

The Role of Family Support in the Developmental Outcomes of Rural Students in China: A Mediation Analysis

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Research Article

Keywords: family support, adversity in childhood, resilience, academic performance, prosocial outcomes, rural, developing countries, China

Posted Date: February 8th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1328783/v1>

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Abstract

This study investigated the association between household characteristics, perceived family support (PFS), and the developmental outcomes (resilience, academic performance, and prosociality) among at-risk students. Our large sample included 1564 primary and secondary school students from poor rural China ($M = 11.55$ years old). Having a caregiver whose resilience score was in the top 50% of the sample was associated with a 0.48-point increase (or 0.31 d effect size), while having a migrant mother was correlated with a 0.26-point decrease (or 0.17 d effect size). PFS was a significant ($p < 0.0001$) mediator between household characteristics and developmental outcomes. Our study highlights the link between caregiver resilience and PFS, and the healthy functioning of disadvantaged students in a developing context.

Introduction

There is a wide literature that demonstrates the importance of perceived social support (PSS) for the healthy development of school-aged children. PSS is defined as “perceiving to have close others who can provide help or care, particularly during times of stress,” (Eisenberger, 2013) and it is a contributing factor to a range of outcomes related to emotional well-being and academic achievement during adolescence. For instance, studies have shown that perceived support from parents, teachers, and peers positively predicted students’ pursuit of prosocial behavior, raised their interest in school and classes, and increased their academic motivation (Wentzel, 1997; Song et al., 2015; Legault, 2006). The role of PSS in enhancing resilience to stress has also been well established (Ozbay, 2007). When compared to perceived support from other relationships, perceived family support (PFS) in particular has been found to influence the widest range of child outcomes (Demaray et al., 2005), which may be because parents and household caregivers are usually perceived by children as their general and multipurpose support providers, whereas teachers and peers generally occupy more specialized roles (Reid, 1989). Children who perceive parental warmth and a supportive relationship with their parents or guardians are found to have better emotional, academic, and prosocial outcomes than peers who perceive less emotional support from parents (Demaray et al., 2005; Yoo et al., 2013; Wang et al., 2011).

Given the influence of PFS on developmental outcomes, it is essential to identify potential social determinants of PFS, which may help to better target interventions designed to help at-risk students. While there is ample evidence showing a positive link between PSS and child development, very few studies have explored household factors that may influence PSS in general or PFS specifically. In fact, existing literature on social support has “almost exclusively” examined it only as an independent, moderating, or mediating variable (Shields & Price, 2005). Of the findings that do explore household factors associated with social support, the majority do not examine PSS among children. Studies of adults have found that factors that are associated with higher levels of PSS include being married or cohabitating, high educational attainment, high income, being male, not belonging to an ethnic minority group, and a lack of psychological distress or disease (Shields & Price, 2005; Xu et al., 2019). One of the few known studies that explored the determinants of PSS from family members specifically, which was

conducted among a sample of adults in the U.S., identified having a college degree and speaking English at home as being positively associated with PFS (Almeida et al., 2009). The scarcity of empirical evidence on the determinants of PFS, especially PFS among youth populations in developing countries, highlights the need for more research to be conducted in order to better design and target community-based interventions in contexts that lack such social support.

Rural China is an important setting to investigate these issues, as there is a wide range of family characteristics that may be related to a student's PFS. One potential factor is caregiver resilience. Poor mental health outcomes (which are closely linked with psychological resilience) (Hu et al., 2015) are common in rural China, with one recent study estimating that 39% of female caregivers suffer from depression, anxiety, or stress (Zhang et al., 2018). The same study observed that caregivers with mental health issues in rural China engage in fewer interactive parenting practices, and this may affect the amount of family support received by their children. Left-behind children (LBC) – whose parents migrate to urban areas for work, generally live with their grandparents, and account for over one-third of all rural children in China (Tian et al., 2017) – are another vulnerable group due to prolonged separation from their parents. Previous research has shown that migration's effects on parenting practices and child outcomes seem to be dependent on which parent migrates, with maternal migration potentially playing a greater role (Xu et al., 2019). Socioeconomic status indicators, both including household income and parental education level, have also been shown to be positively correlated with parent-child communication in rural areas of China (Guo et al., 2018). In sum, the high prevalence of these issues in rural China and their potential link with PFS highlights the need for further investigation of their association.

Besides which household factors are associated with a student's PFS, a related question is which PFS may mediate the effects of family characteristics on student developmental outcomes, which has been seldomly explored in China. Students in rural China often face high levels of adversity, and family support may play an important role in mitigating effects of exposure to environmental risk factors. To our knowledge, few studies have investigated the connection between PFS as a mediator between family characteristics and students' developmental outcomes in rural China. The handful of existing studies do not explore the role of support from family members specifically and are generally focused on the role that social support plays in reducing negative outcomes like depression (Wu et al., 2015) and self-injury (Wang & Liu, 2020). Consequently, there is a lack of evidence on how PFS may be linked to protective traits and positive outcomes like psychological resilience, academic performance, and prosocial behavior (such as involvement in group-based activities and their relationships with peers and teachers). As there is ample literature in developed contexts demonstrating the direct relationship of resilience, academic achievement, and prosocial skills with students' overall well-being (Zhao et al., 2020; González et al., 2021), it is important to understand how and to what degree PFS may affect differences in these outcomes for disadvantaged student populations.

To address these gaps, the aim of the current study is to measure the association between family characteristics and the PFS of students, as well as to understand how PFS mediates the link between such characteristics and student developmental outcomes. The specific objectives are the following: 1.)

explore the prevalence of PFS in rural China; 2.) measure the association of family characteristics with PFS; and 3.) determine the extent to which PFS acts as a mediator between family characteristics and students' resilience, academic, and prosocial outcomes.

This paper makes two important contributions to the existing literature. First, we use a large-scale dataset ($n=1,564$) of at-risk school-aged youth in the context of a rural area in a developing country, where empirical evidence about the determinants of PFS is relatively scarce. Such evidence is necessary to inform research and policy agendas in LMICs where individuals may be exposed to different levels and kinds of adversity compared to more developed contexts. Second, among the potential household determinants of PFS examined, we include a measure of caregiver resilience (using the Connor-Davidson Resilience Scale), which is a factor neglected by most past studies on child development in low-income, disadvantaged contexts despite demonstrated associations of maternal resilience with the well-being and adaptive functioning of children (Miller-Graf et al., 2020). Caregiver resilience may be particularly important in low-income settings, as it can allow for caregivers to foster warm and responsive relationships with their children despite toxic stressors in their environment, thereby enabling their children to develop secure attachments and healthy coping mechanisms to confront adversity in their own lives (Atwool, 2006).

Methods

Ethical approval

Ethical approval for this study was granted by the Institutional Review Board (IRB) of Stanford University (protocol number 58251). The research team adhered to the Declaration of Helsinki principles on maintaining data privacy and confidentiality throughout. Written consent forms were sent to parents or guardians of eligible students prior to conducting the survey. Discussion of student responses was prohibited during or after the survey, and student names were deleted from all electronic files during data encryption.

Sample location and sampling

The data used in this study were from 30 rural schools located in Gansu province, which is located in northwest China. Rural households' per capita yearly income in the sample area was approximately 1,354 USD. This is significantly lower than the national average annual per capita income of rural Chinese residents (2,249 USD) and of Chinese residents overall (4,033 USD) (Statistical Communiqué, 2020). Additionally, about 48% of the sample area was composed of rural residents, which is higher than the national average (40%) (China Statistical Yearbook, 2019). Thus, the sample location is poorer and more rural than China overall.

To choose our study sample, we began by selecting our sample classes. To do this, we chose 30 schools at random from the local education bureau's list of all schools. The 30 schools in our sample included 20 primary schools and 10 junior high schools. In the primary schools we sampled students from the fourth

and fifth grades, and in the junior high schools we sampled students from the seventh and eighth grades. Next, in each grade, we randomly chose two classes to participate in the study due to financial constraints. In situations where there was only one class in a grade, only one class was included.

We then proceeded to select our sample students. In each sample class, half of the students present on the day of the study were selected randomly to participate in the survey. Our initial sample included 1,609 students in 95 classes across the 30 sample schools. Due to missing data from 45 students, our final analytical sample consisted of 1,564 students (Figure 1).

Data collection

The data collection for this study was conducted in October 2020 in 30 rural schools in Gansu province. After students gave their assent to participate in the survey, the sample students received a standardized math test, a series of scales that measure mental health and resilience, and a demographic questionnaire. Enumerators enforced strict time limits during the standardized test. In addition, to collect data on caregiver demographics and resilience, students were also given survey forms to bring home and ask their caregivers to fill out.

Perceived family support (PFS)

We measure students' PFS using the Chinese version of the Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS is a 12-item scale which uses a Likert scale to assess perceived social support from three subscales: family, friends, and significant others. Each subscale comprises four statements pertaining to examples of support they might receive, and for each statement students are asked to rate the extent to which it applies to them, with a possible range of 1 to 7: 1 ("Very Strongly Disagree"), 2 ("Strongly Disagree"), 3 ("Mildly Disagree"), 4 ("Neutral"), 5 ("Mildly Agree"), 6 ("Strongly Agree"), and 7 ("Very Strongly Agree"). The score for each individual subscale is derived by summing the responses for a given subscale and then dividing by 4 to get a mean value. The MSPSS has been used in many contexts internationally and its reliability and validity have been tested among adolescents in China (Chronbach's alpha coefficient of family subscale = 0.86) (Chou, 2000; Canty-Mitchell & Zimet, 2000).

Primary covariates

Caregiver resilience

We measured caregiver resilience using the 25-question Connor Davidson Resilience Scale (CD-RISC). The CD-RISC is a self-report scale that can measure the resilience of a wide range of age groups and has been used in many contexts around the world (Connor & Davidson, 2003). For each of the 25 questions in the survey, respondents are asked to specify the degree to which a statement applies to them on scale of 0-4: 0 ("not true at all"), 1 ("rarely true"), 2 ("sometimes true"), 3 ("often true"), and 4 ("true nearly all the time"). The total score is derived from the sum of each individual answer and can range from 0

(indicating low resilience) to 100 (indicating high resilience). The CD-RISC has been previously used and validated for use among adult populations in China (Chronbach's alpha coefficient = 0.88)

Family characteristics

The demographic questionnaire asked a number of questions related to the students' families and households. To identify whether or not a student was a left-behind child, we asked whether their parents had lived at home for at least six months during the past year. To measure parental or caregiver education levels, we asked students how many total years of formal schooling their parents attended. We also gathered data on parents' marital status as well the number of people who were living in their household. To collect data on family income, we asked students whether their household owned 12 assets that are included in the National Household Income and Expenditure Survey (1 = yes, 0 = no). We then used the data to generate an index of family assets.

Student developmental outcomes

Student resilience

To measure student resilience, we used the same scale as we used in the caregiver survey (the 25-question version of the CD-RISC). The items and scoring procedure were identical to the form given to their caregivers (see above). The CD-RISC has been shown to be reliable and has been validated among school-aged populations in China (Cronbach's alpha coefficient = 0.89) (Yu et al., 2011).

Academic performance

Academic performance was measured by a 30-minute standardized mathematics assessment. The test was designed in cooperation with local educators to ensure that the questions were aligned with the students' curriculum and were of the appropriate difficulty for their learning levels. Prior to the formal survey, the test was piloted to ensure its relevance as well as to ensure that the time restrictions were appropriate. The test used in this survey has also been previously used in other surveys by research teams in China (Wang et al., 2021).

Prosocial outcomes

On the demographic questionnaire, we asked students a series of questions related to their prosocial behavior and resources. First, to measure the students' relationship with their teacher, we asked them to rate their relationship on a scale of 0-100. Second, to measure students' relationships with their peers, we asked them how many supportive friendships they had. Third, we asked students how often they participate in group activities at school when such opportunities are available, and we later categorized their responses into a binary variable (1=actively participates, 0=does not actively participate). Finally, we collected information on students' coping skills, asking them whether they actively express feelings to others when they face problems (1=yes, 0=no).

Control variables

We also collected data on student demographic characteristics that may be potential confounders. Specifically, we gathered data on student sex (1=female, 0=male), age (years), whether the student is an only child (1=yes, 0=no), whether the student boards at school (1=yes, 0=no), and ethnicity (1=Han, 0=ethnic minority). Besides these, we also include each student's level of schooling (1=junior high, 0=primary) as a control variable.

Analysis

First, we report the summary statistics of the sample, including means or proportions and standard deviations. Second, we conduct ordinary least squares (OLS) regressions to identify which primary covariates (including caregiver resilience and other family characteristics) were associated with PFS, adjusting for student characteristics. Finally, we employ mediation analysis to estimate the proportion of the link between caregiver resilience and student outcomes (student resilience, academic performance, and prosocial behavior) mediated by PFS (see Figure 2 for a visual representation of the model). The results of mediation analysis are adjusted for other family characteristics and student characteristics. All regressions controlled for school fixed effects and standard errors are clustered at the school level. Analyses were performed in Stata 16.1 (StataCorp LP, College Station, TX, USA).

Results

Summary statistics of family and student characteristics

Table 1 shows the summary statistics related to family and student characteristics. The mean caregiver resilience score on the CD-RISC was 55.35. Migration among mothers (26%) was less common than migration among fathers (58%). Mothers also had fewer years of formal education (mothers = 7.27 years, fathers = 9.08 years). In the sample, there was an average of five people living at home (5.09). Eight percent (8%) of students reported that their parents were divorced. Slightly less than half of the students were female (45%), and they had a mean age of approximately 12 years. Fourteen percent (14%) of the sample was an only child, while 15% reported boarding at school. The large majority of the sample (96%) was of the Han ethnicity and 41% were attending junior high school.

Prevalence of perceived family support

The mean MSPSS family support score was 4.63 points, and the standard deviation was 1.56 points (Table 2). This mean score lies in the moderate range of the scale (3.0-5.0). Additionally, forty-three percent (43%) of students scored in the high range on the MSPSS (mean score >5.0).

Student developmental outcomes

Summary statistics of student developmental outcomes are displayed in Table 2. For prosocial outcomes, the mean rating students gave to their relationship with their teacher was 82 out of 100 points.

Students reported to have approximately five close friends, and over two-thirds (70%) of students reported actively participating in group activities at school when such activities were offered. Over one-third (38%) of students indicated that they actively shared their feelings with others when encountering problems in their lives. For student resilience, the average CD-RISC score was 59.92 (SD = 14.24).

Correlation of perceived family support with family characteristics

Three family characteristics – caregiver resilience, maternal migration, and maternal education level – were significantly associated with PFS when adjusting for student characteristics and school fixed effects (Table 3, column 3; Figure 3). Having a caregiver whose resilience score was in the top 50% of the sample was associated with a 0.48-point increase in the MSPSS family support score (equivalent to a difference of 0.31 standard deviations). In contrast, having a migrant mother was correlated with a 0.26-point (or 0.17 SD) decrease in the MSPSS family support score. Finally, each additional year of mother’s education was associated with a 0.03-point increase in MSPSS family support score – a small but statistically significant difference. Other household factors – including father’s years of education, father’s migration status, family asset index, number of people at home, whether their parents were divorced – were not significantly associated with PFS in the adjusted equation.

Mediation analysis of PFS and student outcomes

PFS was a significant mediator between family characteristics and all three dimensions of student developmental outcomes, including resilience, academic performance, and prosocial outcomes (Table 4, Figure 2). The strength of the mediation with student resilience was 3.40 points on the CD-RISC (95% CI: 3.06-3.74) and 0.10 SD on the standardized math score (95% CI: 0.06-0.13). For prosocial outcomes, the strength of the mediation was 2.29 points on the child self-report of relationship with teachers (95% CI: 1.50-3.07), 0.37 for number of close friends (95% CI: 0.37), 0.17 SD for participation in group activities at school (95% CI: 0.10 - 0.24), and 0.30 SD for actively expressing feelings to others when encountering problems (95% CI: 0.21-0.39). The results of each of these mediation analyses were all significant at the 1% level.

Discussion

This study is one of the first to explore the determinants of perceived family support and its role as a mediator between family characteristics and student developmental outcomes among school-aged children. We first measured student PFS using the internationally valid MSPSS scale and calculated a mean score of 4.63. Second, we found that PFS was associated with a number of family characteristics when adjusting for student characteristics. Among these, PFS had a strong positive association with caregiver resilience (0.31 SD) and a negative association with maternal migration (0.17 SD). It also had a small but statistically significant positive association with maternal education level. Other household factors, including father’s migration status and education level, family asset index, number of people at home, and parents’ divorce status, were not significantly associated with PFS. Finally, with a mediation

model (Figure 2), we estimated the natural indirect effects of PFS between family characteristics and student developmental outcomes.

As displayed in Appendix Table 1, the prevalence of PFS in our study is among the lowest when compared to other samples among school-aged children. Previous studies that report family subscale scores of the MSPSS have primarily been conducted in developed countries. One study conducted in East London among similarly aged adolescents (11-14 years old) and which also had a large sample size ($n=2,790$) found that the sample mean MSPSS was 5.69 points, which is 0.68 standard deviations higher than the mean in our sample (4.63). Other smaller-scale studies conducted among slightly older adolescents have also reported higher mean scores than in the present study's sample, including Turkey (5.58) (Gunuc & Dogan, 2013), the U.S. (5.33) (Canty-Mitchell & Zimet, 2000), and Hong Kong (4.86) (Chou, 2000). While it is difficult to directly compare the results of self-report scales like the MSPSS across different societal and cultural contexts, the significantly lower mean scores of children in this sample of rural China compared to developed contexts indicate that students who are socioeconomically disadvantaged may be more likely to report lower levels of PFS.

Perhaps one of the most important findings of this study is the strong and robust association between PFS and caregiver resilience when adjusting for other student and household factors (including characteristics like family assets and parental education levels). Based on the findings of one past study among young African American mothers in the U.S (Hess et al., 2002) and another study in a high-risk neighborhood in Peru (Miller-Graff et al., 2020), it is possible that certain aspects of caregiver resilience (such as maternal maturity and self-esteem) may lead to more nurturing parenting practices and ultimately contribute to better child outcomes. The social ecological theory of resilience highlights the intimate connection between the development of an individual's resilience and their interactions with the social systems they are a part of, which includes those - like family - within whom they interact on a daily basis. This finding may be policy-relevant in that caregiver resilience could prove to be a feasible target for future interventions that seek to improve the outcomes of disadvantaged students, as resilience is a malleable trait and may be more easily addressed than other common sources of childhood adversity, like socioeconomic disadvantage (Southwick et al., 2016).

Besides caregiver resilience, PFS also had a significant negative association with maternal migration status, though the association with paternal migration status was not significant. Xu et al. (2019) found nearly identical results, with maternal migration having a large negative association with both parenting practices and student outcomes and paternal migration having no significant association (Xu et al., 2019). This contrast may be due to the different roles that parents often take on in a household: in societal contexts where mothers generally spend significantly more time on child rearing compared to fathers, such as in rural China, a mother's extended absence from home may have a comparatively strong impact on both perceived and actual family support. In cases of maternal migration in rural China, both parents are generally absent, and grandparents become the primary caregivers (Zhou et al., 2014). However, not all studies have found negative impacts of maternal migration on student developmental outcomes (Wen et al., 2015; Zhou et al., 2015), and it is still unclear whether factors like the increased

household income from parental migration may offset the potential negative effects of lower family support on student developmental outcomes.

The results of the mediation analyses provide evidence suggesting that in the context of rural China, PFS may be an important mediator of the link between students' family characteristics and their developmental outcomes. Other recent studies in rural China have also identified links between social support and resilience (Su et al., 2017; Abbey et al., 2021) as well as between social support and academic achievement (Abbey et al., 2021), though these studies did not investigate PSS's role as a mediator. The results on prosocial outcomes are consistent with those of a recent study conducted among rural-urban migrant children in southeast China (Xiong et al., 2021; Su et al., 2017), which found that perceived social support in general was a significant mediator between students' socioeconomic status and their prosocial tendencies. The literature suggests that when a student encounters adverse circumstances like socioeconomic disadvantage and negative life events, their lower levels of PSS can affect both their physical and mental health, which then in turn can affect their behavior (Hobfoll et al., 1990). However, although we do not conduct moderation analyses in the current study, it is also possible that PSS can also act as a protective factor: in situations where students who face adverse circumstances have high levels of PSS, it may alleviate some of the negative impacts of these circumstances on their development (White et al., 1998; Sandler et al., 1989). Due to its potential role as a moderator of student risk factors in disadvantaged communities, targeting PFS as an intermediary outcome may be an important component of future interventions for at-risk children.

Despite the contributions of this study, it also has several limitations. First, due to the cross-sectional nature of our data, causal relationships cannot be determined. Our inability to draw causal relationships underscores the need for future longitudinal randomized studies to examine the directionality of the correlations we observed using cross-sectional data. Another limitation of this study is the lack of a standardized and internationally validated measure of prosocial outcomes. This reduces the reliability of our data on prosocial outcomes and our ability to directly compare the prosocial outcomes of sample children in the current study with other studies. Future research should determine which measures of prosocial outcomes are valid among school-aged populations in rural China.

Conclusions

With a sample of 1,564 students across primary and junior high schools in rural China, we explored the prevalence of PFS, the association between PFS and student's family characteristics, as well as PFS's role as a mediator between household factors and student developmental outcomes. Our findings indicate that among students in rural China, PFS is relatively low when compared to studies conducted in developed contexts that also used the same scale (the MSPSS). Caregiver resilience and maternal migration status were most strongly associated with PFS: caregiver CD-RISC scores in the top 50% of the sample were associated with higher scores on the MSPSS family scale, while maternal migration was associated with lower scores on the MSPSS. In addition, our findings also show that PFS mediates for a substantial proportion of the association between family characteristics and student developmental

outcomes. Our study contributes to the nascent empirical research aimed at better understanding the determinants and prevalence of PFS among at-risk children, as well as sheds light on how PFS mediates the relationship between household factors and student developmental outcomes. Our findings highlight the roles of caregiver resilience and maternal migration status as important determinants of PFS, as well as underscores the need for additional research on PFS and its determinants among disadvantaged school-aged populations in order to better prescribe interventions that target the social inequities.

Declarations

Acknowledgements: none

Declarations of interest: None.

Ethical approval: Ethical approval for this study was granted by the University Institutional Review Board (IRB) (protocol number 58251).

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Tables

Table 1. Descriptive Statistics of Family and Student Characteristics

	Full Sample (N=1564)
	Mean (SD) or N (Percent)
<i>Panel A Family Characteristics</i>	
Caregiver resilience score (CD-RISC)	55.35 (18.91)
Migrant mother, 1=Yes	402 (26%)
Mother's years of education	7.27 (3.57)
Migrant father, 1=Yes	900 (58%)
Father's years of education	9.08 (3.07)
Family asset index	-0.01 (1.24)
Number of people at home	5.09 (1.51)
Parents are divorced, 1=Yes	132 (8%)
<i>Panel B Student Characteristics</i>	
Female student, 1=Yes	707 (45%)
Student age, years	11.55 (1.62)
Student is an only child, 1=Yes	212 (14%)
Student boards at school, 1=Yes	237 (15%)
Student is of the Han ethnicity, 1=Yes	1505 (96%)
Student attends junior high school, 1=Yes	649 (42%)

Table 2. Descriptive Statistics of Student Outcomes

	Full Sample (N=1564)
	Mean (SD) or N (Percent)
MSPSS Family Support Score	4.65 (1.56)
CD-RISC resilience score of student, 0-100	59.92 (14.24)
Standardized math test score	0.01 (0.95)
Child self-report of relationship with teacher, 0-100	82.34 (21.93)
Number of close friends	4.67 (3.95)
Actively participates in group activities at school, 1=Yes	1091 (70%)
Actively expresses feelings to others when encountering problems in their life, 1=Yes	599 (38%)

Table 3. Correlation of Perceived Family Support with Family Characteristics (N=1564)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: MSPSS Perceived Family Support Score					
	Coefficient (95% CI)	P-value	Coefficient (95% CI)	P-value	Coefficient (95% CI)	P-value
Caregiver CD-RISC score is in top 50% of sample, 1=Yes	0.54 (0.40 - 0.69)	<0.0001	0.48 (0.32 - 0.63)	<0.0001	0.48 (0.32 - 0.63)	<0.0001
Migrant mother, 1=Yes			-0.24 (-0.43 - -0.06)	0.01	-0.26 (-0.45 - -0.06)	0.01
Mother's years of education, years			0.03 (0.00 - 0.05)	0.04	0.03 (0.00 - 0.05)	0.04
Migrant father, 1=Yes			0.05 (-0.12 - 0.22)	0.56	0.05 (-0.12 - 0.23)	0.53
Father's years of education, years			0.02 (-0.01 - 0.05)	0.15	0.02 (-0.01 - 0.05)	0.15
Family asset index is in top 50% of sample, 1=Yes			0.13 (-0.03 - 0.29)	0.10	0.13 (-0.02 - 0.29)	0.10
Number of people at home			-0.02 (-0.08 - 0.03)	0.36	-0.02 (-0.08 - 0.03)	0.42
Parents are divorced, 1=Yes			-0.05 (-0.33 - 0.24)	0.75	-0.07 (-0.39 - 0.24)	0.65
Student characteristics	Y		Y		Y	

Notes:

1) Coefficients and 95% confidence intervals in parentheses are reported. P values of each regressions are also reported.

2) Results of the ordinary least squares model, controlling for school fixed effects, are reported; standard errors are clustered at the class level.

3) Student characteristics include student gender, age, whether the student is an only child, whether the student boards at school, and whether the student is Han.

Table 4. Mediation Analysis of Perceived Family Support and Student Outcomes

	Coefficient (95% CI)		P-values		Coefficient (95% CI)		P-values	
	(1)		(2)		(3)			
	CD-RISC Score of Student, 0-100		Standardized Math Test Score		Child Self-Report of Relationship With Teacher, 0-100			
MSPSS Family Support Core	3.40	<0.0001	0.10	<0.0001	2.29	<0.0001		
	(3.06 - 3.74)		(0.06 - 0.13)		(1.50 - 3.07)			
	(4)		(5)		(6)			
	Number of Close Friends		Actively Participates in Group Activities at School, 1=yes		Actively Expresses Feelings to Others When Encountering Problems in Their Life, 1=yes			
MSPSS Family Support Core	0.37	<0.0001	0.17	<0.0001	0.30	<0.0001		
	(0.23 - 0.50)		(0.10 - 0.24)		(0.21 - 0.39)			

Notes:

-) Coefficients and 95% confidence intervals in parentheses are reported.
-) Ordinary least squares regressions used for continuous variables (regression (1) to regression (4) and logistic regressions used for binary variables (regressions (5) and (6)).
-) All regressions control for family and student characteristics, and school fixed effects; standard errors are clustered at the class level.

Appendix

Appendix 1. Comparing the prevalence of perceived family support across studies

MSPSS score (Mean)	Study Location	Sample Size	Sample Age (Mean)	Types of Schools/Clinics	Study References
4.63	China (rural Gansu)	1564	11.6	Primary, Junior High Schools	Current study
4.86	China (Hong Kong)	475	17.5	Hong Kong Chinese 12th Grade	Chou (2000)
5.27	South Africa	502	16.2	Cape Town High Schools	Bruwer et al. (2008)
5.33	United States	222	15.8	Midwestern City High Schools	Canty-Mitchell and Zimet (2000)
5.43	United States	290	15	CA/TX/KS Middle, High Schools	Edwards (2004)
5.58	Turkey	166	15.5	Merkez Efendi Children's Clinic	Gunuc and Dogan (2013)
5.74	United Kingdom	2790	11 ~ 14	East London Secondary Schools	Klineberg et al. (2006)

Figures

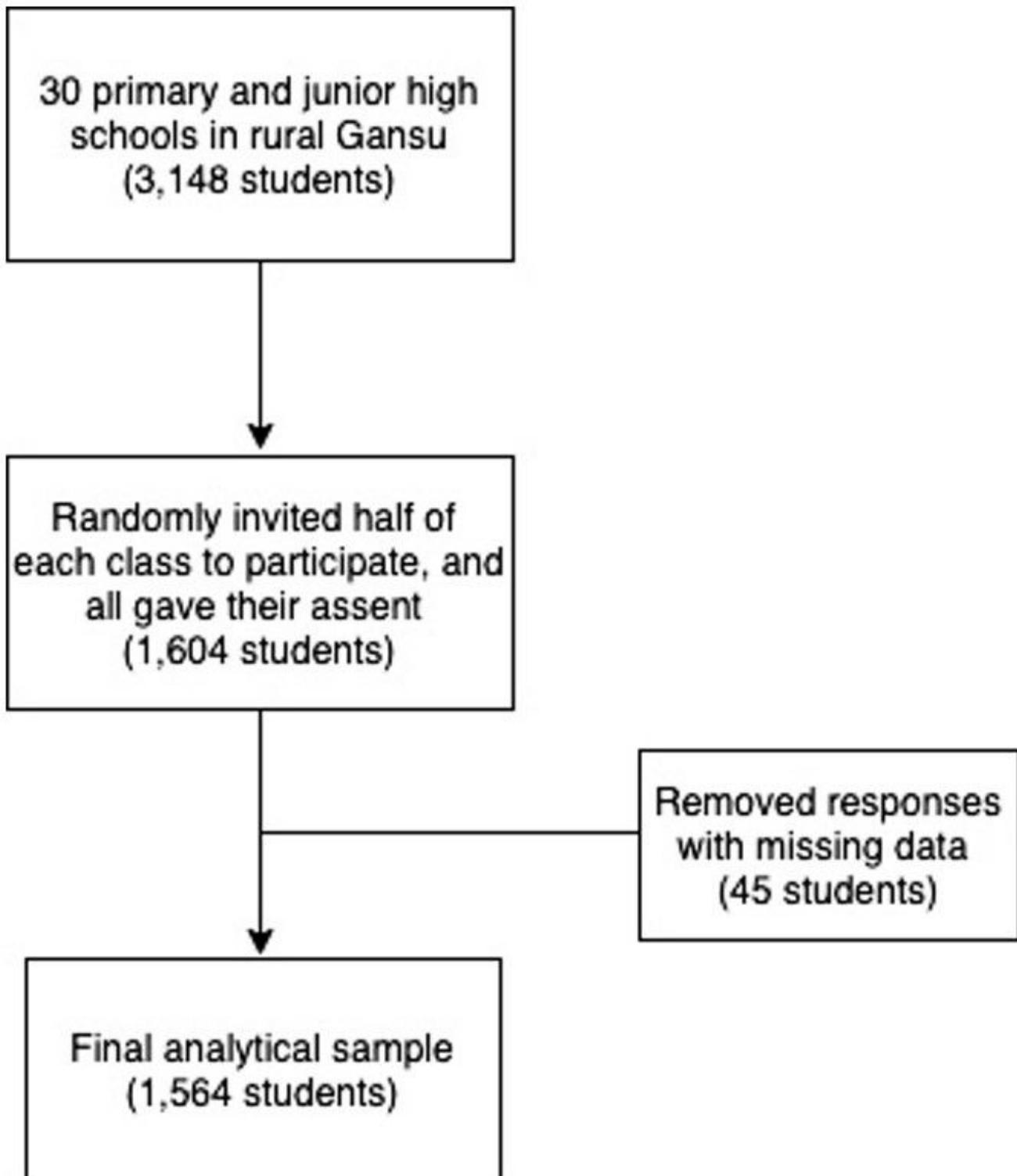


Figure 1

Flowchart detailing sample selection process.

Notes: Sample students were selected from grades 4, 5, 7, and 8. All students invited to participate gave their assent to take part in the survey.

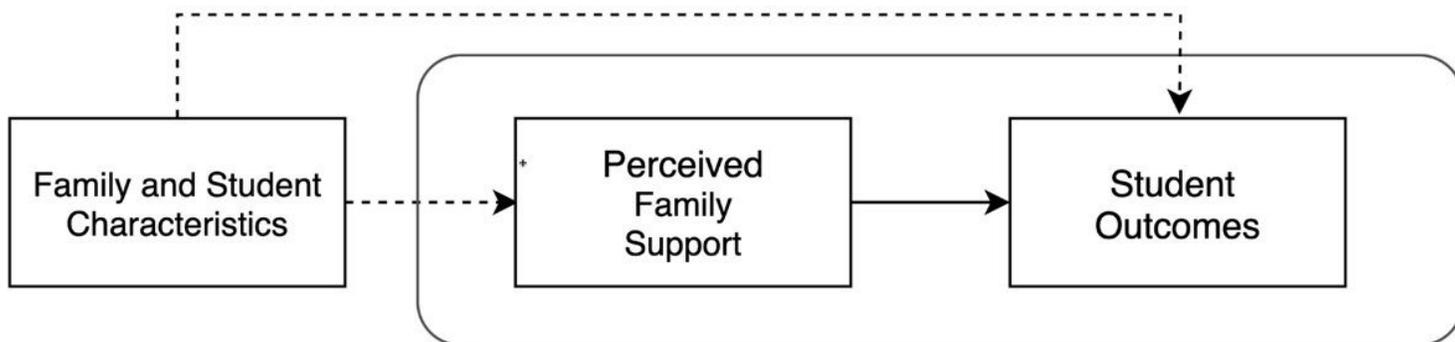


Figure 2

A visual representation of the mediation model.

Notes: Dotted lines indicate direct effects and solid lines indicate the indirect effects mediated by perceived family support.

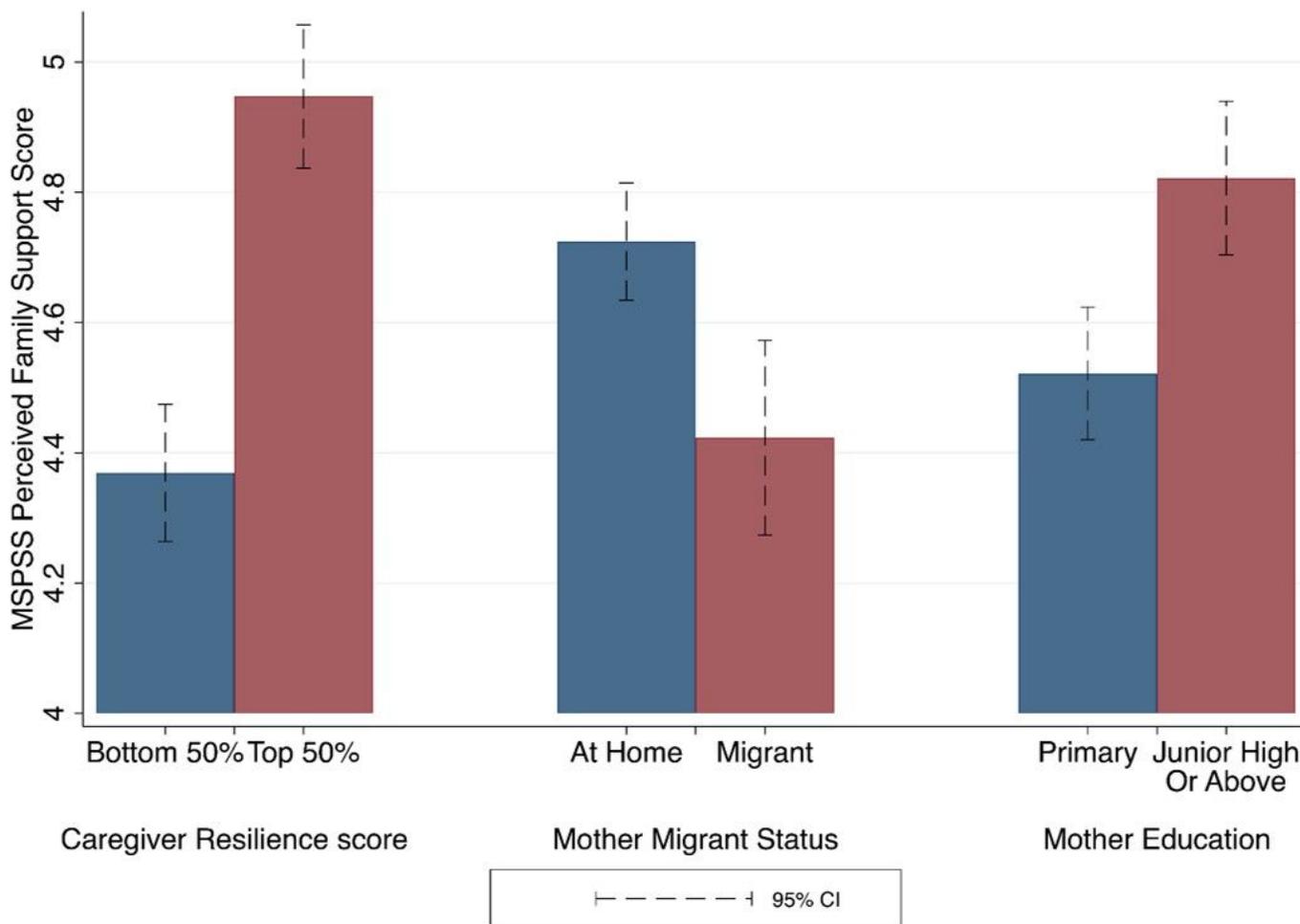


Figure 3

Difference in perceived family support between students with different family characteristics