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by

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Abstract

This paper investigates the socioeconomic determinants of parenting style in the context of a developing country using early childhood panel data from rural Thailand. Our key findings are that more patient caregivers tend to be more authoritative than authoritarian, caregivers are more likely to be authoritative than authoritarian when they observed better behaviors from their children, and caregivers exhibit more authoritarian than authoritative parenting if they perceived the community to be more dangerous. We also find that families with fewer resources, proxied by wealth, marital status, and parental absence, are more likely to be authoritarian.

Keyword: Parenting style, time preferences, child behavioral problems, community risk factors, developing country

JEL Code: D91; J24; O15

1 Introduction

Many psychological and economic studies have illustrated the important role of parenting style in human capital production. Most of the studies showed that authoritative parenting[1] positively affects child or adolescent outcomes, including social behavior (Casas et al., 2006; Dooley and Stewart, 2007; Fiorini and Keane, 2014; Roopnarine et al., 2006), academic and school performance (Baumrind et al., 2010; Cobb-Clark et al., 2019; Doepke and Zilibotti, 2017; Dornbusch et al., 1987), self-esteem (Zakeri and Karimpour, 2011), and drug use (Calafat et al., 2014). These findings highlight the importance of understanding the socioeconomic determinants of parenting style. This paper belongs to the literature on the determinants of parenting style, suggesting that parenting style is shaped by parent and child characteristics and community environment. Parents' relative risk aversion, marital status, education, ethnicity, income, job characteristics, and financial strain are significantly related to parenting style (e.g., Simons et al., 1990; Coolahan et al., 2002; Goldberg et al., 2002; Darolia and Wydick, 2011; Doepke and Zilibotti, 2017; Cobb-Clark et al., 2019). Another group of studies has shown that parenting style can be affected by children's characteristics such as age, gender, innate ability, cognitive development (e.g., academic achievement, school grades, and IQ scores), and social-emotional development (e.g., irritability and temperament, and behavioral problems) (e.g., van den Boom and Hoeksma, 1994; Burton et al., 2002; Goldberg et al., 2002; Agostinelli et al., 2020). Furthermore, community factors such as income inequality, return to education, redistributive policies, poverty, residential stability, public services, and neighborhood safety are found to significantly influence parenting style (e.g., Pinderhughes et al., 2001; Trentacosta et al., 2008; Doepke and Zilibotti, 2017). While these studies significantly contribute to our understanding of the determinants of parenting style, all of them are from developed countries and none of them provide empirical evidence on the role of caregiver's patience using an incentivized field experiment. This paper extends the literature on the determinants of parenting style to the context of developing countries by

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[1]The definitions of parenting styles discussed in this paper are taken from Baumrind (1966) and Baumrind (1991). Authoritative parents monitor and impart clear standards for their children's conduct; they are assertive but not intrusive or restrictive. Authoritarian parents are obedience- and status-oriented and provide an orderly environment with a clear set of regulations. Permissive parents are lenient, do not require mature behavior, allow for self-regulation, and avoid confrontation.

investigating the effect of child behavioral skills, community risks, and caregivers' time preferences on parenting style. We find that caregivers tend to be more authoritative than authoritarian after observing better behaviors from their children, and conversely, they tend to be more authoritarian than authoritative when they perceive the community as riskier. These findings are in line with the literature on both community risks (e.g., Pinderhughes et al., 2001; Trentacosta et al., 2008), and child behavioral problems (e.g., Maccoby et al., 1984; van den Boom and Hoeksma, 1994; Eisenberg et al., 2008). The former emphasizes the important role of the community environment in the human capital accumulation process, and the latter confirms in the context of developing countries, the relationship between child behavioral problems and parenting style. A novel contribution of the paper is to show that more patient caregivers (a larger discount factor) tend to be more authoritative than authoritarian. To the best of our knowledge, this is the first paper to analyze this relationship using the time discount factor measured through a field experiment. This result is similar to Brenoe and Epper (2019), who also find a negative correlation between parents' time preferences and authoritarian parenting. However, their measure of time preferences was derived from a hypothetical question while ours was from an elicitation task with real monetary payment. For evidence on hypothetical bias, see List and Gallet (2001); Delavande et al. (2011); Bond and Lang (2019). Even though our result is primarily empirical, it also has a theoretical implication of highlighting the important role of parental patience in an economic model of parenting style (e.g., Doepke and Zilibotti, 2017). Our three key findings are that more patient caregivers are more likely to be authoritative than authoritarian, caregivers tend to be more authoritative than authoritarian when they observed better behaviors from their children, and caregivers exhibit more authoritarian than authoritative parenting if they perceived the community to be more dangerous. We also find that families with fewer resources, proxied by wealth, marital status, and parental absence, are more likely to be authoritarian. In our empirical strategy, we conceptualize that each parent practices both authoritative and authoritarian parenting styles but with different intensities. Technically, we treat both styles as latent factors and estimate them using factor analysis. Our main outcome variable is then defined by the log ratio of authoritative and authoritarian indices, capturing the tendency toward authoritative (relative to authoritarian) parenting. We correct for measurement errors using the approach proposed by Heckman et al.

(2013). In addition, the fact that observed child behavioral problems are one year lagged should help mitigate an endogeneity problem due to reverse causality. We also estimate heterogeneous effects with respect to child gender, child age, caregiver relation to the child, and caregiver education, and perform robustness checks in several dimensions.

The remainder of the paper proceeds as follows: Section **??** presents data sources and variable measurements. The empirical strategy is explained in Section **??**. Section **??** reports the main and heterogeneous results, and Section **??** presents the robustness checks. Section **??** concludes the paper.

2 Data and Measurements

2.1 RIECE Panel Data

This study uses early childhood panel data from the Reducing Inequality through Early Childhood Education (RIECE) program. See Chujan and Kilenthong (2021) for a brief description of the project. The data collection began in 2015 and has continued annually ever since. The survey is comprised of two main components, household- and child-related data. The household questionnaire is designed based on the annual Townsend Thai Data survey with additional information on individual labor supply and leisure. The child questionnaire draws from several existing surveys, including the Cohort Study of Thai Children, Denver Developmental Screening Test, World Health Organization Quality of Life, National Educational Panel Study, and Early Childhood Longitudinal Program. The child's primary caregiver was designated as the respondent. If there is more than one sampled child in the household, the caregiver would be interviewed about each child separately. This data set is suitable for our research because it provides detailed information not only on child and household characteristics but also on child behavioral problems as observed by the caregiver, discount factor capturing caregiver time preferences, community risk index, and especially parenting style.

All data in this study come from the RIECE data survey for 2020, except for observed child behavioral problems, which was part of the 2019 survey. The 2020 survey covered 1,394 children ages 5 to 12 years old from 1,213 households. The exclusion of samples with any missing relevant information results in our final sample of 696 children from 627 households. The children in our sample were between 5 to 11 years old at the time of the

survey in 2020, with most of them (86%) between 7 to 10 years old.

2.2   Parenting Style Measurement

The 2020 survey interviewed primary caregiver regarding parenting styles using 34 questions from Robinson et al. (1995), which in turn is based on the conceptualizations of Baumrind (1966) typology of authoritative, authoritarian, and permissive parenting. These questions can be partitioned into 11 sub-dimensions: warmth and involvement, reasoning/induction, democratic participation, good nurtured/easy-going (capturing authoritative), verbal hostility, corporal punishment, non-reasoning/punitiveness, directiveness (capturing authoritarian), and lack of follow-through, ignoring misbehavior and self-confidence (capturing permissive). See the online appendix for the list of all questions.
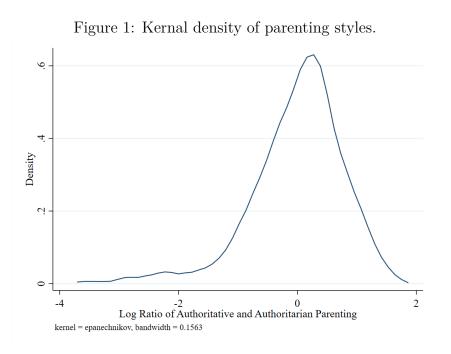
We employ factor analysis technique to deal with measurement errors (as in Cunha and Heckman, 2008). First, each raw score is age-standardized using kernel-weighted local polynomial smoothing (as in Attanasio et al., 2020). Second, we compute the average scores for all 11 sub-dimensions/items of parenting styles. Next, we apply exploratory factor analysis (EFA) to those 11 items. The result indicates that there are only two factors (with eigenvalues larger than one), which can be interpreted as authoritative and authoritarian parenting styles. See the online appendix for the details.

We then estimate the following dedicated measurement system or factor model, in which each item only proxies one latent factor, using a confirmatory factor analysis (CFA) approach (e.g., Gorsuch, 1983; Thompson, 2004).

$$M_j^s = \alpha_j^s + \lambda_j^s \ln \theta^s + \varepsilon_j^s, \text{ for } j = 1 \ldots, J_s, \tag{1}$$

where M_j^s is the average score of item j for parenting style or latent factor s, θ^s is a latent factor s, λ_j^s is a factor loading of item j for factor s, and ε_j^s is a mean zero measurement error term which is assumed to be independent of the latent factors and each other. There are two latent factors or parenting skills in our case, namely authoritative ($J_s = 4$) and authoritarian ($J_s = 4$). All of these latent factors are freely correlated with each other. We normalize the model by setting the factor loading on the first item of each factor as unity; that is, $\lambda_1^s = 1$ for all s (Anderson and Rubin, 1956). See the online appendix for the estimation results. Note that Cronbach's alphas and signal-to-noise ratios indicate that the measurements are internally consistent and informative, respectively. In addition,

both factors are infinitesimally positively correlated with the correlation coefficient of 0.002. Factor scores for both parenting styles were estimated using the Bartlett method (Bartlett, 1937).

Technically, each caregiver will have both authoritative and authoritarian factor scores, θ_i^{at} and θ_i^{ar}, respectively. We conceptualize that parenting practices of each caregiver exhibits both types of parenting but with different intensities. Following Attanasio et al. (2020), we interpret each factor score as the log of the corresponding parenting index in order to ensure that the parenting indices are positive. As a result, the difference of the two factors can then be interpreted as the log ratio of the indices, $\ln\left(\frac{\theta_i^{at}}{\theta_i^{ar}}\right)$, which is our key dependent variable in this study. Figure 1 plots the kernel density of the log ratio of authoritative and authoritarian parenting styles.

Figure 1: Kernal density of parenting styles.

kernel = epanechnikov, bandwidth = 0.1563

2.3 Measuring Time Preferences of Caregiver: Discount Factor

This paper uses discount factor data from Boonmanunt et al. (2022). The data were computed using a field experiment in 2019 based on the price list method (Andersen et al., 2008; Coller and Williams, 1999; Harrison et al., 2002; Sutter et al., 2013). See online appendix B for the price list used in this study. Technically, Boonmanunt et al. (2022) imputed an individual discount factor, β_i, using the following indifference condition

between the sooner reward M_t (next month) and the switching later reward[2] M_{t+1} (next two months) with log utility function:

$$\ln(c_i + M_t) + \beta_i \ln(c_i) = \ln(c_i) + \beta_i \ln(c_i + M_{t+1}) \tag{2}$$

where c_i is per-capita consumption of a household i. Note that M_t and M_{t+1} come from the elicitation task. To account for measurement errors during the experiment, we also control for caregiver's choice consistency, which will be one if caregiver, who performed the elicitation task, switched no more than once, and zero otherwise. See Boonmanunt et al. (2022) for the details. In addition, some of caregivers (178 observations) who participated in the elicitation task were not the ones who answered the parenting styles questionnaire. We therefore added a dummy variable indicating that the caregiver, who answered the questionnaire, performed the task or not (called caregiver-player dummy). This allows us to keep the number of observations in the baseline estimation at maximum. Nevertheless, we also perform a robustness check by dropping those 178 observations.

2.4   Observed Child Behavioral Skills Measurement

Child behavioral skills are measured using the 28 questions of the behavioral problem index (BPI), comprising six sub-dimensions: anxious/depressed, antisocial, headstrong, hyperactive, and peer problems (Peterson and Zill, 1986). This data is part of the 2019 survey. See the online appendix for the complete list of the underlying items. We estimate child behavioral skills using factor analysis as in the case of parenting style. The estimation confirms that all six items can be explained by only one factor, called observed child behavioral skills. A higher score here means less problematic. See the online appendix for estimation results. Note that Cronbach's alphas and signal-to-noise ratios indicate the measurements are internally consistent and informative, respectively.

2.5   Community Risk Factors Measurement

Primary caregivers were interviewed using five questions regarding community risk factors in the 2020 survey. Those questions capture caregivers' perceptions of community

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[2]In practice, each player will choose from discrete choices of the future reward, and therefore we need to approximate the switching value by $\frac{M_{t+1}^{-1} + M_{t+1}^j}{2}$ where M_{t+1}^{-1} and M_{t+1}^{+1} are the reward before and after the player switched.

dangerousness, illegal drug problems, gambling problems, physical violence problems, and smoking problems among children below 15 years of age. We again generate a community risk index using factor analysis as in the case of parenting style without the age-standardization process. The estimation confirms that all five items can be explained by only one factor. A caregiver who perceives that her community is more dangerous should have a higher score on this index. See the online appendix for estimation results. Note that Cronbach's alphas and signal-to-noise ratios indicate that the measurements are internally consistent and informative, respectively.

2.6 Other Covariates

Our additional covariates include household structure (household wealth, child rearing agreement, divorce status, parental absence), child characteristics (age, gender), and caregiver characteristics (age, gender, education, relation to the child, choice consistency, caregiver-player dummy). Since most of these variables are standard, we need to describe only a few of them. Household wealth is constructed using a confirmatory factor analysis (CFA) based on five household assets: pickup trucks, motorcycles, mobile phones, color television, and fans. See the online appendix for the details. The child-rearing agreement is the answer of the primary caregiver to the following question: "Did you and your household members discuss child-rearing/did you jointly agree on child-rearing?". The answer ranges on a 5-point-scale from (1) 'not at all' to (5) 'very much'. Divorce status is one if biological parents were divorced and zero otherwise. Similarly, the parental absence will be one if both of them were away from home for more than six months during the last 12 months and zero otherwise. See Table 1 for summary statistics of all key variables.

2.7 Attrition Bias

As noted above, the 2020 RIECE survey consist of 1,394 children but our baseline sample has only 696 observations.[3] Filtering all missing data leads to almost 50% attrition rate. This subsection investigates whether the attrition is systematic or not. Technically, we regress each variable on a dummy variable that takes the value of one if the observation is missing, and zero otherwise. The results in Table 2 show that only two out of 17

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[3] An attrition rates of parenting styles and community risk factors is about 29%, discount factor is roughly 30%, and child behavioral skills is approximately 21%.

Table 1: Summary Statistics.

Variables	Mean	Std. Dev.	Min	Max
Panel A: Parenting Styles				
Log of Authoritative	0.000	0.601	-2.072	1.182
Log of Authoritarian	0.000	0.774	-1.705	2.806
Panel B: Key Explanatory Variables				
Log of Discount Factor	-0.299	0.299	-0.738	-0.021
Observed Child Behavioral Skills	0.000	0.648	-3.271	0.995
Community Risk Index	0.000	0.659	-0.804	1.686
Panel C: Other Covariates				
Household Wealth	0.000	0.484	-1.091	1.594
Child Rearing Agreement	2.009	1.540	1.000	5.000
Divorced	0.379	0.486	0	1
Parental Absence	0.473	0.500	0	1
Child Age (Months)	97.32	15.62	58	132
Child Gender (Female)	0.489	0.500	0	1
Caregiver Age (Years)	51.59	12.58	23	88
Caregiver Gender (Female)	0.878	0.328	0	1
Caregiver Years of Schooling	7.247	3.711	0	19
Caregiver as Father/Mother	0.276	0.447	0	1
Caregiver-player Dummy	0.744	0.437	0	1
Consistent Discounting	0.747	0.435	0	1

Note: Number of observations is 696. Household wealth is captured through CFA and is measured by the number of household assets including pickup trucks, motorcycles, mobile phones, color TVs, and fans (See the online appendix for the results of the EFA and CFA processes, respectively).

variables are statistically significant, namely authoritative parenting score and caregiver-player dummy. The positive signs of both estimation coefficients imply that we tend to drop samples whose authoritative parenting scores are relatively higher, and who both performed the elicitation task and answered the parenting styles questionnaire.

Table 2: Estimation results for regression of each variable on the attrition dummy.

Variables	Est. Coeff.	P-value	Obs.
Panel A: Parenting Styles			
Log of Authoritative	0.089	0.037**	989
Log of Authoritarian	-0.027	0.797	989
Panel B: Explanatory Variables			
Log of Discount Factor	-0.010	0.649	971
Observed Child Behavioral Skills	0.040	0.340	1097
Community Risk Factors	-0.011	0.799	990
Panel C: Other Covariates			
Wealth	-0.003	0.918	1391
Child Rearing Agreement	0.093	0.386	990
Divorced	-0.034	0.184	1383
Parental Absence	-0.040	0.138	1391
Child Age (Months)	1.128	0.188	1388
Child Gender (Female)	-0.010	0.706	1390
Caregiver Age (Years)	0.597	0.391	1388
Caregiver Gender (Female)	-0.015	0.416	1383
Caregiver Years of Schooling	-0.142	0.484	1371
Caregiver is Father/Mother	0.008	0.753	1391
Caregiver-player Dummy	0.072	0.029**	971
Consistent Discounting	-0.016	0.610	975

Note: Robust standard errors are in parentheses. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

3 Empirical Model

This paper employs the following linear regression model to investigate the association between parenting styles and covariates.

$$\ln\left(\frac{\theta_i^{at}}{\theta_i^{ar}}\right) = \gamma_0 + \gamma_1 \ln \hat{\beta}_{i,-1} + \gamma_2 CD_{i,-1} + \gamma_3 CR_i + \boldsymbol{\gamma_4 X}_i + \varepsilon_i, \tag{3}$$

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where θ_i^{at} and θ_i^{ar} are authoritative and authoritarian parenting indices for child i, respectively. As discussed earlier, the dependent variable here is the log ratio of authoritative and authoritarian indices, interpreted as the tendency toward authoritative parenting (relative to the authoritarian). In other words, a family with a higher value of the dependent variable would be more authoritative than authoritarian parenting. Key factors of interest are household discount factor in last year, $\hat{\beta}_{i,-1}$, observed child behavioral skills in last year, $CD_{i,-1}$, and community risk index, CR_i. Other covariates are represented by $\boldsymbol{X}_i$ and ε_i is an error term. Note that one-year lag of child behavioral skills should help reduce a reverse causality bias since the current child behavioral skills could potentially affect and be affected by parenting styles.

We correct for the measurement error introduced from using predicted values of the latent factors as explanatory variables following Heckman et al. (2013). The standard errors are estimated using bootstrap technique with 1,000 replications. This should help mitigate the measurement errors problem that arises from employing factor analysis to predict factor scores for child behavioral skills, community risk index, and household wealth. We also report estimation results from the ordinary least square regression (OLS) for comparison. In addition, we estimate heterogeneous effects with respect to child gender, child age, caregiver's relation to the child and caregiver's education, and perform robustness checks in several dimensions.

4   Empirical Results

This section presents the baseline results, heterogeneous effects, and robustness checks. Even though our discussion primarily focuses on the three variables of interest, namely the discount factor, observed child behavioral skills in the last period, and community risk index, we occasionally discuss the impact of other factors as well.

4.1   Baseline Results

Our first key finding is that patient caregivers (with larger discount factor) tend to exhibit more authoritative than authoritarian parenting. See the first row of Table 3. In particular, the estimated coefficients of the log of discount factor with and without cor-

rection are both significant but slightly different.[4] For the baseline case, a one percent increase in the discount factor is associated with an approximately 0.21 percent rise in the ratio of authoritative and authoritarian indices. To the best of our knowledge, this result is the first empirical evidence confirming the positive relationship between a caregiver's patience and the tendency toward authoritative parenting using the data from a field experiment. This result is similar to the one in Brenoe and Epper (2019), who measure time preferences using a hypothetical question. We believe that previous research could not perform this analysis because there was no data set containing measures of both parenting style and time discount factor from a field experiment. Nevertheless, the description of authoritative and authoritarian parenting in the literature is consistent with our empirical result. While authoritarian parents are associated with having little patience for disobedience (Tancred and Greeff, 2015), authoritative parenting requires more patience and effort (Robinson et al., 1995).

Table 3: Baseline estimation results with and without correction.

	OLS with Correction	OLS without Correction
Discount Factor	0.2147**	0.2214**
	(0.1092)	(0.1033)
Child Behavioral Skills	0.1516**	0.1799**
	(0.0631)	(0.0715)
Community Risk Factors	-0.1086***	-0.1521***
	(0.0334)	(0.0451)
Wealth	0.1087*	0.1277**
	(0.0571)	(0.0617)
Divorced	-0.1270**	-0.1254**
	(0.0634)	(0.0610)
Parental Absence	-0.1175*	-0.1141*
	(0.0713)	(0.0675)

Note: Standard errors for OLS with correction result from 1,000 bootstrap replications while for OLS without correction are robust standard errors. Both standard errors are in parentheses. *, **, *** denote significance at 10%, 5%, and 1%, respectively. Number of Observations is 696. See online appendix for the complete results.

The next main finding is that caregivers tend to be more authoritative than authoritarian after observing better behaviors from their children. An increase of the behavioral

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[4]The difference results from applying the error correction approach of Heckman et al. (2013), which affects both estimation coefficients and standard errors.

skills index by one unit of its standard deviation is associated with a 0.1516 percent rise in the ratio of authoritative and authoritarian indices. This effect is slightly larger than the effect of wealth index. This implies that observed child behavioral skills and wealth are equally important in determining the parenting styles of caregivers. See the second row of Table 3. In other words, when an average parent observed the child being less anxious/depressed, antisocial, headstrong, hyperactive, dependent, and/or having peer problems, they would be more involved and democratic but less verbally hostile and punishing. This finding aligns with the literature from developed countries (e.g., Maccoby et al., 1984; van den Boom and Hoeksma, 1994; Eisenberg et al., 2008). This negative response to children problematic behaviors may result from parents' disutility generated by misbehaving children (van den Boom and Hoeksma, 1994).

The third key finding is that community risks are positively correlated with authoritarian parenting. An increase of the community risks index by one unit of its standard deviation is associated with a 0.1086 percent fall in the ratio of authoritative and authoritarian indices. This effect is roughly the same as the effect of wealth index. This implies that community risks and wealth are equally important in determining the parenting styles of caregivers. See the third row of Table 3. In other words, caregivers, who perceive that their community is dangerous, tend to exhibit more authoritarian than authoritative parenting. This suggests that parents would be more verbally hostile and punishing when they perceive that the community is more dangerous with respect to drug use, gambling, physical violence, and smoking among children below 15 years of age. One potential explanation is that when caregivers perceive their neighborhood to be dangerous, to cope with their concern about the child's future, they would adopt authoritarian parenting that emphasizes discipline and control. Furthermore, this result is in line with the literature, e.g., Pinderhughes et al. (2001); Trentacosta et al. (2008), which suggests that community risks may tax a caregiver's coping resources and ability to gather the energy necessary to be warm, thus reducing parental nurture and involvement and, therefore, push them toward authoritarian parenting. To the best of our knowledge, our result is the first empirical evidence from rural areas in a developing country.

The impacts of other covariates are discussed next. First, less wealthy families tend to exhibit more authoritarian than authoritative parenting. See the fourth row of Table 3. Second, a family with divorced parents or no parents at home is more likely to be

authoritarian. See the fifth and sixth rows of Table 3. These results suggest that the scarcity of resources can be a key factor pushing parents toward authoritarian parenting.

4.2 Heterogeneous Effects

This subsection answers whether caregiver's time preferences, child behavioral skills and community risks affect parenting style differently across subgroups, including child gender, child age, caregiver's relation to the child, and caregiver's education. Technically, we estimate the baseline model for each subgroup separately.

The estimates reported in panel A of Table 4 show that the impacts of caregiver's time preferences and child behavioral skills on parenting style are different for boys and girls. In particular, parenting choices for boys are relatively more sensitive with respect to caregiver's time preferences but less sensitive with respect to child behavioral skills. On the other hand, their choices for boys and girls are equally sensitive with respect to community risks. These heterogeneous effects in the context of Thailand can be explained in the following manner. Thai parents tend to believe that raising a girl is easier and therefore requires less patience and effort. In addition, Thai social norm requires that girls should behave well all the time, and therefore, caregivers would be more sensitive to child behavioral skills for girls than boys.

The next part is the estimation results for a group of children younger than 8.5 years old and the older group. The results in panel B of Table 4 indicate that the effects of caregiver's time preferences and community risks on parenting style are different for younger and older children. In particular, parenting decision for the younger is more sensitive with respect to caregiver's time preferences but less responsive to community risks. On the other hand, the decision for younger and older children is equally sensitive to child behavioral skills. The heterogeneous effect with respect to child age for time preferences is reasonable since raising young children requires closer supervision (Trentacosta et al., 2008); thus, it may require more patience. The effect for community risks is also sensible since measures of neighborhood danger are more relevant to adolescent behaviors, e.g., smoking, drug and gambling (Worthman et al., 2016).

Panel C of Table 4 presents the heterogeneous effects with respect to caregiver's education. The results indicate that heterogeneity is found for child behavioral skills and community risks while the effect of caregiver's time preferences is uniform across

Table 4: Heterogeneous effects by child gender, child age, caregiver education and caregiver relation to child using OLS with correction.

Panel A: Child Gender	Male	Female
Discount Factor	0.2954*	0.0765
	(0.1575)	(0.1254)
Child Behavioral Skills	0.0889	0.2182***
	(0.1148)	(0.0654)
Community Risk Factors	-0.1184**	-0.0883**
	(0.0534)	(0.0446)
N	356	340
Panel B: Child Age	Younger (< 8.5 years)	Older
Discount Factor	0.2629*	0.1087
	(0.1352)	(0.1431)
Child Behavioral Skills	0.1416*	0.1999**
	(0.0821)	(0.0974)
Community Risk Factors	-0.0802**	-0.1438**
	(0.0408)	(0.0602)
N	397	299
Panel C: Caregiver's Education	Primary or Below	Above Primary
Discount Factor	0.2169*	0.2396
	(0.1313)	(0.1998)
Child Behavioral Skills	0.1092	0.2121*
	(0.0791)	(0.1096)
Community Risk Factors	-0.1626***	-0.0155
	(0.0449)	(0.2048)
N	433	263
Panel D: Caregiver's Relation to Child	Father/Mother	Others
Discount Factor	0.5212*	0.0700
	(0.2751)	(0.1135)
Child Behavioral Skills	0.1018	0.1542**
	(0.1387)	(0.0718)
Community Risk Factors	-0.0748	-0.1233***
	(0.6853)	(0.0416)
N	190	504

Note: Standard errors, reported in parentheses, are from 1,000 bootstrap replications. *, **, *** denote significance at 10%, 5%, and 1%, respectively. See online appendix for the complete results.

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subgroups. In particular, we found that parenting style decision for higher educated caregivers (above primary level) is more responsive to child behavioral skills but less sensitive to community risks. This reflects the fact that more educated parents are better equipped to understand and respond to child behavioral skills and also are more resourceful to deal with community risks.

The heterogeneous effects with respect to the caregiver's relationship to the child, shown in the last panel of Table 4, imply that the effects of all three variables are different for a group of children whose primary caregivers were father or mother and the other group (mostly grandmothers). The result implies that non-biological caregivers choose their parenting styles based on their external observations (of child behaviors and community risks) more than the biological ones. In particular, parenting style decision for biological parents is more sensitive with respect to their time preferences but less responsive to child behavioral skills and community risks. Unfortunately, we cannot explain these patterns yet.

5 Robustness Checks

This section presents estimation results with changes in a couple of dimensions for robustness checks. The overall results confirm the baseline results indicating that caregivers will be more likely to exhibit more authoritative (relative to authoritarian) parenting if their discount factors are larger, they observe better behaviors from their children, and they perceive that their neighborhoods are less dangerous to children.

First, we estimate the model using structural equation modeling (SEM), which is a maximum likelihood method with normality assumptions. This approach can automatically deal with measurement errors which result from predicting factor scores of explanatory variables. The estimation results are reasonably close to the baseline results with correction. Compare the first and second columns of Table 5.

Second, we restricted the sample to children whose caregivers answered the questionnaire (including for parenting styles) and also performed the elicitation task relating to time preferences (dropping 178 observations whose caregiver-player dummy equals zero). The estimates in the third column of Table 5 are quite comparable with the baseline in the first column except for the insignificance of child behavioral skills.

Third, we change the outcome from the log ratio to a binary variable, which equals

Table 5: Estimation results for structural equation modeling (SEM), restricted sample, and logistic regression.

	Baseline (1)	SEM (2)	Restricted Sample (3)	Logit (4)
Discount Factor	0.2147**	0.2275**	0.2809**	0.3477
	(0.1092)	(0.1010)	(0.1175)	(0.2848)
Child Behavioral Skills	0.1516**	0.1292**	0.0923	0.5400***
	(0.0631)	(0.0556)	(0.0706)	(0.2074)
Community Risk Factors	-0.1086***	-0.1812***	-0.1016***	-0.3681***
	(0.0334)	(0.0538)	(0.0337)	(0.1216)
Wealth	0.1087*	0.1716*	0.1070	0.2333
	(0.0571)	(0.0882)	(0.0696)	(0.1796)
Divorced	-0.1270**	-0.1243**	-0.1019	-0.2573
	(0.0634)	(0.0633)	(0.0683)	(0.1735)
Parental Absence	-0.1175*	-0.1027	-0.1504**	-0.2862
	(0.0713)	(0.0761)	(0.0757)	(0.2031)
N	696	696	518	696

Note: Standard errors for the baseline and restricted samples (OLS with correction) result from 1,000 bootstrap replications while for the logit regression are robust standard errors. Standard errors are in parentheses. *, **, *** denote significance at 10%, 5%, and 1%, respectively. See online appendix for the complete results.

one if the log ratio is larger than zero and zero otherwise. As a result, about 56% of caregivers in our sample are classified as authoritative and the remaining as authoritarian. Then, we estimate the model using a logistic regression. The non-linearity nature of logistic regression implies that it is not reasonable to compare the magnitude of estimation coefficients with the baseline, which is a linear model.[5] Qualitatively, the results shown in the fourth column of Table 5 are similar to the baseline; that is, the estimated coefficients for the log of discount factor and child behavioral skills are positive while it is negative for community risks. Though, the coefficient for the log of discount factor is insignificant here.

6 Conclusion

This paper explores factors determining the parenting style choices of primary caregivers using early childhood panel data from rural Thailand. We focus on the roles of three variables, including the caregiver's time preference (measured by discount factor), child behavioral skills observed by the caregiver, and community risk factors. In our empirical strategy, we construct our dependent variable as the log ratio of authoritative and authoritarian indices, reflecting parents' tendency toward authoritative relative to authoritarian parenting. We estimate our empirical model using ordinary least square regression (OLS) with correction for measurement errors arising from using predicted factor scores (as in Heckman et al., 2013).

The availability of caregiver time preferences, collected through a field experiment, enables us to be the first to empirically establish its positive relationship with parents' tendency to be more authoritative than authoritarian. This is a novel contribution of our paper. This finding also adds to the economic literature by emphasizing that the discount factor, a preference parameter, is fundamental to individual/household decision-making, including parenting style choices. Another key contribution is the empirical finding showing a positive association between caregivers' perception of community risks and authoritarian parenting. This emphasizes the important role of the community environment in the human capital accumulation process. In addition, we found that caregivers tend to be more authoritative than authoritarian after observing their children with less behav-

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[5]The non-linearity also makes it impossible to apply the correction method of Heckman et al. (2013), which can be applied to a linear model only.

ioral problems. It is also noteworthy that our study is one of the first to explore these relationships in the context of developing countries.

Our paper has some important implications. First, since caregivers with a higher discount factor (more patient) have a higher tendency toward authoritative parenting, which is widely found to be related to higher child human capital production (Dornbusch et al., 1987; Roopnarine et al., 2006; Casas et al., 2006; Zakeri and Karimpour, 2011; Fiorini and Keane, 2014; Doepke and Zilibotti, 2017), it may be important to nurture this quality in future parents/caregivers. Second, the significant impact of observed child behavioral skills on parenting styles implies that a potential intervention is to educate parents/caregivers on how to observe and evaluate child development. Parents with a more accurate measurement of child development should be able to make more effective parenting decisions. Third, we find that caregivers tend to be more authoritarian in response to higher community risks, and authoritarian parenting leads to risky behaviors (Clausen, 1996; Radziszewska et al., 1996; Moreno-Ruiz et al., 2018; Zuquetto et al., 2019). One potential consequence of this finding could be that it creates a vicious cycle where community risk feeds harsh parenting, and this form of parenting, in turn, results in more risky behaviors in children. Therefore, it is important to equip caregivers with proper and various tools to deal with community risks rather than relying on authoritarian parenting only.

The main limitation of this study is that the estimation results so far should be interpreted as correlation and not causality. It would be interesting to perform a randomized controlled trial where the treatment is a parenting education program, aiming to encourage caregivers to be more patient. This should be able to uncover a causal relationship between caregivers' time preferences and their parenting style choices.

References

Agostinelli, F., Doepke, M., Sorrenti, G., and Zilibotti, F. (2020). It takes a village: The economics of parenting with neighborhood and peer effects. *SSRN Electronic Journal.*

Andersen, S., Harrison, G. W., Lau, M. I., and Rutström, E. E. (2008). Eliciting risk and time preferences. *Econometrica*, 76(3):583–618.

Anderson, T. W. and Rubin, H. (1956). Statistical inference in factor analysis. In *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability*, volume 5, pages 111–150.

Attanasio, O., Cattan, S., Fitzsimons, E., Meghir, C., and Rubio-Codina, M. (2020). Estimating the production function for human capital: Results from a randomized controlled trial in colombia. *American Economic Review*, 110:48–85.

Bartlett, M. S. (1937). The statistical conception of mental factors. *British Journal of Psychology. General Section*, 28:97–104.

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development*, 37:887.

Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *The journal of early adolescence*, 11(1):56–95.

Baumrind, D., Larzelere, R. E., and Owens, E. B. (2010). Effects of preschool parents' power assertive patterns and practices on adolescent development. *Parenting*, 10:157–201.

Bond, T. and Lang, K. (2019). The sad truth about happiness scales. *Journal of Political Economy*, 127(4):1629–1640.

Boonmanunt, S., Jantorn, W., Khruapradit, V., and Kilenthong, W. T. (2022). Intergenerational transmission of time preferences: An evidence from rural thailand. *Working Paper.*

Brenoe, A. A. and Epper, T. (2019). Parenting values moderate the intergenerational transmission of time preferences. *Working Paper.*

Burton, P., Phipps, S., and Curtis, L. (2002). All in the family: A simultaneous model of parenting style and child conduct. *American Economic Review*, 92:368–372.

Calafat, A., García, F., Juan, M., Becoña, E., and Fernández-Hermida, J. R. (2014). Which parenting style is more protective against adolescent substance use? evidence within the european context. *Drug and Alcohol Dependence*, 138:185–192.

Casas, J. F., Weigel, S. M., Crick, N. R., Ostrov, J. M., Woods, K. E., Yeh, E. A., and Huddleston-Casas, C. A. (2006). Early parenting and children's relational and physical aggression in the preschool and home contexts. *Journal of Applied Developmental Psychology*, 27:209–227.

Chujan, W. and Kilenthong, W. T. (2021). Short-term impact of an early childhood education intervention in rural thailand. *Journal of Human Capital*, 15(2):269–290.

Clausen, S.-E. (1996). Parenting styles and adolescent drug use behaviours. *Childhood*, 3(3):403–414.

Cobb-Clark, D. A., Salamanca, N., and Zhu, A. (2019). Parenting style as an investment in human development. *Journal of Population Economics*, 32(4):1315–1352.

Coller, M. and Williams, M. B. (1999). Eliciting individual discount rates. *Experimental Economics*, 2(2):107–127.

Coolahan, K., McWayne, C., Fantuzzo, J., and Grim, S. (2002). Validation of a multidimensional assessment of parenting styles for low-income african-american families with preschool children. *Early Childhood Research Quarterly*, 17:356–373.

Cunha, F. and Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. *Journal of Human Resources*, 43:738–782.

Darolia, R. and Wydick, B. (2011). The economics of parenting, self-esteem and academic performance theory and a test. *Economica*, 78:215–239.

Delavande, A., Giné, X., and McKenzie, D. (2011). Measuring subjective expectations in developing countries: A critical review and new evidence. *Journal of Development Economics*, 2(94):151–163.

Doepke, M. and Zilibotti, F. (2017). Parenting with style: Altruism and paternalism in intergenerational preference transmission. *Econometrica*, 85:1331–1371.

Dooley, M. and Stewart, J. (2007). Family income, parenting styles and child behavioural-emotional outcomes. *Health Economics*, 16:145–162.

Dornbusch, S. M., Ritter, P. L., Leiderman, P. H., Roberts, D. F., and Fraleigh, M. J. (1987). The relation of parenting style to adolescent school performance. *Cognitive and Moral Development, Academic Achievement in Adolescence*, 58:276–289.

Eisenberg, N., Hofer, C., Spinrad, T. L., Gershoff, E., Valiente, C., Losoya, S., Zhou, Q., Cumberland, A., Liew, J., Reiser, M., Maxon, E., J. G., S., and Darling, N. (2008). Understanding mother-adolescent conflict discussions: Concurrent and across-time prediction from youths' dispositions and parenting. *Monographs of the Society for Research in Child Development*, 73:vii–viii.

Fiorini, M. and Keane, M. P. (2014). How the allocation of children's time affects cognitive and noncognitive development. *Journal of Labor Economics*, 32(4):787–836.

Goldberg, W. A., Clarke-Stewart, K. A., Rice, J. A., and Dellis, E. (2002). Emotional energy as an explanatory construct for fathers' engagement with their infants. *Parenting*, 2:379–408.

Gorsuch, R. L. (1983). *Factor analysis*. Psychology Press, New York.

Harrison, G. W., Lau, M. I., and Williams, M. B. (2002). Estimating individual discount rates in denmark: A field experiment. *American Economic Review*, 92(5):1606–1617.

Heckman, J., Pinto, R., and Savelyev, P. (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *American Economic Review*, 103:2052–2086.

List, J. A. and Gallet, C. A. (2001). What experimental protocol influence disparities between actual and hypothetical stated values? *Environmental and resource economics*, 20(3):241–254.

Maccoby, E. E., Snow, M. E., and Jacklin, C. N. (1984). Children's dispositions and mother-child interaction at 12 and 18 months: A short-term longitudinal study. *Developmental Psychology*, 20:459–472.

Moreno-Ruiz, D., Estévez, E., Jiménez, T. I., and Murgui, S. (2018). Parenting style and reactive and proactive adolescent violence: Evidence from spain. *International Journal of Environmental Research and Public Health*, 15.

Peterson, J. L. and Zill, N. (1986). Marital disruption, parent-child relationships, and behavior problems in children. *Journal of Marriage and the Family*, pages 295–307.

Pinderhughes, E. E., Nix, R., Foster, E. M., and Jones, D. (2001). Parenting in context: Impact of neighborhood poverty, residential stability, public services, social networks, and danger on parental behaviors. *Journal of Marriage and Family*, 63:941–953.

Radziszewska, B., Richardson, J. L., Dent, C. W., and Flay, B. R. (1996). Parenting style and adolescent depressive symptoms, smoking, and academic achievement: ethnic, gender, and ses differences. *Journal of Behavioral Medicine*, 19:289–305.

Robinson, C. C., Mandleco, B., Olsen, S. F., and Hart, C. H. (1995). Authoritative, authoritarian, and permissive parenting practices: Development of a new measure. *Psychological Reports*, 77:819–830.

Roopnarine, J. L., Krishnakumar, A., Metindogan, A., and Evans, M. (2006). Links between parenting styles, parent-child academic interaction, parent-school interaction, and early academic skills and social behaviors in young children of english-speaking caribbean immigrants. *Early Childhood Research Quarterly*, 21:238–252.

Simons, R. L., Whitbeck, L. B., Conger, R. D., and Melby, J. N. (1990). Husband and wife differences in determinants of parenting: a social learning and exchange model of parental behavior. *Journal of Marriage and the Family*, 52:375.

Sutter, M., Kocher, M. G., Glätzle-Rützler, D., and Trautmann, S. T. (2013). Impatience and uncertainty: Experimental decisions predict adolescents' field behavior. *American Economic Review*, 103(1):510–31.

Tancred, E.-M. and Greeff, A. P. (2015). Mothers' parenting styles and the association with family coping strategies and family adaptation in families of children with adhd. *Clinical Social Work Journal*, 43(4):442–451.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* Applied Psychological Measurement, Washington, DC.

Trentacosta, C. J., Hyde, L. W., Shaw, D. S., Dishion, T. J., Gardner, F., and Wilson, M. (2008). The relations among cumulative risk, parenting, and behavior problems during early childhood. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 49:1211–1219.

van den Boom, D. C. and Hoeksma, J. B. (1994). The effect of infant irritability on mother-infant interaction: A growth-curve analysis. *Developmental Psychology*, 30:581–590.

Worthman, C. M., Tomlinson, M., and Rotheram-Borus, M. J. (2016). When can parents most influence their child's development? expert knowledge and perceived local realities. *Social Science & Medicine*, 154:62–69.

Zakeri, H. and Karimpour, M. (2011). Parenting styles and self-esteem. *Procedia - Social and Behavioral Sciences*, 29:758–761. The 2nd International Conference on Education and Educational Psychology 2011.

Zuquetto, C. R., Opaleye, E. S., Feijó, M. R., Amato, T. C., Ferri, C. P., and Noto, A. R. (2019). Contributions of parenting styles and parental drunkenness to adolescent drinking. *Brazilian Journal of Psychiatry*, 41:511.

Roles of Caregiver Time Preferences, Child Behavioral Problems and Community Risks on Parenting Style

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This online appendix contains supplementary materials for the paper titled "Roles of Caregiver Time Preferences, Child Behavioral Problems and Community Risks on Parenting Style" by Ahmad Shabir Faizi and Weerachart T. Kilenthong.

A   Parenting Styles Measurements

Tables A.1, A.1 and A.1 report the survey questions for authoritative, authoritarian, and permissive parenting styles. We employ factor analysis technique to deal with measurement errors (as in Cunha and Heckman, 2008). First, each raw score is age-standardized using kernel-weighted local polynomial smoothing (as in Attanasio et al., 2020). Second, we compute the average scores for all 11 sub-dimensions/items of parenting styles. Next, we apply exploratory factor analysis (EFA) to those 11 items. Note that in this paper, three conditions for extracting a factor are applied: (1) only factors with eigenvalues greater than one are extracted; (2) we retain items with loadings of at least 0.4 to ensure that convergence is achieved and exceeds the second-highest factor loading by 0.1 to avoid cross-loaded measures; (3) we need at least three measures for each factor to achieve identification. Tables A.4 reports the results of the exploratory factor analysis (EFA). The EFA process allows us to extract two factors corresponding to authoritative and authoritarian parenting. We then estimate the dedicated measurement system or factor model, in which each item only proxies one latent factor, using a confirmatory factor analysis (CFA) approach (e.g., Gorsuch, 1983; Thompson, 2004). Table A.5 reports the results of confirmatory factor analysis (CFA), and Cronbach's alphas and signal-to-noise

ratios for each factor. Note that the latent factors are freely correlated with each other in the CFA process.

Table A.1: Authoritative parenting styles.

Warmth and Involvement

[I know] the names of our child's friends.

[I am] aware of problems or concerns about our child in school.

[I give praise] when our child is good.

[I express] affection by hugging, kissing, and holding our child.

Reasoning/ Induction

[I explain] the consequences of the child's behavior.

[I give] our child reasons why rules should be obeyed.

[I emphasize] the reasons for rules.

Democratic Participation

[I take] into account our child's preferences in making plan for the family.

[I allow] our child to give input into family rules.

[I take] our child's desires into account before asking the child to do something.

Good Nurtured/ Easy Going

[I am] easy-going and relaxed with our child.

[I show] patience with our child.

[I joke and play] with our child.

Table A.2: Authoritarian parenting styles.

Verbal Hostility

[I explode] in anger towards our child.

[I yell or shout] when our child misbehaves.

[I argue] with our child.

Corporal Punishment

[I use] physical punishment as a way of disciplining our child.

[I spank] when our child is disobedient.

[I slap] our child when the child misbehaves.

Non-reasoning/ Induction and Punitiveness

[I punish] by taking privileges away from our child with little if any explanations.

[I punish] by putting our child off somewhere alone with little if any explanations.

When our child asks why (he)(she) has to conform, [I state]: because I said so, or I am your parent, and I want you to.

Directiveness

[I tell] our child what to do.

[I demand] that our child does/do things.

[I scold and criticize] to make our child improve.

Table A.3: Permissive parenting styles.

Lack of follow-through

[I state] punishments to our child and does not actually do them.

[I threaten] our child with punishment more often than actually giving it.

[I spoil] our child.

Ignoring Misbehavior

[I allow] our child to interrupt others.

[I allow] our child to annoy someone else.

[I ignore] our child's misbehavior.

Self-confidence

[I appear] confident about parenting abilities.

[I appear] unsure on how to solve our child's misbehavior.

[I find] it difficult to discipline our child.

Table A.4: Exploratory factor analysis for parenting styles.

Sub-dimensions	Factor 1	Factor 2	Factor 3
Authoritative			
Warmth and Involvement	-0.043	0.535	0.030
Reasoning/ Induction	-0.033	0.736	0.044
Democratic Participation	0.031	0.703	0.054
Good Nurtured/ Easy Going	-0.207	0.436	0.281
Authoritarian			
Verbal Hostility	0.614	-0.019	0.116
Corporal Punishment	0.682	-0.039	-0.053
Non-reasoning/ Induction and Punitiveness	0.672	0.037	0.057
Directiveness	0.417	0.270	0.255
Permissive			
Lack of follow-through	0.123	0.196	0.427
Ignoring Misbehavior	0.610	-0.136	-0.041
Self-confidence	0.086	-0.012	0.095
Eigenvalues	1.908	1.646	0.362

Note: All items are age-standardized as well as standardized to have mean 0 and standard deviation of 1 before running EFA. Number of observations is 696.

Table A.5: Confirmatory factor analysis for parenting styles.

Factor 1: Authoritative		
Sub-dimensions	Loading	Signal-to-Noise
Warmth and Involvement	1.0000	0.3739
Reasoning/ Induction	1.4853	0.6056
Democratic Participation	1.4061	0.5766
Good Nurtured/ Easy Going	0.8394	0.2833
Cronbach's Alpha	0.720	

Factor 2: Authoritarian		
Sub-dimensions	Loading	Signal-to-Noise
Verbal Hostility	1.0000	0.4896
Corporal Punishment	1.0788	0.5345
Non-reasoning/ Induction and Punitiveness	0.9578	0.4868
Directiveness	0.6710	0.2853
Cronbach's Alpha	0.707	

Root mean squared error of approximation (RMSEA)		0.095
Comparative fit index (CFI)		0.898
Tucker-Lewis index (TLI)		0.850

Note: Number of observations is 696.

B   A Brief Description of an Elicitation Task of Time Preferences

This section is a brief description of an experimental task that was used to elicit caregiver time preferences. See Boonmanunt et al. (2022) for the details. An interviewer asked participants to choose between the sooner reward $M_t = 100$ Thai Baht (THB) in a month and a later larger reward M_{t+1} in two months with six different scenarios as shown in Table A.6.

Table A.6: Price list for time preferences elicitation task

Decision	Option A THB next month		Option B THB in 2 months
1	100	or	105
2	100	or	110
3	100	or	120
4	100	or	130
5	100	or	150
6	100	or	200

C   Child Behavioral Skills, Community Risk and Wealth Measurements

Table A.7 reports the survey questions on the child behavioral problems. We estimate child behavioral skills (reverse coded child behavioral problems), community risk index and wealth index using factor analysis as in the case of parenting style. Table A.8 reports the results of EFA conducted separately for each factor. Note that, unlike child behavioral skills and parenting styles, we do not age-standardize the items for community risk factors and wealth before performing EFA. Table A.9 reports the CFA results, Cronbach's Alphas, and signal-to-noise ratios for child behavioral skill, community risk factors, and wealth. Note that the latent factors are freely correlated with each other in the CFA process.

Table A.7: Child behavioral problems.

Sub-dimensions	Description
Anxious/Depressed	Has sudden changes in mood or feeling
	Feels/complains no one loves him/her
	Is too fearful or anxious
	Feels worthless or inferior
	Is unhappy, sad, or depressed
Antisocial	Cheats or tells lies
	Bullies or is cruel/mean to others
	Does not seem to feel sorry after misbehaving
	Breaks things deliberately
	Is disobedient at school
	Has trouble getting along with teachers
Headstrong	Is rather high strung, tense, and nervous
	Argues too much
	Is disobedient at home
	Is stubborn, sullen, or irritable
	Has strong temper and loses it easily
Hyperactive	Has difficulty concentrating/paying attention
	Is easily confused, seems in a fog
	Is impulsive or acts without thinking
	Has trouble getting mind off certain thoughts
	Is restless, overly active, cannot sit still
Peer Problems	Has trouble getting along with other children
	Is not liked by other children
	Is withdrawn, does not get involved with others
Dependent	Clings to adults
	Cries too much
	Demands a lot of attention
	Is too dependent on others

Table A.8: Exploratory factor analysis for child behavioral skills, community risk factors, and wealth.

Child Behavioral Skills		
Sub-dimensions (items)	Factor 1	Factor 2
Anxious/ Depressed	0.594	-0.005
Antisocial	0.639	0.040
Headstrong	0.758	-0.046
Hyperactive	0.724	0.024
Peer Problems	0.453	0.102
Dependent	0.513	-0.101
Eigenvalues	2.328	0.025

Community Risk Factors		
Items	Factor 1	Factor 2
community dangerousness	0.602	0.116
drug problems in community	0.763	0.111
gambling in community	0.732	-0.103
physical voilance	0.654	-0.139
Smoking for children below 15 years of age	0.703	0.017
Eigenvalues	2.402	0.056

Wealth		
Items	Factor 1	Factor 2
Pickup truck	0.416	0.179
Motorcycle	0.574	-0.158
Mobile Phone	0.693	0.035
Color TV	0.547	0.108
Fan	0.432	-0.155
Eigenvalues	1.469	0.094

Note: For child behavoiral skills, all items are age-standardized before running EFA. All items are standardized to have mean 0 and standard deviation of 1 before running EFA for all three factors. Number of observations is 696.

Table A.9: Confirmatory factor analysis for child behavioral skills, community risk factor, and wealth.

Child Behavioral Skills		
Sub-dimensions (items)	Loading	Signal to Noise
Anxious/ Depressed	1.0000	0.4083
Antisocial	1.1117	0.4657
Headstrong	1.3408	0.6307
Hyperactive	1.2651	0.5830
Peer Problems	0.7535	0.2466
Dependent	0.8754	0.3113
Cronbach's Alpha	0.790	

Community Risk Factors		
Items	Loading	Signal to Noise
Community dangerousness	1.0000	0.4116
Drug problems in community	1.2987	0.6315
Gambling in community	1.2396	0.5874
Physical voilance	1.0726	0.4785
Smoking for children below 15 years of age	1.1914	0.5465
Cronbach's Alpha	0.828	

Wealth		
Items	Loading	Signal to Noise
Pickup truck	1.0000	0.2389
Motorcycle	1.3878	0.4239
Mobile Phone	1.8705	0.5807
Color TV	1.3216	0.3901
Fan	0.9798	0.2559
Cronbach's Alpha	0.679	

Root mean squared error of approximation (RMSEA)	0.039	
Comparative fit index (CFI)	0.962	
Tucker-Lewis index (TLI)	0.955	

Note: Number of observations is 696.

D   Complete Results

This appendix reports the complete (including all controls) baseline, heterogeneous, and robustness results.

Table A.10: Baseline estimation results with and without correction.

	OLS with Correction	OLS without Correction
Discount Factor	0.2147**	0.2214**
	(0.1092)	(0.1033)
Child Behavioral Skills	0.1516**	0.1799**
	(0.0631)	(0.0715)
Community Risk Factors	-0.1086***	-0.1521***
	(0.0334)	(0.0451)
Wealth	0.1087*	0.1277**
	(0.0571)	(0.0617)
Child Rearing Agreement	0.0131	0.0147
	(0.0202)	(0.0201)
Divorced	-0.1270**	-0.1254**
	(0.0634)	(0.0610)
Parental Absence	-0.1175*	-0.1141*
	(0.0713)	(0.0675)
Child Age (Months)	0.0007	0.0008
	(0.0019)	(0.0019)
Child Gender (Female)	0.0981*	0.0952
	(0.0589)	(0.0584)
Caregiver Age (Years)	0.0041	0.0038
	(0.0034)	(0.0033)
Caregiver Gender (Female)	0.0975	0.0945
	(0.0996)	(0.0989)
Caregiver Years of Schooling	0.0190	0.0183
	(0.0120)	(0.0120)
Caregiver is Father/Mother	-0.0634	-0.0642
	(0.0906)	(0.0944)
Caregiver-player Dummy	0.0616	0.0652
	(0.0674)	(0.0666)
Consistent Discounting	0.1903**	0.1872***
	(0.0754)	(0.0727)
Constant	-0.5651*	-0.5651*
	(0.3044)	(0.3044)

Note: Standard errors for OLS with correction result from 1,000 bootstrap replications while for OLS without correction are robust standard errors. Both standard errors are in parentheses. *, **,*** denote significance at 10%, 5%, and 1%, respectively. Number of Observations is 696.

Table A.11: Heterogeneous effect by child gender using ols with correction.

	Male	Female
Discount Factor	0.2954*	0.0765
	(0.1575)	(0.1254)
Child Behavioral Skills	0.0889	0.2182***
	(0.1148)	(0.0654)
Community Risk Factors	-0.1184**	-0.0883**
	(0.0534)	(0.0446)
Wealth	0.0783	0.1157
	(0.0737)	(0.0830)
Child Rearing Agreement	0.0241	0.0039
	(0.0319)	(0.0248)
Divorced	-0.0374	-0.2118**
	(0.0929)	(0.0829)
Parental Absence	-0.0982	-0.0987
	(0.1002)	(0.1010)
Child Age (Months)	0.0007	0.0009
	(0.0029)	(0.0023)
Child Gender (Female)	0.0000	0.0000
	(0.0000)	(0.0000)
Caregiver Age (Years)	-0.0001	0.0061
	(0.0051)	(0.0045)
Caregiver Gender (Female)	-0.0516	0.2309
	(0.1345)	(0.1416)
Caregiver Years of Schooling	0.0065	0.0338**
	(0.0186)	(0.0140)
Caregiver is Father/Mother	-0.0824	-0.0700
	(0.1505)	(0.1241)
Caregiver-player Dummy	0.0901	0.0296
	(0.1014)	(0.0858)
Consistent Discounting	0.2299**	0.1056
	(0.1102)	(0.0986)
Constant	-0.1593	-0.7946**
	(0.4641)	(0.3896)
N	356	340

Note: Standard errors, reported in parentheses, are from 1,000 bootstrap replications. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

Table A.12: Heterogeneous effect by child age using OLS with correction.

	5 to 8	9 to 11
Discount Factor	0.2629*	0.1087
	(0.1352)	(0.1431)
Child Behavioral Skills	0.1416*	0.1999**
	(0.0821)	(0.0974)
Community Risk Factors	-0.0802**	-0.1438**
	(0.0408)	(0.0602)
Wealth	0.0742	0.1238
	(0.0863)	(0.0798)
Child Rearing Agreement	-0.0144	0.0457
	(0.0280)	(0.0290)
Divorced	-0.1931**	-0.0262
	(0.0831)	(0.0940)
Parental Absence	-0.0968	-0.1747
	(0.0858)	(0.1110)
Child Age (Months)	0.0009	0.0021
	(0.0038)	(0.0061)
Child Gender (Female)	0.1406*	0.0453
	(0.0738)	(0.0890)
Caregiver Age (Years)	0.0023	0.0083
	(0.0043)	(0.0059)
Caregiver Gender (Female)	0.1377	0.0409
	(0.1253)	(0.1874)
Caregiver Years of Schooling	0.0085	0.0366*
	(0.0146)	(0.0195)
Caregiver is Father/Mother	-0.0348	-0.0859
	(0.1167)	(0.1649)
Caregiver-player Dummy	0.0997	0.0667
	(0.0867)	(0.1062)
Consistent Discounting	0.0997	0.2985**
	(0.0858)	(0.1299)
Constant	-0.3499	-1.1515
	(0.4561)	(0.9094)
N	397	299

Note: Standard errors, reported in parentheses, are from 1,000 bootstrap replications. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

Table A.13: Heterogeneous effect by caregiver relation to child using OLS with correction.

	Father/Mother	Others
Discount Factor	0.5212*	0.0700
	(0.2751)	(0.1135)
Child Behavioral Skills	0.1018	0.1542**
	(0.1387)	(0.0718)
Community Risk Factors	-0.0748	-0.1233***
	(0.6853)	(0.0416)
Wealth	0.1377	0.0973*
	(1.1815)	(0.0574)
Child Rearing Agreement	0.0216	0.0240
	(0.0448)	(0.0227)
Divorced	-0.0276	-0.1855***
	(0.3635)	(0.0717)
Parental Absence	0.0000	0.0000
	(0.0000)	(0.0000)
Child Age (Months)	-0.0008	0.0016
	(0.0047)	(0.0021)
Child Gender (Female)	0.1315	0.0577
	(0.1428)	(0.0705)
Caregiver Age (Years)	0.0094	0.0045
	(0.0167)	(0.0039)
Caregiver Gender (Female)	0.1754	0.1020
	(0.3135)	(0.1158)
Caregiver Years of Schooling	-0.0070	0.0388***
	(0.0452)	(0.0131)
Caregiver is Father/Mother	0.0000	0.0000
	(0.0000)	(0.0000)
Caregiver-player Dummy	-0.1577	0.1454*
	(0.2234)	(0.0838)
Consistent Discounting	0.2444	0.1797**
	(0.1601)	(0.0896)
Constant	-0.3452	-0.9383***
	(0.5500)	(0.3631)
N	190	504

Note: Standard errors, reported in parentheses, are from 1,000 bootstrap replications. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

Table A.14: Heterogeneous effect by caregiver education using OLS with correction.

	Primary or below	above Primary
Discount Factor	0.2169*	0.2396
	(0.1313)	(0.1998)
Child Behavioral Skills	0.1092	0.2121*
	(0.0791)	(0.1096)
Community Risk Factors	-0.1626***	-0.0155
	(0.0449)	(0.2048)
Wealth	0.1196	0.0312
	(0.0796)	(0.1151)
Child Rearing Agreement	0.0176	0.0080
	(0.0268)	(0.0351)
Divorced	-0.1556**	-0.0987
	(0.0740)	(0.1262)
Parental Absence	-0.1370*	-0.0833
	(0.0752)	(0.1423)
Child Age (Months)	0.0004	-0.0012
	(0.0023)	(0.0033)
Child Gender (Female)	0.0722	0.1687*
	(0.0750)	(0.0944)
Caregiver Age (Years)	0.0053	0.0105*
	(0.0057)	(0.0056)
Caregiver Gender (Female)	0.0781	0.1180
	(0.1449)	(0.1301)
Caregiver Years of Schooling	0.0344	-0.0121
	(0.0410)	(0.0241)
Caregiver is Father/Mother	0.1117	-0.0384
	(0.1922)	(0.1286)
Caregiver-player Dummy	0.1614*	-0.0387
	(0.0961)	(0.0921)
Consistent Discounting	0.3257***	-0.0166
	(0.0956)	(0.1273)
Constant	-0.7843	-0.1945
	(0.5289)	(0.4784)
N	433	263

Note: Standard errors, reported in parentheses, are from 1,000 bootstrap replications. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

Table A.15: Estimation results for structural equation modeling (SEM), restricted sample and logit regression.

	SEM	Restricted Sample	Logit
Discount Factor	0.2275**	0.2809**	0.3477
	(0.1010)	(0.1175)	(0.2848)
Child Behavioral Skills	0.1292**	0.0923	0.5400***
	(0.0556)	(0.0706)	(0.2074)
Community Risk Factors	-0.1812***	-0.1016***	-0.3681***
	(0.0538)	(0.0337)	(0.1216)
Wealth	0.1716*	0.1070	0.2333
	(0.0882)	(0.0696)	(0.1796)
Child Rearing Agreement	0.0158	0.0133	0.0495
	(0.0189)	(0.0252)	(0.0529)
Divorced	-0.1243**	-0.1019	-0.2573
	(0.0633)	(0.0683)	(0.1735)
Parental Absence	-0.1027	-0.1504**	-0.2862
	(0.0761)	(0.0757)	(0.2031)
Child Age (Months)	0.0010	0.0007	0.0032
	(0.0019)	(0.0022)	(0.0052)
Child Gender (Female)	0.0920	0.1030	0.2551
	(0.0579)	(0.0710)	(0.1622)
Caregiver Age (Years)	0.0036	0.0001	0.0137
	(0.0036)	(0.0042)	(0.0098)
Caregiver Gender (Female)	0.0931	0.1725	0.5491**
	(0.0943)	(0.1374)	(0.2733)
Caregiver Years of Schooling	0.0167	0.0105	0.0858***
	(0.0111)	(0.0139)	(0.0316)
Caregiver is Father/Mother	-0.0538	-0.2006	-0.0805
	(0.1088)	(0.1222)	(0.2973)
Caregiver-player Dummy	0.0673	0.0000	0.3538*
	(0.0701)	(0.0000)	(0.1959)
Consistent Discounting	0.1835***	0.2091**	0.4090**
	(0.0693)	(0.0837)	(0.1862)
Constant	-0.5753*	-0.2533	-2.2827**
	(0.3232)	(0.3735)	(0.8951)
N	696	518	696

Note: Standard errors restricted sample (OLS with correction) result from 1,000 bootstrap replications while for the logit regression are robust standard errors. Standard errors are in parentheses. *, **, *** denote significance at 10%, 5%, and 1%, respectively.

References

Attanasio, O., Cattan, S., Fitzsimons, E., Meghir, C., and Rubio-Codina, M. (2020). Estimating the production function for human capital: Results from a randomized controlled trial in colombia. *American Economic Review*, 110:48–85.

Boonmanunt, S., Jantorn, W., Khruapradit, V., and Kilenthong, W. T. (2022). Intergenerational transmission of time preferences: An evidence from rural thailand. *Working Paper.*

Cunha, F. and Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. *Journal of Human Resources*, 43:738–782.

Gorsuch, R. L. (1983). *Factor analysis.* Psychology Press, New York.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* Applied Psychological Measurement, Washington, DC.