy → Cultural capital → School-standardized subject score	0.040*
Total effects	
High-homogamy → School-standardized subject score	-0.002
Hypergamy → School-standardized subject score	0.047*
Hypogamy → School-standardized subject score	0.018
Model fit	
χ^2 (df=6)	504.02
CFI	0.900
RMSEA	0.097
N	8873

Notes: ***p < 0.001, ** p < 0.01, * p < 0.05; Reference group for matching dummies is Low-homogamy.

homogamy was indirectly associated with academic performance through family cultural capital (β = 0.328, p < .001). This finding supports the argument that the academic implications of high parental educational homogamy operate at least partly through the accumulation and transmission of family cultural capital. The indirect effect of hypogamy through cultural capital was also statistically significant (β = 0.040, p < .05).

To further assess the robustness of the mediation result, a non-parametric bootstrap procedure with 500 replications was conducted. The bias-corrected 95% confidence interval for the indirect effect of high educational homogamy on academic performance through cultural capital was [0.259, 0.398], confirming that the indirect effect was statistically different from zero. This provides additional evidence in support of H2.

4.4 Robustness test

To assess the robustness of the main findings, the structural equation model was re-estimated using Grade 8 cognitive ability as an alternative outcome, while retaining the same measurement model for family cultural capital and the same set of control variables. The model showed good fit to the data, $\chi^2(6)=212.85$, CFI = 0.986, RMSEA = 0.062.

The results were consistent with the main analysis. Cultural capital was positively associated with Grade 8 cognitive ability, β = 0.483, p < .001, and the indirect association between high homogamy and cognitive ability through cultural capital was also significant, β = 0.385, p < .001. Unlike the main model, in which the total effect of high homogamy on school-standardized academic achievement was nonsignificant, β = -0.002, p = .960, the total effect on Grade 8 cognitive ability was positive and significant, β = 0.181, p < .001. These robustness test findings suggest that the cultural-capital pathway is robust across outcome measures.

5. Discussion

The findings reveal a more complex relationship between parental educational assortative mating, family cultural capital,

and children's academic performance. High educational homogamy was positively associated with family cultural capital, and family cultural capital was in turn positively associated with students' school-standardised academic performance. However, the total effect of high educational homogamy on academic performance was not significant, indicating that children from families with high educational homogamy did not necessarily demonstrate higher overall academic performance than those from families with low educational homogamy. Thus, H1 was not supported. By contrast, the mediation analysis provided stronger support for H2, showing that family cultural capital serves as an important pathway linking parental educational pairing to students' academic outcomes.

These results contribute to research on intergenerational educational inequality by suggesting that parental education should not be understood only as an individual parental attribute. Rather, the educational combination of both parents may shape the cultural environment of the household, including access to learning materials and parental expectations. Consistent with cultural reproduction theory, the findings indicate that educational advantages are transmitted less through parental education per se than through family-based cultural resources that are valued in school contexts (Luo et al., 2022). Household book collections reflect the material and symbolic presence of educational resources, while parental educational expectations represent the family's orientation toward schooling and future attainment.

Meanwhile, the findings for mixed educational pairings were less consistent. Hypogamy, defined here as cases in which the mother has substantially more schooling than the father, was positively associated with cultural capital and showed an indirect association with children's academic performance. Hypergamy, by contrast, did not show a significant mediation pathway. This pattern suggests that the educational contribution of mothers may be especially important in shaping the home learning environment. It is consistent with studies emphasising mothers' central role in children's educational development (Pomerantz & Dong, 2006; Zou & Wu, 2020), particularly through educational communication and the management of learning activities in hypogamous families (Ortiz-Gervasi, 2021).

One notable finding is the negative direct association between high parental educational homogamy and children's subject scores after accounting for cultural capital and control variables. This result suggests the presence of competing mechanisms. On the one hand, highly educated homogamous families tend to possess higher levels of cultural capital, which supports academic performance (Tan et al., 2023). On the other hand, after accounting for this cultural capital pathway, other unobserved characteristics of these families may be negatively associated with school-standardised achievement. These may include academic pressure and performance anxiety (Wang, 2023). A more cautious interpretation is that the benefits of high educational homogamy appear to operate primarily through measurable cultural capital, while additional unmeasured mechanisms may weaken or offset its overall association with subject scores.

The robustness analysis using Grade-8 cognitive ability as an alternative outcome further supports the importance of cultural capital. The mediation pathway remained significant, suggesting that cultural capital is relevant not only for school-specific subject performance but also for broader cognitive development. At the same time, the positive total effect of high homogamy on cognitive ability, compared with its nonsignificant total effect on subject scores, indicates that different academic outcomes may capture different dimensions of educational advantage. Cognitive ability may be more closely related to long-term learning environments within the family, whereas school-standardised subject scores may also be influenced by curriculum, classroom instruction, examination preparation, and other school-level factors (Brandt et al., 2020; Tikhomirova et al., 2020).

6. Conclusion

Overall, the study suggests that parental educational assortative mating matters for children's academic development primarily through its association with family cultural capital. While high educational homogamy does not directly translate into higher school-standardised performance, it is linked to a more resource-rich cultural environment that supports learning. The findings therefore highlight the importance of cultural capital as a key mechanism through which family educational background contributes to the reproduction of educational inequality.

These findings have implications for educational inequality in China. They suggest that inequality is reproduced not only through formal parental education or economic resources, but also through more subtle, family-based cultural resources and educational expectations. Children from low-education homogamous families may face compounded disadvantages because both parents may have fewer resources and less institutional knowledge to support schooling. Therefore, policies aimed at reducing educational inequality should pay greater attention to unequal home learning environments. Schools can play a compensatory role by expanding access to books, reading programmes, learning materials, academic mentoring, and extracurricular opportunities, particularly for students from less educationally advantaged families.

Several limitations should be acknowledged. First, the study uses observational data, and the results should be interpreted as associations rather than causal effects. Second, cultural capital is measured by only two indicators, which capture important but limited aspects of the construct. Third, the model fit was only marginal, suggesting that additional family, school, or psychological mechanisms may need to be incorporated in future research. Finally, the interpretation of hypogamy and hypergamy would benefit from more direct measures of maternal and paternal involvement, parenting practices, and intra-household educational decision-making.

Data availability

Application can be uploaded by researchers to access the data used in this study from the China Education Panel Survey website (http://ceps.ruc.edu.cn/index.htm).

Conflict of interest

The authors declare no conflict of interest.

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