Chapter 13
Duration of Family Poverty and Primary Math Achievement in Bangladeshi Slum Children:
Role of Parental Investment and Parenting Practice

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ABSTRACT

Associations of duration of family poverty (DFP) via parental monetary investment (PMI) and parenting practice (PP) with primary math achievement (PMA) among slum children were less investigated. This chapter tested and compared the mediating effects of PMI and PP on the association DFP and PMA between working children (n = 283) and non-working children (n = 182; M = 12.09, SD = .86, 60.86%). Over 12 months, data on the key variables: DFP, PMI, PP, and PMA were collected, using questionnaire method. Using structural equation modeling, the authors found that working children with more DFP than their peers had poor math scores in fifth grade final examination. Although both factors (e.g., PMI, PP) significantly and positively mediated the DFP-PMA relation, lower frequency of PP than PMI was a potential mechanism by which DFP was more likely to transmit negative effects on PMA in working children than in non-working children.

INTRODUCTION

Decades of research demonstrate that family poverty during childhood has a more detrimental effect on child development, social adjustment, health and academic achievement, including mathematics (Baker et al., 2018; Duncan & Brooks-Gunn, 1997; Duncan et al., 1998; Evans & English, 2001; Seccombe, 2000; Tomul et al., 2021). Mathematics is a basic, technical, hierarchical subject that promotes children's school achievement over time (Jordan et al., 2009). Despite this, current research in the United States and internationally shows that children growing up in poor or low socioeconomic status families have lower scores or GPA in mathematics than their rich peers throughout primary schooling (Akmal et al., 2021; Baker et al., 2018; Pearman, 2019; Silva-Laya et al., 2020; Tomul et al., 2021). In Bangladesh, although reducing poverty over the last decade has improved children's life chances by 10-20%, about 30% of the families are still poor (Bangladesh Bureau of Statistics, BBS, 2020). Growing research shows that children who come from poor families have a poorer GPA in primary mathematics than their counterparts (BBS, 2020; Uddin, 2017, 2022; Uddin & Jahan, 2023a; Uddin et al., 2023e). This poor math achievement has adverse consequences in disadvantaged children's English and science achievement, including early school dropout and primary school attainment.

Children need care and support to develop primary mathematics during their early childhood through early adolescent years (Coley et al., 2020; Elliot & Bachman, 2018; Lombardi & Dearing, 2020). Theories and research have indicated that children growing up in poor families, compared to their rich peers, are deprived of parental material support (e.g., food, medicine, school supply, books) and proper

parenting practices (e. g., discipline, control, supervision, psychosocial and cognitive support) to develop skills in primary mathematics from their early childhood (Diemer et al., 2020; Elliot et al., 2018; Kalil & DeLeire, 2004). Consequently, they have worse performance in primary mathematics. Although some studies in the US have found significant relations between lower income/chronic poverty and children's poor math achievement via parental monetary and time investment, less is known about how parental monetary investment and parenting practices in math education underlie the relations between duration of family poverty (DFP) and primary math achievement in Bangladesh (Baker et al., 2018; Coley et al., 2020; Elliot et al., 2018; Guo & Harris, 2000; Uddin, 2022; Uddin et al., 2023b, 2023e). Drawing from family investment and parenting models, the present chapter examined two mechanisms: parental monetary investment and parenting practice by which DFP (duration of family poverty) may transmit detrimental effects on primary math achievement (PMA) in Bangladeshi slum working versus in non-working children (Uddin et al., 2023e). In this chapter, structural equation modeling was used to test these potential mechanisms (parental monetary investment and parenting practice) through which DFP (duration of family poverty) is more likely to transmit negative effects on PMA (primary math achievement) in working children than in non-working children, implying greater opportunities for early intervention to improve working children's PMA (primary math achievement) in Bangladesh. Secondly, based on parental investment and parenting theory, this chapter reviews literature to describe these potential mechanisms by which DFP (duration of family poverty) imparts more detrimental effects on working children's PMA (primary math achievement) than on their peer groups. The third section describes methodology to study and analyze the main variables used in the chapter. The fourth section presents the results. The Discussion and Conclusion of the chapter are presented in the fifth and sixth sections.

Theoretical Background

Duration of Family Poverty and Primary Math Achievement

Family disadvantage and research suggests that economic disadvantage during childhood has more detrimental effects on children's development and educational achievement over time (Dannefer, 2003; DiPrete & Eirich, 2006). Some empirical studies in the US have found that poor educational achievement is significantly associated with persistent family poverty, after adjusting age, sex, ethnicity/race and socioeconomic status (Ackerman et al., 2004; Dubow & Ippolito, 1994; Engle & Black, 2008; Lee, 2011; Kiernan & Mensah, 2011). These studies have found that compared to children from wealthy families, children growing up in persistent family poverty have poor math and English scores from kindergarten through fifth

grade, after controlling for family characteristics (e.g., SES, household structure, and welfare receipt).

Despite a promising history of poverty reduction in the past decade, 24.5% of the populations were poor and 13% were extremely poor (BBS, 2010, 2020). With respect to child poverty and deprivation, research demonstrates that 46% of children age 1-17, live below the national poverty line; 59% live on $1.08 dollars (PPP) a day and 23% live in persistent poverty (BBS, 2016). Although PMA (primary math achievement) among school children in Bangladesh is the foundation for future education (e.g., secondary & higher education), the history of family poverty affects children's development and math education. According to the national curriculum, this education helps all children to acquire basic knowledge and skills in primary mathematics (e.g., addition, multiplication, subtraction; Rahman & Islam, 2009; Uddin, 2021, 2022). The basic knowledge and practical skills acquired from primary math education not only help children to be admitted to a high school, but it also fosters upward social mobility, including primary job involvement, small business enterprise and reducing poverty at the micro level (Amin et al., 2004, 2006; Alam et al., 2015). Despite this fact, growing literature reveals that slum working children living in poor families and disadvantaged neighborhoods have worse performance in mathematics examinations than non-working children (Amin et al., 2004, 2006; Alam et al., 2015; Kabeer, 2003; Kabeer & Mahmud, 2009). Although the association between DFP (duration of family poverty) and poor PMA (primary math achievement) is strong in abroad, as well as in Bangladesh, less is known about how DFP negatively influences PMA among working children than non-working children in Bangladesh.

Mechanisms

Parental Investment Linking Family Poverty to Primary Math Achievement

The Family Investment Model and research suggest that PMI (parental monetary investment) in math education mediates the association between DFP (duration of family poverty) and PMA (primary math achievement) (Hamilton et al., 2007; Hamilton, 2012; McLanahan, 1985; McLanahan et al., 1994). The family investment model suggests that poor parents with limited resources (money & wealth), compared to affluent parents, have fewer monetary investments in children's wellbeing and educational competency development (Hamilton, 2012; Kalil et al., 2004; McLanahan, 1985; McLanahan et al., 1994). Although some studies have found that PMI (parental monetary investment) in number word books and toys mediates the association between lower income and math achievement between poor and rich

children, few studies have directly focused on PMI in math-related books and math services or math tutoring that mediates the association between DFP (duration of family poverty) and math achievement between working and non-working children. In Bangladesh, extant research reveals that poor parents with limited economic resources are less able than their rich peers to provide books, to appoint a math tutor and to invest money to improve their children's math education (Uddin, 2022, 2023e). Consequently, children from poor families have poorer math scores on their final exam than their rich peers.

Parenting Practice Linking Family Poverty to Primary Math Achievement

Parenting theory and research also suggest that parenting practice in children's learning mediates the association between family poverty and academic achievement (Aikens et al., 2009; Ross & Veal, 2009). Although some extant studies have found that family poverty via parental stress and parenting (e.g., warm, strictness) negatively influences children's internal and external behavioral problems and academic achievement, less is known about how parenting practices such as parental support, supervision, and monitoring children's math education mediate the association between DFP (duration of family poverty) and PMA (primary math achievement) between working and non-working children (Casey et al., 2018; McCoy et al., 2015; Yeung et al., 2002). Some research has found that parenting practices such as parental math support, communication, supervision and monitoring in children's education have a positive effect on child outcomes, including school achievement (Aikens et al., 2009; Ross et al., 2009; Villena-Rodan & Rios-Aguilar, 2011). For example, Villena-Rodan et al. (2011) found that maternal supervision had a direct causal effect on their children's math scores. Milkie et al. (2015) found that a mother's time investment in children's education at primary school (age range 3-11) had positive math outcomes. Nomaguchi et al. (2016) also found that poor mothers with a lower socioeconomic status spent less time with their children's math care, supervision and monitoring, which had detrimental effects on their math scores at primary school level.

The assumptions of the family investment model and parenting perspective may be plausible to understand and examine whether DFP (duration of family poverty) is linked to poor parental investment and parenting practices in children's math education (e.g., money, time, care, supervision etc.) that in turn affects lower PMA (primary math achievement) among working children than the non-working children at Rajshahi city, Bangladesh. Rajshahi Metropolitan city with more than one million people is one of the largest, modernized, mobile, and educational cities of Bangladesh where a number of economic disadvantaged households (e.g., persistent family pov-

erty) and working children (10% - 20%) in the households are gradually increasing from 6, 998 in 1997 to 27,665 in 2005 (BBS, 2010, 2016; Ministry of Primary and Mass Education, 2018). Some periodical research shows that one and a half lakh children live in chronic poverty and grows up with poor cognitive and educational skills (Alam et al., 2015; Haider et al., 2005; Islam & Mia, 2007; Rahman et al. 2009). Unlike the findings in the developed and developing societies, some research in Bangladesh indicates that poor parents cannot provide material and logistic or technical supports related to learning primary math. In turn, these poor material and parenting practices are more likely to affect working children than non-working children in their PMA (primary math achievement), including English and science (Kabeer et al., 2009; Mahmud, 2021; Uddin et al., 2023a). Poor parents cannot help their children to do primary math at home compared to rich mothers (Haider, 2008; Kabeer et al., 2009). Poor parents also cannot appoint a math tutor and cannot invest money to pay tuition fees for their children compared to non-working children. As both parents of working children work outside the family, they cannot spend time with children in control, supervision and monitoring. This has negative effects on child outcomes, including PMA (primary math achievement) (Nath, 2007, 2015; Mahmud, 2021; Uddin et al., 2023c). Taken together, the aforementioned theory and literature suggest that fewer monetary investments in educational materials and lower frequency of parenting practices in home-learning activities are important pathways by which DFP (duration of family poverty) is associated with poor educational outcomes, including PMA (primary math achievement). Despite this, few studies have examined PMI (parental monetary investment) and PP (parenting practice) pathways by which DFP (duration of family poverty) negatively influences math achievement in fifth grade final exams in Bangladesh.

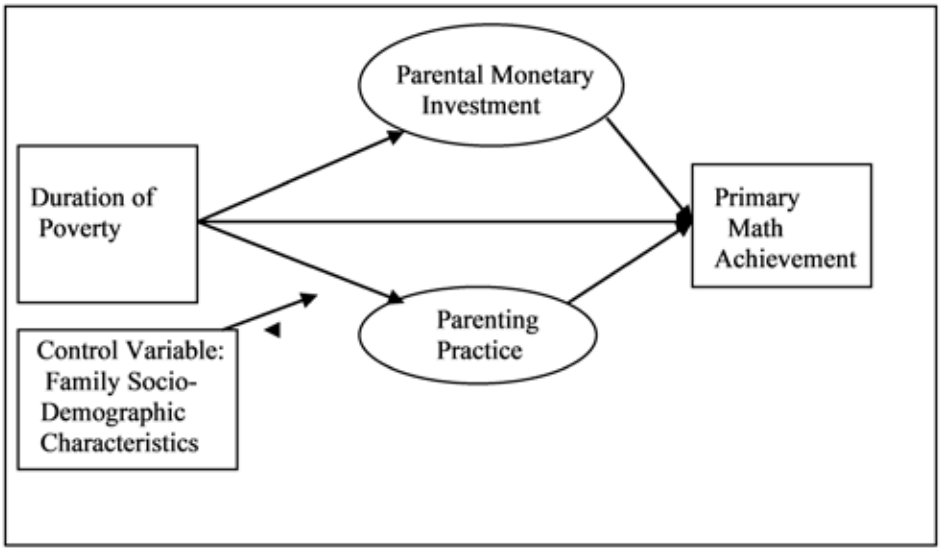
The Present Study

The goal of the present chapter, therefore, was to explore the extent to which parental monetary investment (e.g., math-related books, math tutoring) and parenting practices in children's math learning (e.g., math support, math supervision, math monitoring) mediate the relation between DFP (duration of family poverty) and math achievement for the fifth grade final exam between working and non-working children (see, Figure 1). Specifically, we tested the following hypotheses in the Bangladesh context: 1) The DFP (duration of family poverty) of working children than non-working children is directly and significantly associated with their poorer math scores on the fifth-grade final exam. Second, fewer parental monetary investments in math-related books and math tutoring are more likely to transmit the negative effects of DFP (duration of family poverty) of working children than non-working children on fifth grade math scores. Third, poor parenting practices in

math support, math supervision and math monitoring are more likely to transmit the negative effects of DFP of working children than non-working children on their fifth grade math scores (Aikens et al., 2009; Ross et al., 2009). Past research shows that persistent poverty has more negative effects on early childhood development and education than on later development (Duncan et al., 1997; Duncan et al., 1998). We, therefore, expected parenting practices and parental monetary investments to have more negative effects of DFP on fifth grade math scores among working children than among non-working children.

Finally, we controlled several background characteristics, including the mother's education, the mother's math knowledge, the mother's math support, family size, child's age and sex to understand the hypotheses, mentioned above. In Bangladesh, past research has shown that a low-level of socioeconomic status of parents (e.g., education, occupation, wealth) is significantly associated with fewer monetary investments and poor math knowledge and math support for child's math education (Uddin, 2015b, 2022). In turn, these fewer monetary investments and parenting for poor math supports negatively influence children's math education and achievement. In this patriarchal country, researchers observe that parents invest more money and time in male children than female children because they are dependent on the male child in their old age, while a daughter is married off and becomes a member of her husband's family (Lee, 2010; Uddin, 2015a, 2021). In the resource-scarce households, the female children, compared to the male children, are deprived more of parental monetary and time investment in their education (Uddin, 2021, 2022). Parental monetary investment and parenting, therefore, also influence gender differences in math education and achievement. Inclusion of these relevant control variables may reduce bias in the estimation of the unique contributions that each proposed mediator makes to the relation between DFP and poorer primary math achievement in the study's context.

Figure 1. Hypothesized model



METHOD

Subject and Materials

This cross-sectional study to test the hypothesized model presented in Figure 1 was conducted in in Rajshahi Metropolitan city, Bangladesh from January to December, 2017. In so doing, we purposefully selected the schools of the Underprivileged Children's Educational Program (UCEP) where most of the students (90%) came from poor families and worked outside of the family. First of all, we frequently visited *UCEP's* five schools; then we selected the students who enrolled in class 5. Following *UCEP* schools' enrollment list, we found 1150 students. Using a simple random sampling, about 465 (41%) of the students (M = 12.09, SD = .86) and their mothers (aged 20-50 years) were selected for the study. Of the students, 283 students (60.86%) were working children and 182 (39.14%) were non-working ones. Most of the parents were Muslims (98.5%) and the rest of them were Hindus (1.5%). The students selected would live in slum, semi-slum (62.8%) or non-slum (37.2%) areas of the Rajshahi city, Bangladesh.

Measures

Duration of Family Poverty

The duration of family poverty situation has detrimental effects on child socialization, development and educational achievement. The parents and children living in the slum area of Rajshahi City also suffer from chronic poverty (parents' income 60% below the poverty line) and deprived of food and other necessities over the years). Based on a retrospective approach, we asked our selected parents (e.g., mothers): How many months have you been suffering in poverty living in the slum area? The answer of the parents was summed up for working children (M = 10.08, SD = .51) and non-working children (M = 6.10, SD = .75). In this study, the average years of DFP for the groups were used as an observed predictor variable.

Table 1. Sample characteristics (N = 465)

	Working Children	**Non-Working Children**	**Range**
	Mean (SD)	**Mean (SD)**	
1. W1 Duration of family poverty	10.08 (.51)	6.10 (.75)	1-14
Parental monetary investment			
2. W2 Cost of math book in Taka	200.00 (.45)	350.00 (.75)	100-500
3. W2 Cost of math tutoring	1000.00 (1.99)	3000.00 (2.35)	500-5000
Parenting Practice			
4. W2 Math support	2.00 (.55)	4.00 (.85)	0-10
5. W2 Math supervision	3.00 (.64)	6.20 (.91)	0-10
6. W2 Math monitoring	2.50 (.42)	5.10 (.77)	0-10
7. W3 5th grade math score	55.20 (12.25)	60.19 (10.22)	30-80
8. W1 Mother's age	35.04 (3.22)	33.12 (2.21)	30.45
9. W1 Mother's education in year	5.34 (2.47)	10.26 (3.89)	0-12
10. W1 Family size	3.51 (1.87)	3.01 (.88)	1-4
11. W1Children's age in year	12.20 (1.44)	11.40 (.68)	0-14
12. W1 Child gender (male %)	52.00	49.00	

Primary Math Achievement

Primary math achievement (PMA) refers to how students (e.g., male, female) do in math examinations in the domains of basic rules of operation and its related story-problems, fraction & decimal, average & percentage and primary geometry,

as well as their behavior at school over time. The data on PMA in the fifth grade final exams were obtained for all participants from the school records. The scores (also marks) of academic PMA (primary math achievement) were based on objective examinations conducted and evaluated by different school teachers over the years (Uddin, 2022). The total marks for math courses were 100; a test score of 60 is usually considered the cutoff point between a pass and a failure in the course. In the present study, math scores (M = 55.20, SD =12.25 for working children, M = 60.19, SD =10.22 for non-working children) in the fifth grade final exam, which was used as an observed outcome variable.

Parental Investment

In this study, we used parental monetary investment (PMI) as a latent construct in the children's fifth grade math education. PMI was numerically measured using two items (e.g., parental spending on children's math-related books and math tutoring) from previous research (Hamilton, 2012; Lee, 2010; Uddin, 2022, 2024). In so doing, we asked mothers: How much money did you spend on your child's *math-related books* (M = 200.00, SD = .45 for working children, M = 350.00, SD = .75 for non-working children) and *math tutoring* (M = 1000.00, SD = 1.99 for working children, M = 3000.00, SD = 2.35 for non-working children) for fifth grade math education?

Parenting Practice

Parenting practice as a latent construct in children's math education was measured, using three items: Math support, math supervision and math monitoring at home (Aikens et al., 2009; Casey et al., 2018; Nomaguchi et al., 2016; Ross et al., 2009). We asked mothers: How many times did you *support* (M = 2.00, SD =.55 for working children, M = 4.00, SD = .85 for non-working children), *supervise* (M = 3.00, SD =.64 for working children, M = 6.20, SD = .91 for non-working children) and *monitor* (M = 2.5, SD =.42 for working children, M = 5.10, SD = .77 for non-working children) your child in math education and practice at home? The internal consistency reliability alpha was .71 for PMI (parental monetary investment) and .77 for PP (parenting practice) respectively. The average values of the two latent constructs: PMI and PP were separately used as mediators in the final analysis.

Covariates

We included child and mother characteristics as control variables. Mothers reported their age in years (M_{age} = 35.04, SD = 3.22 for working, M_{age} = 33.12, SD = 2.21 for working), family size (number of members living together; M = 3.51, SD = 1.87 for working, M = 3.01, SD = .88 for non-working), mother's education in years (M = 5.34, SD =2.47 for working, M = 10.26, SD =3.89 for non-working) and occupation (House wife = 1 and job involvement= 0) at W1. Regarding child characteristics, they also reported their focal child's date of birth from age in year at baseline, and child gender (0 = female, 1 = male).

Data Collection Procedure

In this study, a cross-sectional survey design was used to study and analyze associations between DFP (duration of family poverty) and PMA (primary math achievement) between working and non-working children at Rajshahi City. For this, a questionnaire instrument with open-ended and close-ended questions was designed, based on previous studies' instruments. As most of the parents[1] and students came from lower socioeconomic statuses, the interview technique with the questionnaire was applied for data collection. According to the questionnaire, both the mother and her child (e.g., boy or girl) were asked for relevant questions. Before data collection, several times we visited the respondent's home and UCEP schools at Rajshahi City, where the study was conducted. The first wave (W1) data on family sociodemographic characteristics and poverty were collected from January to March, 2017. After six months (October to November, 2017), we collected the second wave data (W2) on two latent constructs: PMI (parental monetary investment) and PP (parenting practice) in children's math education. We continued this process until the data collection was complete. As the final exam of primary school was held on November of each year, the fifth grade math score of each student was collected from school record in December, 2017. To conduct this research, official permission was approved by a Chief Program Officer. Despite this, to conduct research with the questionnaire instrument present researchers maintained some ethical considerations, including confidentiality, informed consent, privacy, mutual benefit and reciprocity. First of all, informed consent to conduct the cross-sectional survey was collected from the parents or guardians. The parents were assured that personal identity and information would be safe. And privacy and confidentiality would be maintained. In the data collection process, the researchers, however, conversed in the Bengali language with the respondents, and then the responses of the selected respondents were converted into English.

Statistical Analysis

We began our analysis with a descriptive (see, Table 1) and bivariate correlation (see, Table 2) among predictor, mediator, and outcome variables, and then we tested mediating pathways from W1 DFP (duration of family poverty) through W2 parental investments (e.g., PMI) and parenting practice (e.g., PP) to W3 fifth grade math achievement. In so doing, we used structural equation modeling (SEM) with the Amos (Analysis of Moment Structure, version 20.0) program to create two latent variables such as PMI (parental monetary investment) and PP (parenting practice) pathways by which DFP (duration of family poverty) influences PMA (primary math achievement) (Byrne, 2016). In the present analysis, we preferred full information maximum likelihood estimation which calculates all model parameters from the raw data of all variables. While each of the DFP (duration of family poverty) and fifth grade math score represented a single observed variable, PMI (parental monetary investment) and PP (parenting practice) were latent constructs. Using latent variable modeling relations, the analysis can decompose the extent to which DFP (duration of family poverty) and PMI (parental monetary investment) vs. PP (parenting practice) have direct effects on the fifth grade math score. In addition, both PMI and PP have indirect effects of DFP on later fifth grade math scores.

The present SEM analysis has two components: 1) the measurement model and 2) the structural model (Byrne, 2016). In the measurement model, we described the coefficients of latent constructs of W2 PMI and PP and their observed W1 DFP and W3 fifth grade math scores. In the structural model shown in Figure 1, we outlined both direct and indirect pathways through which W1 DFP relates to W3 fifth grade math score. In the model, both PMI (parental monetary investment) and PP (parenting practice) are dependent variables of W1 DFP, but independent variables of W3 fifth grade math score. Before testing the mediation model, we conducted confirmatory factor analysis to identify the model, to evaluate factor loadings of the latent constructs (e.g., PMI & PP) and gender measurement equivalence in math. The results indicated that the measurement model was fully identified; the factors loadings of both the mediating latent constructs (e.g., PMI & PP) were relatively high from .75 to .90; measurement equivalence across gender groups were supportive (e.g., male & female) (χ^2 (123, N=465, *df*= 14) = .123; the model fit with the data was good (GFI=.985; TLI= .988; CFI= .999; RMSEA= .041). As the first requirements of the measurement model were fulfilled, we tested separate mediating effects of the W2 PMI and PP on the relations between DFP (duration of family poverty) and W3 fifth grade math score between working and non-working children. In so doing, we first tested separate mediating models of working children for each mediator (see, Figure 2) and then we tested mediating models of non-working to identify different effects of the latent mediator constructs on the association between predictor and

outcome measures for the working and non-working children (see, Figure 2). In all models, control variables (e.g., parents' and children's age, parents' education, family size) were included to know whether or not these control variables affect the focal models. In the final analysis, we evaluated model fit, using chi-square, a goodness-of-fit index (GFI), comparative fit index (CFI), and the root mean square error of approximation (RMSEA).

RESULTS

Bivariate Correlation

The results of descriptive analyses presented in Table 1 revealed that the DFP (duration of family poverty) of working children was higher than non-working children. But their PMI (parental monetary investment) and PP (parenting practice) and PMA (primary math achievement) were lower than non-working children. Particularly, the results of bivariate correlation shown in Table 2 showed that DFP was significantly and positively associated with PMA ($r = 0.26$, $p < 0.05$), PMI ($r = 0.48$, $p < 0.05$) and PP ($r = 0.32$, $p < 0.05$) in math education. In turn, both PMI (parental monetary investment) ($r = 0.36$, $p < 0.05$) and PP (parenting practice) ($r = 0.38$, $p < 0.05$) in math education were significantly and positively associated with poor math scores in fifth grade. Both parental education and family size except child's age and sex were positively associated with predictor, mediator and outcome variables (see, Table 2). As the pattern and direction of the associations among predictor, mediator, and outcome variables with covariates was consistent with the hypothesized model in Figure 1, the measurement and structural models were then sequentially tested. The results of the measurement model and the structural model are presented in Table 3.

Table 2. Bivariate correlation for all major variables

Variable	1	2	3	4	5	6	7
1 W1 Duration of Family poverty	1						
2 Parental monetary investment	0.48*	1					
3 Parenting practice	0.32*	0.20*	1				
4 5th grade math score	0.26*	0.36*	0.38*	1			
5 Mother's education	0.09*	0.11*	0.42*	0.18*	1		
6 Family size	0.04*	0.10*	0.44*	0.09*	0.44*	1	

continued on following page

Table 2. Continued

Variable	1	2	3	4	5	6	7
7 Child's age	0.06*	*-.01*	0.03**	0.08*	0.08**	0.14*	1
8 Child's sex	*-0.02*	0.05*	0.12**	0.12*	0.31*	*-0.03*	0.15*

Note: All are significant except italicized figures.
* $p<0.05$, ** $p<0.01$

The Measurement Model

Standardized factor loadings from the CFA (confirmatory factor analysis) conducted for the indicators of PMI (parental monetary investment) and PP (parenting practice) are shown in Table 3. The results of the analysis indicated that the measurement model was fully identified. The convergent validity for all indicators onto their respective factors (the standardized factor loadings of the mediators) was relatively high, from .697 to .752 for PMI and .658 - .759 for PP. The CFA model fitting with the data was adequate at χ^2 (195) = 214.27, $p < .05$; GFI = .971; TLI = .911; CFI = .938; RMSEA = .041 for PMI and χ^2 (165) = 104.17, $p < .05$; GFI = .972; TLI = .935; CFI = .978; RMSEA = .031) for PP respectively.

Table 3. Factor Loadings of Parental Monetary Investment and Parenting Practice

Variable	Standardized Loading	*SE*
Parental Monetary Investment		
Cost of math book	.752	.032
Cost of math tutoring	.697	.033
Parenting Practice		
Math support	.684	.012
Math supervision	.759	.021
Math monitoring	.658	.033

The Structural Model

The structural model examined the direct, indirect, and total pathways of the association between DFP (duration of family poverty), PMI (parental monetary investment) and PP (parenting practice), and children's poor math scores in fifth grade, after accounting for background characteristics. Figure 2 presents standardized coefficients ( ) with standard errors (SE) for the path coefficients that were significant at $p<0.05$ and $p<0.01$ levels and are depicted with a solid line. Table 4 presents unstandardized and standardized coefficients with standard errors (SE) for each direct, indirect, and total paths between predictor, mediators, and children's math outcomes that were computed, using the product of coefficients.

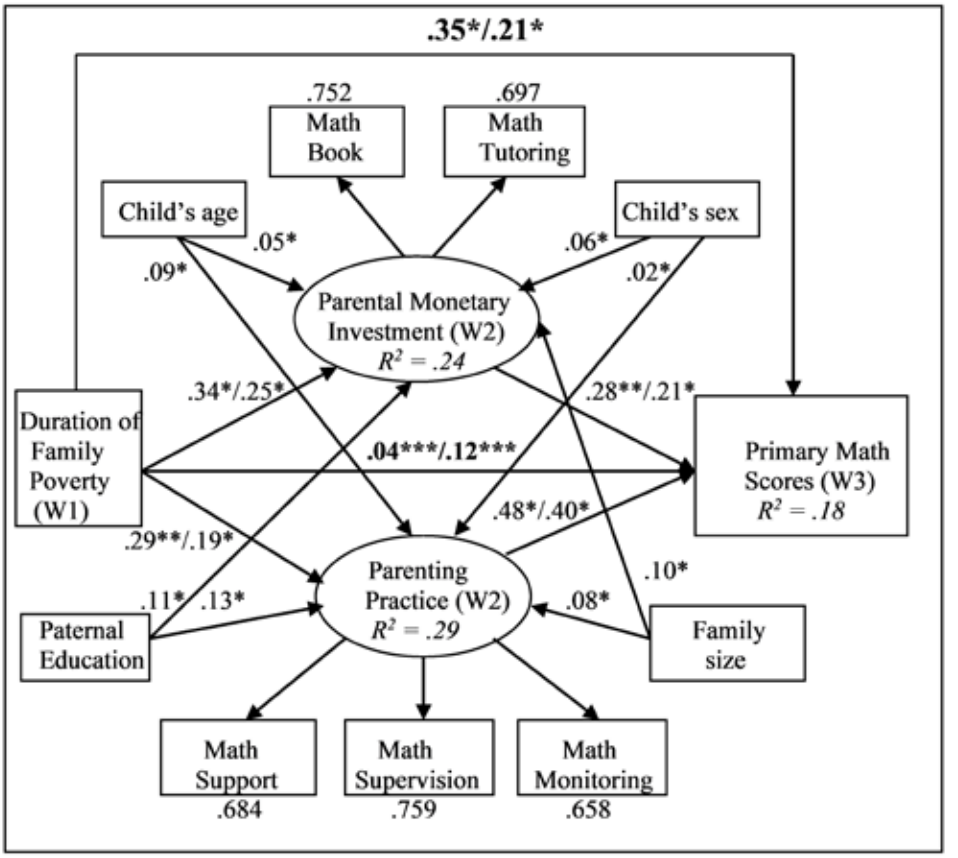
Direct Effects

Standardized coefficients (*s*) of direct effects of DFP (duration of family poverty) and parental investments on children's fifth grade math score are shown in Figure 2 and are also presented in the text. The results of the SEM model that explained an 18% variance in the children's poor math outcomes indicated positive and significant direct effects of DFP (duration of family poverty) and PMI (parental monetary investment) and PP (parenting practice) on children's poor math outcomes between working and non-working children, after accounting for background characteristics. Although we found direct and positive associations between DFP (duration of family poverty) and poor math scores for both the groups, DFP had more negative effects on working children's poor math outcomes (= .35, SE = .03, p< .05) than that on non-working children (= .21, SE = .02, p< .05). We also found significantly positive and direct effects of DFP on parental investments and in turn on poor math outcomes between the groups. Specifically, we found more direct effects of DFP on PMI (= .34, SE = .04, p< .05 for working children; = .25, SE = .01, p< .05 for non-working children) and PP (= .29, SE = .03, p< .05 for working children; = .19, SE = .02, p< .05 for non-working children) in working children's math education than in non-working children were positively significant. Likely, fewer PMIs (= .28, SE = .04, p< .01 for working children; = .21, SE = .02, p< .05 for non-working children) and PPs (= .48, SE = .03, p< .05 for working children; = .40, SE = .02, p< .05 for non-working children) of the working children than non-working had more direct effects on their poor math outcomes were also positively significant.

Indirect and Total Effects

Like direct effects, we also found indirect effects of the two latent variables (e.g., PMI and PP) that partially explained the 24-29% variance in the comparison between DFP (duration of family poverty) and poor math outcomes between the two groups. Specifically, when we included both latent variables such as PMI (parental monetary investment) and PP (parenting practice) in the baseline model, direct and positive relations between DFP and poor math outcomes were substantially reduced by 31%, = .04, *SE* = .03, p< .001 for working children than 9%, = .12, *SE* = .03, p< .001 for non-working children. The findings suggest that mediators were more likely to explain the relations between DFP and poor math outcomes for the working than non-working children with control variables (e.g., age, sex, parental education and family size) in Bangladesh. Overall, the total effects of DFP had more marginal total effects on working children's poor math scores (= .39, *SE* = .03, $p < 0.001$) than on non-working children (= .33, *SE* = .03, $p < 0.001$) in the study context.

Figure 2. Full mediating model (PMI & PP) for the duration of family poverty predicting 5th grade math scores between working and non-working children



The upper line represents parameter estimates for the pathways without both the mediators, but the lower middle line represents the pathways with both the mediators. Standardized path coefficients on the left side for working and on the right side for non-working are shown.

Both the pathways with control variables (e.g., parental education, family size, age and sex) are significant at $*p < .05$, $**p < .01$, $***p < .001$.

DISCUSSION

In this chapter, we followed Bangladeshi poor children over 12 months to examine PMI (parental monetary investment) and PP (parenting practice) as potential mediators of the association between DFP (duration of family poverty) and math achievement in the fifth grade final examination. In so doing, we used a recognized questionnaire to measure PMI (parental monetary investment) and PP (parenting practice) that underlies the association between DFP (duration of family poverty) and math scores between working and non-working children (Uddin, 2022). The results from structural equation modeling confirmed that fewer PMIs (parental monetary investment) and a lower frequency of PPs (parenting practice) in working children's math education than their non-working peers over the months, significantly and partially mediated the association between DFP (duration of family poverty) and lower math achievement in the fifth grade, after accounting for background characteristics in the Bangladesh context. The findings point to the potential parental investment and parenting practice pathways by which the detrimental effects are transmitted from DFP (duration of family poverty) to working children's lower math scores in fifth grade exam. Below, we contextualize the findings in detail.

Table 4. Direct, indirect, and total effects of duration of family poverty, parental monetary investment, and parenting practice on 5th grade math scores between working and non-working children

Variable	**Working Children**				**Non-Working Children**			
	Direct effects							
	Unstand. Coeffi.	***SE***	**Stand. Coeffi.**	***SE***	**Unstand. Coeffi.**	***SE***	**Stand. Coeffi.**	***SE***
DFP	1.82	0.98	0.35*	0.03	1.05	0.91	0.21*	0.02
PMI	1.88	0.77	0.28*	0.04	1.12	0.71	0.21*	0.02
PP	1.97	0.96	0.48*	0.03	1.42	0.93	0.40*	0.02
	Indirect effects							
	Unstand. Coeffi.	***SE***	**Stand. Coeffi.**	***SE***	**Unst. Coeffi.**	***SE***	**Stand. Coeffi.**	***SE***
DFP ->PMI->math scores	0.78*	0.40	0.34*	0.04	0.24*	0.41	0.25*	0.01
DFP->PP -> math scores	0.27*	0.23	0.29*	0.03	0.19*	0.21	0.19*	0.02
DFP->PMI->PP->math scores	0.22**	0.17	0.04***	0.03	0.23**	0.15	0.12***	0.03
	Total effects							
	Unstand. Coeffi.	***SE***	**Stand. Coeffi.**	***SE***	**Unstand. Coeffi.**	***SE***	**Stand. Coeffi**	***SE***
DFP	1.99	0.99	0.39***	0.03	1.98	0.94	0.33***	0.03

Note: DFP = Duration of Family Poverty; PMI = Parental Monetary Investment, PP = Parenting Practice
* p <.05, ** p <.01, *** p <.001

Although the DFP (duration of family poverty) of working children more than non-working children was directly and positively associated with their lower fifth grade math scores, some of the associations were accounted for by two potential mediators: Fewer parental monetary investments and lower frequency of parenting practices in their children's math education. Previous research suggests that PMI (parental monetary investment) in educational materials (e.g., number word-books, game items) and special services (e.g., math tutoring) are important contributors to children's math achievement (Kalil et al., 2004; Ross et al., 2009; Uddin, 2022). The present study found that poor working parents had limited abilities to provide these important educational materials and extra services to children over the months that, in turn, influenced children's lower math scores on their fifth-grade final exam in Bangladesh.

The present findings confirm and extend prior research, showing that DFP (duration of family poverty) via fewer monetary investments and parenting practices at home is indirectly and significantly associated with lower math scores during childhood through adolescence in high- and low-income countries (Atalmis et al., 2016; Buchman et al., 2010; Nath, 2015; Uddin, 2022, 2024). In high- and middle-income countries (e. g., U. S., U. K., or East Asian countries), although parental monetary spending on children has increased during the past decade, several studies have documented the negative effects of persistent family poverty on children's math achievement from third grade through eighth grade, because children from persistent poor families have limited access in educational materials (e.g., books, calculator, electronic devices), and math tutoring services to support math practices at elementary and middle school (Atalmis et al., 2016; Buchman et al., 2010; Casey et al., 2018). For example, Buchman et al. (2010) in the U.S. and Atalmis et al. (2016) in Turkey found that low-income children had limited opportunities to access math tutoring services (e.g., one-on-one or center-based tutoring) that, in turn, affected their math scores from fifth grade to seventh grade. In Bangladesh, Nath (2015) and his colleagues (Uddin, 2017) found that poverty status at the household level was significantly associated with fewer monetary investments in learning resources such as guidebooks, notebooks, calculators, and private tutoring services over the months that, in turn, negatively influenced children's math scores in the fifth grade final exam.

Previous research also suggests that like PMI (parental monetary investment), PP (parenting practice) in children's math learning at home such as math support, math supervision and monitoring also enhances math achievement in children who perform poorly in early primary mathematics. In this chapter, we found that poor parents also had less math support, supervision and monitoring in math learning at home, because they worked long hours outside the home. In turn, lower frequency of PP (parenting practice) negatively influenced working children's math scores in

their fifth grade final exam. These findings are also consistent with previous research in high- and low-income countries (Kornrich & Furstenberg, 2013; Lunn & Kornrich, 2018). In high- and low-income countries (e.g., U. S., European Union), several studies have found that lower-income parents spend less time with children in their developmental and educational activities such as math support and behavioral monitoring that, in turn, negatively influences their mathematics achievement throughout the elementary grades (Kornrich et al., 2013; Lunn et al., 2018). In the US, Pezdek et al. (2002) found that 10-37% of the parents, whose children were qualified for free/reduced lunch, on average spent 1.14 hours per week with their children for math support and supervision that, in turn, were significantly related to poor math outcomes. In the Estonian context, Silinskas and Kikas (2019) found that mothers' math support for children from third grade to sixth grade enhanced their math motivation and likely improved math performance, while maternal control of supervision in children's math homework during these periods negatively impacted their math scores in sixth grade.

In the present chapter, the findings suggested that even when both parents would work longer hours, they would not earn enough money to maintain living expenses. In turn, they had fewer investments of money and time in their children's education in the Bangladesh context. Limited investments of money and time by parents explained up to one quarter of the associations between lower-family income and children's poor math achievement during fifth grade. These findings, disentangling how fewer parental monetary investments and fewer parental time investments in children's primary math education played a contributing role together, however, yielded a better understanding of the associations between lower-family income and poorer math achievement in fifth grade in the Bangladesh context.

Limitations and Future Directions

Using structural equation modeling, we found strong effects of DFP (duration of family poverty) on poor math scores via PMI (parental monetary investment) and PP (parenting practice) for the disadvantaged children, contributing to research that finds direct links between persistent poverty and preschoolers' and preadolescents' math and cognitive development in the U. S. (Duncan et al., 1997, Duncan et al., 1998). Despite these strengths, the current study has some limitations. *First*, the findings of the study were working children-specific. So, we cannot generalize the findings across groups of children. Second, although we proposed a causal mediation model, and then we followed and collected data on DFP (duration of family poverty) at W1, PMI (parental monetary investment) and PP (parenting practice) at W2 and children's fifth grade math scores at W3 (after 12 months), the lack of longitudinal data (e.g., three or more waves of data on each variable) may make

difficult to establish the causal direction of mediating pathways from DFP (duration of family poverty) to PMI (parental monetary investment) and PP (parenting practice) to poorer math achievement (Maxwell & Cole, 2007). Third, although the parental investment model has multi-dimensional pathways, due to time and budget constraints we only measured parental monetary investment and parenting practice constructs with specific items in math education and we did not include other aspects of the family investment model, such as parental stress, parental communication or interaction, parental emotional investment and social-cultural investment. Future studies should include these important parental investment pathways to analyze how DFP duration of family poverty) affects children's math achievement over time (Maxwell et al., 2011).

Conclusion and Implications

The present chapter followed Bangladeshi poor children over months to explain underlying PMI (parental monetary investment) and PP (parenting practice) mechanisms by which DFP (duration of family poverty) imparts negative effects on PMA (primary math achievement) in working children in Bangladesh. The results from structural equation modeling suggested that lower investments of money and parenting practice in children's math education significantly and partially mediated the association between DFP (duration of family poverty) and poor PMA (primary math achievement) in disadvantaged children, after accounting for background characteristics. The present findings consistent with previous research may have social policy implications (e.g., economic support, training for parenting practice) to improve disadvantaged children's PMA (primary math achievement) (Uddin, 2022). Several intervention studies have found that changes in lower income enhance parents' monetary abilities to purchase and provide more stimulating math and learning materials for their children that, in turn, transform disadvantaged children's primary math and reading achievement to a higher income context (Duncan et al., 2011; Dahl & Lochner, 2008). In addition, economic support for lower-income families also save parents' time to invest in their children's math learning activities (e.g., homework, reading, supervision or monitoring, and playing) that, in turn, promote primary school achievement (Uddin, 2023d).

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KEY TERMS AND DEFINITIONS

Duration of Family Poverty: The timing (e.g., day, month or year) of not having enough money to purchase food, clothes, medicine and other necessity (Duncan & Brooks-Gunn, 1997).

Family Investment Model: A process by which we understand how parents invest their valuable resources in child development and education (Kalil & DeLeire, 2004).

Parental Math Monitoring: The parental awareness and watchfulness in the children's math learning activities.

Parental Math Supervision: The parental techniques that involve parents' looking after in their children's math learning activities (Uddin, 2022).

Parental Math Support: The parental math behaviors such as praising math, encouraging math and direct involvement in children's math counting (Lombardi & Dearing, 2020).

Parental Monetary Investment: The ability of parents to provide necessity and educational materials to children.

Parenting Practice: The totality of subjective and objective behaviors through which parents bring up their children (Uddin, 2024).

Parenting: The process of raising, promoting and supporting a child development over time (Uddin, 2024).

Primary Math Achievement: The test scores or GPA obtained in primary mathematics course.

ENDNOTE

[1] Mothers were interviewed in a family setting if the father of the family was absent