

Appendix

Towards Causal Estimates of Children’s Time Allocation on Skill Development

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The appendix is organized as follows. In Section A, we provide evidence that our test is capable of detecting other sources of endogeneity, such as simultaneity, measurement error and various types of model misspecification. In Section B, we present many additional robustness checks, aiming at detecting endogeneity caused by types (a2) and (b) confounders and bridging our input specification with others in the literature. Section C presents estimates from a linear B-spline specification to detect possible hidden heterogeneity in our linear effects showed in section 4 of the paper. In section D, we show additional tables and figures, including factor loadings, estimates for noncognitive skills, an analogous study of the power of the test with the classification of time inputs from Fiorini and Keane (2014), estimates for all estimated models (including the ones rejected by the test), activity composition charts for all other activity partners and standard error plots of time input dummy variables.

A Additional Sources of Detectable Endogeneity

In this section, we extend the discussion from Section 3.3 of the paper. The purpose is to show that the test has power to detect endogeneity arising from a multitude of relevant sources in the context of skill production.

A.1 Simultaneity

If time inputs are caused by skills, rather than the other way around, Assumption 1 in the paper will be violated. For instance, children with low comprehension skill may be less willing to read, which may generate a spurious correlation between time spent reading and the comprehension skill measure. The test has power to detect endogeneity due to simultaneity exactly because of bunching. Indeed, the causal relationship of interest is plausibly continuous at zero, while the reverse causal relationship implies a discontinuous correlation

between skill and inputs at zero minutes because children of different skills are bunched at that threshold. For instance, spending time to read the first word of the title of a book has essentially the same effect on comprehension skills as not reading it at all. In contrast, children that spend zero minutes reading should have a discontinuously lower comprehension ability in comparison to children reading a little amount, since children reading zero minutes may not even know how to read. In Figure A.1, we show that strong correlates of skill levels, such as birth weight, race, age and lagged test score, are in fact discontinuous when various time inputs are zero, suggesting that we have power to detect endogeneity stemming from simultaneity.

A.2 Measurement Error

While time diary data may mitigate concerns regarding omitted inputs, it can raise issues related to reliability. To the extent that time inputs are mismeasured, estimates of the production technology can be biased. To understand this potential source of endogeneity in detail, consider the model from equation (1) in the paper with measurement error in time inputs:

$$\text{Skill}_i = \widetilde{\text{Input}}_i \beta + \text{Control}_i \Pi + \text{Error}_i,$$

where $\widetilde{\text{Input}}_i = \text{Input}_i + \eta_i$. $\widetilde{\text{Input}}_i$ represents the true value of the vector of inputs, while Input_i represents the value observed by the researcher, so that η_i is the measurement error vector, which may vary with each observation and each input in an unrestricted way. Rewriting the equation above,

$$\text{Skill}_i = \text{Input}_i \beta + \text{Control}_i \Pi + \underbrace{\eta_i \beta + \text{Error}_i}_{\text{Error}'_i}.$$

Thus, determinants of η_i that are correlated with Input_i are likely to generate endogeneity stemming from measurement error, unless control variables are able to absorb them. For example, children who spend more (active or passive) time alone may be more likely to fill out their own time-use survey, and children might tend to overstate certain inputs relative to adults (e.g., they might overstate the amount of time they spend with friends or other family members to conceal how often they are alone).

While we cannot observe η_i directly, the misreporting of time use data is likely to depend on the form of the interviews, such as who completed the diary (child, primary caregiver, or other), whether the interview was completed with the help of an interviewer, and whether the interview was concluded face-to-face or by phone. In Figure A.2, we show discontinuity plots of some examples of such correlates of misreporting, such as whether the child completed

the time diary alone. The fact that these variables are discontinuous at zero time inputs for some inputs j suggests that the degree of misreporting is likely discontinuous, implying that our test has power to detect endogeneity stemming from measurement error. Additional examples are provided in Panels (c) and (d) of Figure A.6 in the appendix.

An alternative model of measurement error that may be relevant for our analysis is a situation where individuals who actually spend positive amounts of time in a given activity mistakenly report a zero. If the true input choices are in fact endogenous, this type of misreporting is likely to reduce the power of our test since it will tend to shrink any discontinuity at zero. The reason is that the households that are truly reporting zeros will differ discontinuously on some unobserved dimension, while the households that mistakenly report zero are closer to the average on this same dimension. This will tend to smooth out any jump. We allay this concern by showing evidence of the power of the test to detect endogeneity stemming from observed variables that may have been omitted. Indeed, to the extent that this kind of measurement error happens, it does not seem to be too important to make the discontinuity undetectable.

A.3 Misspecification

Our test is also useful for detecting misspecification errors. This is important in our context since there are countless ways to group activities and model the relationship between skill and time inputs. In particular, we make four key simplifying assumptions to arrive at Equation (1). We discuss each assumption in turn, along with evidence that key variables w_i elicited by the corresponding assumption vary discontinuously at zero.

Over-aggregation

First, we aggregate many time activities into only a few categories, which may induce endogeneity due to over-aggregation (i.e., $\tilde{J} > J$). Suppose that the true model is more disaggregated than the one from equation (1), in the sense that $\text{Input}_i^j = \text{Input}_i^{Aj} + \text{Input}_i^{Bj}$ for each j , where A and B are different time input activities that are originally included in time input activity j . Then the true model is given by

$$\text{Skill}_i = \text{Input}_i^A \beta^A + \text{Input}_i^B \beta^B + \text{Control}_i \Pi + \text{Error}_i,$$

where $\text{Input}_i^A := (\text{Input}_i^{A1}, \dots, \text{Input}_i^{AJ})$ and $\text{Input}_i^B := (\text{Input}_i^{B1}, \dots, \text{Input}_i^{BJ})$, so that:

$$\text{Skill}_i = \text{Input}_i\beta + \text{Control}_i\Pi + \underbrace{\text{Input}_i [w_i \cdot (\beta^A - \beta) + (\mathbf{1} - w_i) \cdot (\beta^B - \beta)]}_{\text{Error}'_i} + \text{Error}_i.$$

Here, w_i is a column vector whose j th element is $w_i^j := \frac{\text{Input}_i^{Aj}}{\text{Input}_i^j}$, and β is a weighted average of β^A and β^B , with w_i and $1 - w_i$ as weights, respectively. ($w_i \cdot \beta$ represents an inner product between two column vectors, and $\mathbf{1}$ represents a column vector of 1s.) If $\beta^A \neq \beta^B$ (so that $\beta^A, \beta^B \neq \beta$), then elements of w_i that are correlated with Input_i are likely to generate endogeneity, unless control variables are able to absorb them. As an example, if a subcategory of maternal active time, such as reading with the mother, increases disproportionately as active time with the mother increases, then we may arrive at a biased estimate of maternal active time.

Figure A.3 shows discontinuities for some examples of w_i that speak directly to this potential issue. For example, Panel (a) shows that children who spend no passive time with their friends are likely to spend a discontinuously larger proportion of the active time they spend with their friends during weekends, relative to children who spend little passive time with their friends. This suggests that if active time with friends is differentially productive during weekends (a type of heterogeneity precluded by our aggregation scheme) and results in endogeneity, then the indicator variable for passive time with friends would detect it. Additional examples are provided in Panels (e) and (f) of Figure A.6 in the appendix.

Heterogeneous Treatment Effects

Another source of endogeneity due to misspecification arises with heterogeneous treatment effects, i.e., $f(\widetilde{\text{Input}_i}, \text{Other}_i)$ is non-separable. For instance, mothers who read well may be more willing to read to their children, and this activity may generate a higher return to their children's skill relative to mothers who do not read well. To understand this potential source of endogeneity, assume here a model with heterogeneous effects of time inputs:

$$\text{Skill}_i = \text{Input}_i\beta_i + \text{Control}_i\Pi + \text{Error}_i,$$

Then

$$\text{Skill}_i = \text{Input}_i\beta + \text{Control}_i\Pi + \underbrace{\text{Input}_i \cdot (\beta_i - \beta)}_{\text{Error}'_i} + \text{Error}_i,$$

where $\beta := E[\beta_i]$. Thus, determinants of β_i that are correlated with Input_i are likely to generate endogeneity, unless control variables are able to absorb them.

The plots in Figure 6 in the paper (see also Figure A.5) depict discontinuities for examples of w_i along which heterogeneity in returns of activities likely occurs, suggesting that we can detect endogeneity resulting from heterogeneous treatment effects. For instance, Panel (a) of Figure 6 shows that lagged math score is discontinuous when passive time with friends is zero. Thus, the test has power to detect endogeneity from heterogeneous effects to the extent that any other time input (e.g., active time with the mother) has a different effect on the child's skills depending on lagged math score.

Non-linear Treatment Effects

A third potential misspecification issue that will generate endogeneity is the presence of non-linear effects (i.e., $f(\text{Input}_i, \text{Other}_i) \neq \text{Input}_i\beta + \text{Control}_i\pi$). For instance, the effect of the 10th hour reading to the child in a week may be different from the effect of the first hour. To understand this potential source of endogeneity, assume here a model with non-linear effects of time inputs:

$$\text{Skill}_i = f(\text{Input}_i) + \text{Control}_i\Pi + \text{Error}_i,$$

where $f(\cdot)$ is continuous at $\text{Input}_i^j = 0$ for each j . We can rewrite the equation as

$$\text{Skill}_i = \text{Input}_i\beta + \text{Control}_i\Pi + \underbrace{f(\text{Input}_i) - \text{Input}_i\beta}_{\text{Error}'_i} + \text{Error}_i. \quad (5)$$

In this case, $w_i := f(\text{Input}_i, \text{Other}_i) - \text{Input}_i\beta$ might be discontinuous when inputs are zero. Panel (a) of Figure A.4 shows that $E[\text{Input}_i^{j'} | \text{Input}_i^j = x]$ is discontinuous at $x = 0$ for examples of $j \neq j'$. Children who spend zero active time with their mother spend a discontinuously larger amount of passive time with their grandparents, an average increase from 1 to 3 hours per week. If the impact of passive time with grandparents is nonlinear, then this mean shift will not be fully captured by the coefficient on grandparents passive time (e.g., $f^{j'}(3) - f^{j'}(1) \neq (3 - 1)\beta^{j'}$). This is direct evidence that the test has power to detect endogeneity from non-linear effects.¹

Additionally, our linear model (2) in the paper may incorrectly predict a discontinuous impact of inputs at zero because of non-linearities away from zero. In this case, D_i will

¹In reality, there is heterogeneity across observations with the same value of Input_i^j , which enhances the power of the test because it can detect endogeneity if $f^{j'}(x_1) - f^{j'}(x_2) \neq (x_1 - x_2)\beta^{j'}$ for other values of x_1 and x_2 . For instance, Panel (b) of Figure A.4 shows that the entire distribution is discontinuous at $x = 0$, not only its first moment. Caetano and Maheshri (2016) discusses this point in more detail.

be significantly different from zero in an attempt to correct for this model misspecification. Regardless of the reason, the test has power to detect endogeneity stemming from non-linear effects.

Misspecification of Controls

If w_i is discontinuous at zero, then $w'_i := g(w_i)$ is also discontinuous at zero for almost all functions $g(\cdot)$. Thus, the test also has power to detect endogeneity due to misspecification of observed controls w_i , which can occur since it is unclear how they should be included in the equation.²

The examples of w_i discussed in Section A of the appendix and Section 3.3 of the paper are just a small subset of observed variables for which we find discontinuities at $x = 0$. Moreover, for ease of exposition, we have discussed in turn the implications of each simplification that is needed to go from the general production function outlined in equation (3) in the paper to the specifications we estimate. Our approach is agnostic about the specific reason why Assumption 1 might fail, and in fact jointly tests for all sources of detectable endogeneity, even ones we may not conceive. Of course, even among these sources of endogeneity there may be confounders that cannot be detected by the test. For example, some confounder w_i implied by an aggregation choice may not be discontinuous when inputs are zero. However, in the next section we argue why these confounders are likely to be rare in our context. In light of this discussion, our claim is ultimately that we can interpret a failure to reject exogeneity as a lack of endogeneity.

²If w_i enters the equation non-linearly, discontinuities in higher moments of the distribution will add power to the test. Here we mostly show discontinuities in the first moment of the distribution, but we actually find discontinuities in the whole distribution (e.g., Panel (b) of Figure A.4). For instance, the variance of w_i is often discontinuously higher when inputs are zero. This is intuitive, as observations tend to be discontinuously more heterogeneous at that point because of bunching.

Figure A.1: Evidence of Power to Detect Endogeneity from Simultaneity

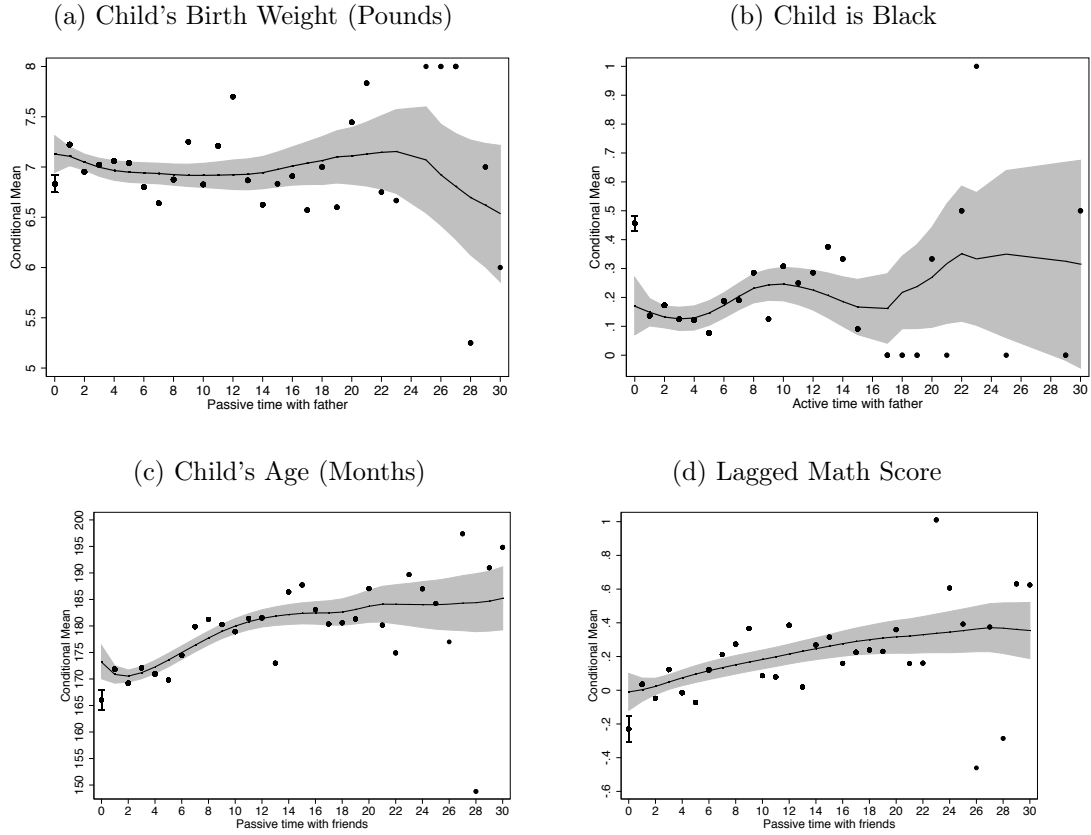
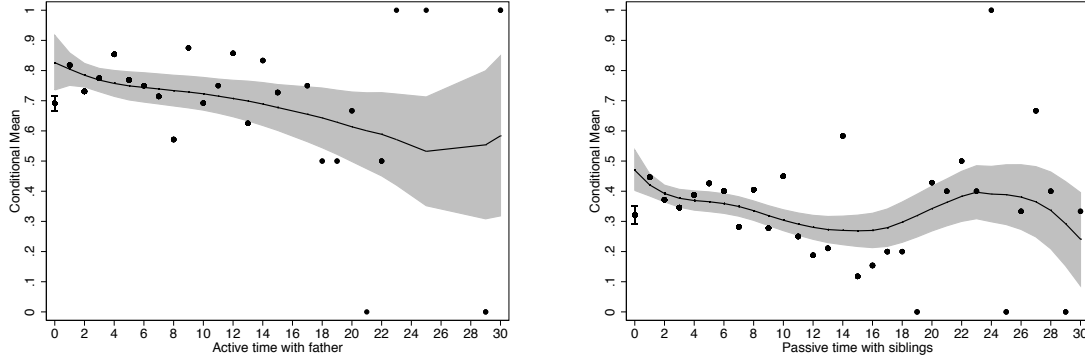


Figure A.2: Evidence of Power to Detect Endogeneity from Measurement Error

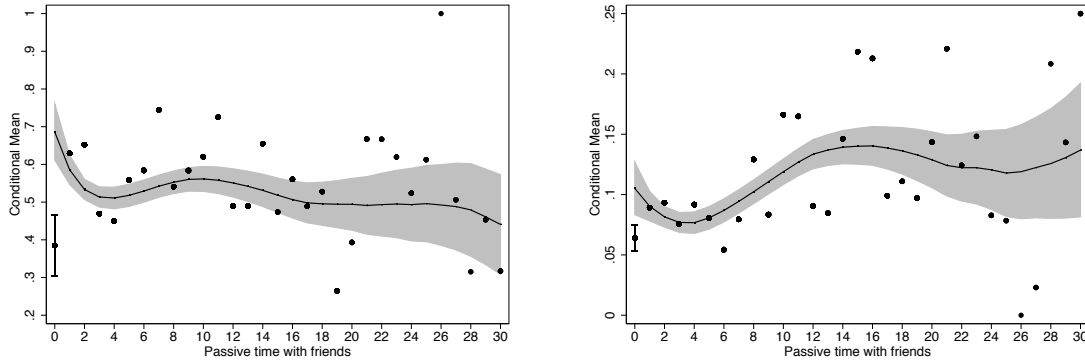
- (a) Weekday Diary was Completed Without Help (b) Primary Caregiver Completed Weekend Diary



Note: In each plot, the vertical axis shows the mean of a potential confounder conditional on a given level of time input (i.e. horizontal axis variable). The scatter plot represents the observed conditional mean of the confounder (aggregated to the next hour of the time input). At zero time input, we show the 95% confidence interval. The solid curve represents a third order local polynomial regression of the confounder on the time input, using time input data at the minute per week level. The shaded region represents the 95% confidence interval for this regression with an out-of-sample prediction at zero minutes. See footnote 33 of the paper for more details on the regression and confidence interval.

Figure A.3: Evidence of Power to Detect Endogeneity from Over-Aggregation of Inputs

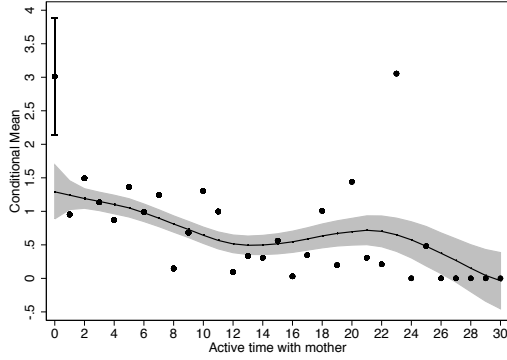
- (a) Proportion of Active Time with Friends During Weekends (b) Proportion of Leisure time with Mother



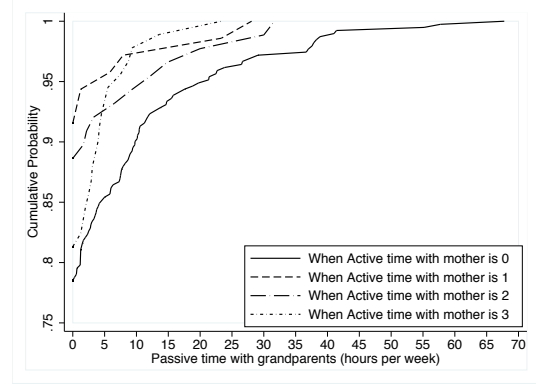
Note: In each plot, the vertical axis shows the mean of a potential confounder conditional on a given level of time input (i.e. horizontal axis variable). The scatter plot represents the observed conditional mean of the confounder (aggregated to the next hour of the time input). At zero time input, we show the 95% confidence interval. The solid curve represents a third order local polynomial regression of the confounder on the time input, using time input data at the minute per week level. The shaded region represents the 95% confidence interval for this regression with an out-of-sample prediction at zero minutes. See footnote 33 of the paper for more details on the regression and confidence interval.

Figure A.4: Evidence of Power to Detect Endogeneity from Non-Linear Effects

(a) Passive Time with Grandparents (1st Moment)

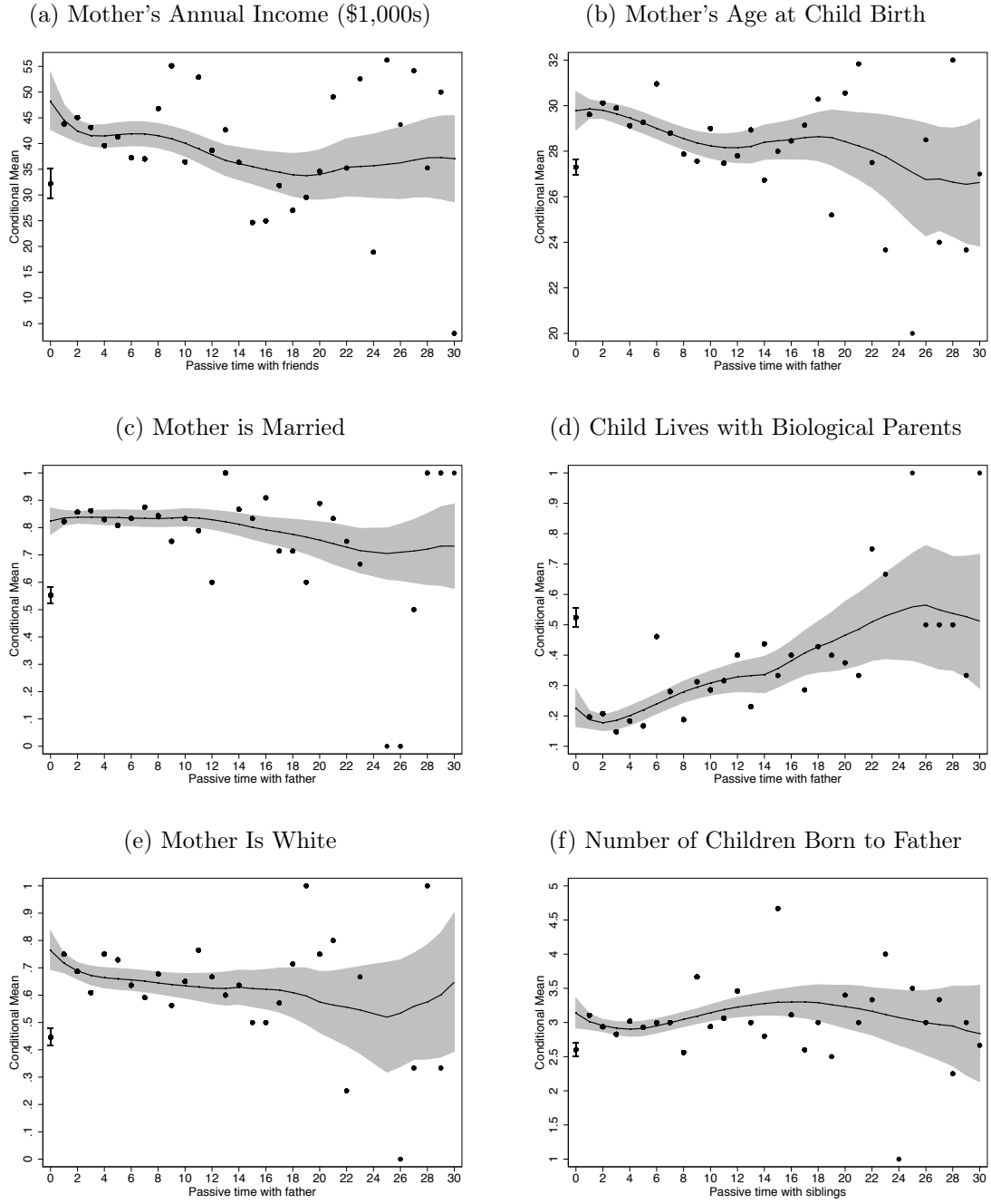


(b) Passive Time with Grandparents (Distribution)



Note: In the plots of the right, we show the cumulative density function of the confounder for selected values of the time input (in hours), for the confounder and time input shown in the corresponding plot of the left. In the plots of the left, the vertical axis shows the mean of a potential confounder conditional on a given level of time input (i.e. horizontal axis variable). The scatter plot represents the observed conditional mean of the confounder (aggregated to the next hour of the time input). At zero time input, we show the 95% confidence interval. The solid curve represents a third order local polynomial regression of the confounder on the time input, using time input data at the minute per week level. The shaded region represents the 95% confidence interval for this regression with an out-of-sample prediction at zero minutes. See footnote 33 of the paper for more details on the regression and confidence interval.

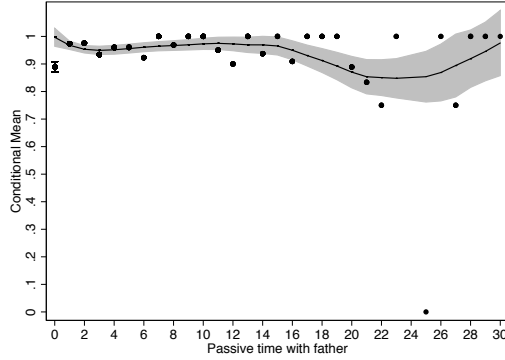
Figure A.5: Further Evidence of Power of Test (1 of 2)



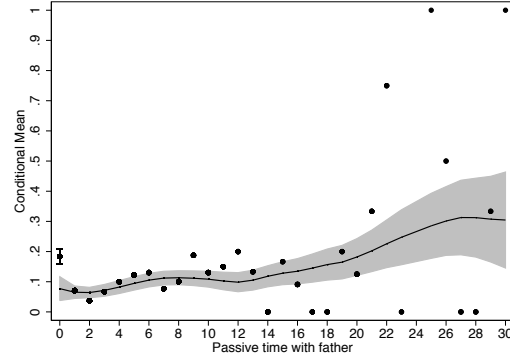
Notes: See the note for Figure 6 in the paper

Figure A.6: Further Evidence of Power of Test (2 of 2)

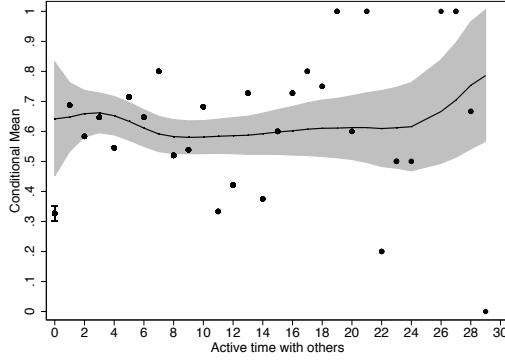
(a) Primary Caregiver Spent Money on Toys for the Child



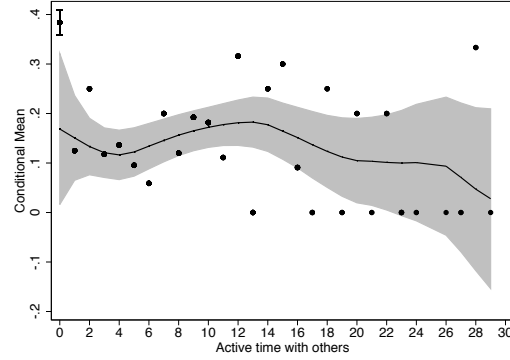
(b) Child Repeated Grade



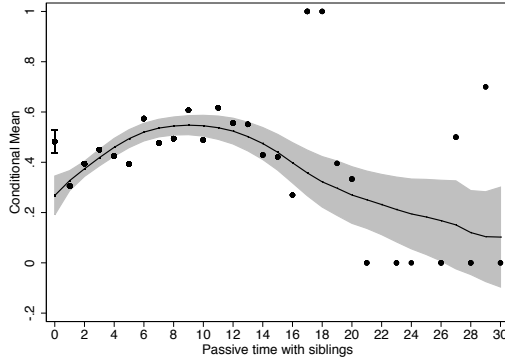
(c) Child Completed Weekday Diary (With or Without Help)



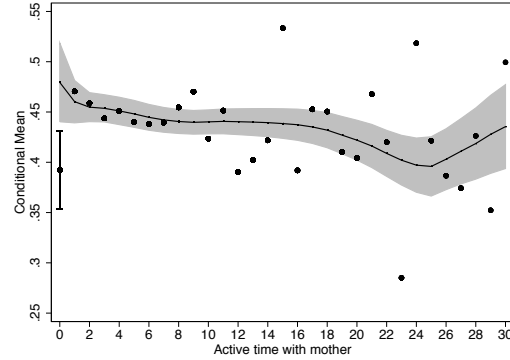
(d) Primary Caregiver Completed Weekday Diary



(e) Proportion of Passive time with Others Participating in activities with the Child



(f) Proportion of Passive Time with Mother During Weekends



Notes: See the note for Figure 6 in the paper.

B Additional Sensitivity Analysis

In this section, we perform many additional robustness checks on specification (6) from Section 4 of the paper. Table B.1 report the p-value of a test for whether the coefficient of β changes as we add controls to specification (6) from Section 4. Each specification in these tables contain additional controls of two types: (a') variables that are discontinuous when some input is zero (some of which are shown in the plots presented in Section 3 of the paper), and (b') variables that are continuous when each input is zero, for all inputs.³ These variables might be correlated to undetectable confounders, as discussed above. For instance, observables of type (a') (type (b')) might be correlated to unobservables of type (a2) (type (b)). If they are, then they will partly absorb confounders that are undetectable by the exogeneity test, which would tell us that the test is unable to detect important sources of endogeneity. The p-values in Table B.1 provide clear evidence that our estimates of specification (6) are statistically unchanged in all alternative specifications .

Specifications (1')-(3') are particularly useful to allay further concerns about omitted variables and simultaneity. In specification (1'), we add more control variables related to child characteristics, family demographic characteristics, and environmental characteristics.⁴ In specification (2'), we add the 15 lagged (i.e., from the previous wave) time inputs.⁵ In specification (3'), we add the other three lagged skill measures as well as the interactions between any two of the four lagged skills.

In specification (4'), we add controls related to misreporting of time diaries (12 additional controls)⁶, to allay further concerns about measurement error. Specifications (5')-(11') are included to check for undetectable confounders from over-aggregation. Active time activities are further subcategorized in the data as educational, social, and school activities, while passive time activities are further subcategorized in the data as general care and media activities.⁷ In specification (5'), we add one more time input by separating school time from

³Of course, these variables may not be confounders of type (b), because they may not be correlated to inputs at all.

⁴Here is the full list of added controls in specification (1'): child's birth weight, number of children born to father, number of children born to mother, months first cared by non-parents, months child began kindergarten, indicator for whether mother's working schedule is a regular (vs. night) shift, and money caregivers spent on toys for the child last year.

⁵This specification is referred to as the "cumulative model" by Todd and Wolpin (2007) and Fiorini and Keane (2014).

⁶The list includes whether the diary was self-administered, whether the diary was reviewed face-to-face, whether the diary was reviewed via phone, and indicators of who completed the diaries.

⁷Fiorini and Keane (2014) stratifies active and passive activities according to these five types, depending on whether the activity involves parents. Thus, specifications (5') and (6') attempts to check for evidence of heterogeneous effects in dimensions that are captured by their specification of inputs and not captured by ours.

self active time, and test whether any of the 15 original coefficients change.⁸ In specification (6'), we add the proportions of each active time input spent in educational activities (7 additional controls).⁹ In specification (7'), we add the proportions of each passive time input spent in general care (7 additional controls).¹⁰ In specification (8'), we add the proportions of each passive time input spent watching TV (7 additional controls).¹¹ In specification (9'), we add the proportions of each time input spent at home as opposed to elsewhere (14 additional controls).¹² In specification (10'), we add the proportions of each time input spent in activities with someone "participating" (14 additional controls).¹³ In specification (11'), we add the proportions of each time input spent during weekends (14 additional controls).

Given the evidence presented in this section, it is difficult to conceive of a confounder that may be biasing our estimates. It needs to be of type (a2) or (b) for all inputs and at the same time be undetectable by all the robustness checks provided in this section. For instance, it is difficult to conceive of variables (of type (a2) or (b) for all inputs) correlated to both $Skill_i$ and $Input_i$ observed in the current wave, and yet uncorrelated to both $Skill_i$ and $Input_i$ observed in the previous wave.

a

⁸School activities, originally fully included in self active time, comprise attending classes for full-time students, and daycare or nursery school for children not in school. They represent about 18% of all activities, 58% of all active activities and 88% of the self active time activity.

⁹Educational activities include helping adults doing household chores, taking extracurricular lessons, and reading. They represent about 6% of all activities and 20% of all active activities.

¹⁰General care include obtaining goods and services, personal needs and care (e.g. having meals), and traveling/waiting. They represent about 15% of all activities and 56% of all passive activities.

¹¹Watching TV represents about 10% of all activities and 35% of all passive activities.

¹²Time spent at home accounts for about 26% of children's total time in a week.

¹³When filling out the time diaries, the respondents were asked not only about with whom each activity was performed, but also whether the partner actually participated in the activity (versus being just around while the child performed the activity). Participation time accounts for about 18% of children's total time in a week. This variable was used in Del Boca et al. (2013) to categorize inputs.

Table B.1: Do Coefficients Change as Controls are Added? (P-Value)

	Alternative Specifications	Math	Vocabulary	Comprehension	Noncognitive
(1')	(6) + more controls	0.967	0.990	0.620	0.778
(2')	(6) + lagged inputs	0.991	0.912	0.989	0.986
(3')	(6) + lagged skills	0.896	0.866	0.572	0.772
(4')	(6) + measurement error controls	0.915	0.883	0.946	0.998
(5')	(6), school time as a separate input	0.996	1.000	0.998	1.000
(6')	(6) + prop. educational activities	0.987	1.000	0.988	0.891
(7')	(6) + prop. general care	0.948	0.737	0.906	0.999
(8')	(6) + prop. watching TV	0.917	0.806	0.526	1.000
(9')	(6) + prop. at home	0.609	0.722	0.974	0.725
(10')	(6) + prop. participation time	0.999	0.987	0.926	0.787
(11')	(6) + prop. weekend time	0.873	0.928	0.976	0.764

Note: This table shows the p-values of a test for whether the 15 coefficient estimates of Input_i for each alternative specification are statistically the same as the corresponding ones from Specification (6) in Table 5 of the paper. Alternative specifications: (1') the full list of added controls can be seen in footnote 4; (2') lagged time inputs of all 15 activities; (3') lagged skill measures of other types and interactions of any two skills; (4') full list of added controls can be seen in footnote 6; (5') 16 time inputs (15 original time inputs plus school activities), whereby the p-value refers to a test of whether the 15 coefficients of the original time inputs are statistically unchanged with respect to specification (6); (6') proportions of each time input spent in educational activities (e.g. reading): 7 additional covariates; (7') proportions of each time input spent in general care (i.e. having meals): 7 additional covariates; (8') proportions of each time input spent watching TV: 7 additional covariates; (9') proportions of each time input spent at home: 14 additional covariates; (10') proportions of each time input that partner actually participates in the activity: 12 additional covariates; (11') proportions of each time input spent during weekends: 15 additional covariates.

C Non-Linear Treatment Effects

The exogeneity test results are presented in Table C.1. For comparison, we show in bold the surviving specifications according to the linear model (2) of the paper. It is useful to check if the models that survive the linear exogeneity test also survive the non-linear exogeneity test. As discussed at the end of Section 3.3 of the paper, the coefficients of D_i in these linear models can capture endogeneity from either discontinuous confounders or from a failure of the linearity assumption. The results show that the specifications that survive the exogeneity test in the linear model also tend to survive the exogeneity test in the B-spline model, and vice-versa. The exception, specification (2) for **comprehension**, survives the non-linear test but does not survive the linear test, suggesting that the linear test detects endogeneity partly due to misspecification of the production function. Overall, most of the power of the test seems to stem from discontinuous unobservables, otherwise the B-spline models would fail to reject in even the most parsimonious specifications. In specifications (6), all models survive both exogeneity tests for all skills.

Table C.2 shows estimates for all four skill measures in our preferred model of specification

(6). We find that maternal passive time only has a significant positive effect on math when it is below 15 hours per week, and in fact has a negative, significant effect in comprehension skills when it is above 27 hours per week. A large amount (above 38 hours per week) of active self time (e.g., mostly due to school activities) seems to be productive for math, while a little (up until 5 hour per week) passive time with friends seems to be unproductive for cognitive skills, compared to sleeping or napping. These results are consistent with the linear results, but provide further details about the production function of skills.

Table C.3 presents the robustness check results for the non-linear models to compare surviving and non-surviving specifications as discussed in subsection 4.2 of the paper. For each specification (1)-(5), we show the p-value from a test of whether the 29 coefficients β^{jk} are significantly different from the corresponding ones in specification (6).¹⁴ We show in bold the specifications that survive the exogeneity test. All surviving specifications according to the exogeneity test also survive the other test with one exception. As in the linear models, all specifications from specification (4) onwards survive both tests for all skills.

We implement the same robustness checks discussed in Section B for the non-linear models, with the aim of allaying further concerns about non-linearities. The results are in Table C.4. We test whether the coefficients β^{jk} , for all j and k (27 coefficients) change as we change specification (6). The results show that, similarly to the linear models, the estimates do not change.

Remark 2. As discussed in Remark 1 in the paper, the fact that the treatment effect estimates are not linear is not evidence that our surviving specifications in the linear models suffer from endogeneity. Indeed, the results suggest that the linear estimates in our preferred models are a weighted average of the corresponding non-linear estimates. For example, the coefficient of passive time with the mother on mathematics skills is 0.004, which is similar to a weighted average of the three coefficients of passive time with the mother from specification (6) shown in Table C.2 (i.e. $0.004 \approx 1/3(0.013 + 0.002 + 0.003)$). In general, an F-test for whether each coefficient of the linear model is the same as the weighted average of the corresponding coefficients of the B-spline model for all 15 time inputs yields a p-value of 0.5392.

¹⁴Some inputs did not allow for more than one or two B-spline terms.

Table C.1: Exogeneity Test Results: B-spline

Controls		Math		Vocabulary		Comprehension		Noncognitive	
		F-stat	p-Value	F-stat	p-Value	F-stat	p-Value	F-stat	p-Value
(1)	Lagged Score	2.392	0.002	1.470	0.108	1.749	0.037	1.501	0.097
(2)	Child Chrs.	1.431	0.124	1.234	0.239	1.373	0.152	1.621	0.061
(3)	Mother Demog. Chrs.	1.553	0.079	1.297	0.195	1.456	0.114	1.649	0.055
(4)	Family Demog. Chrs.	1.487	0.102	1.258	0.221	1.382	0.147	1.726	0.040
(5)	Family Environ. Chrs.	1.591	0.069	1.263	0.218	1.296	0.196	1.437	0.122
(6)	School's Experience	1.561	0.077	1.242	0.233	1.330	0.175	1.284	0.204

Note: All specifications in this table are in the form of a linear B-Spline with 2 knots placed at 33rd and 67th percentiles of each time input, whenever possible. Entries in bold are “surviving specifications” for which we cannot reject exogeneity at 10% of significance *in the linear model*. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child’s school experience. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity.

Table C.2: B-spline Estimation Results

	Math	Vocabulary	Comprehension
Active time with mother (0,2.3)	0.041 (0.047)	0.031 (0.047)	0.027 (0.052)
Active time with mother (2.3,9.5)	-0.003 (0.008)	0.007 (0.009)	0.010 (0.010)
Active time with mother (9.5,.)	0.006 (0.004)	-0.002 (0.003)	-0.004 (0.004)
Passive time with mother (0,14.6)	0.013** (0.006)	0.004 (0.006)	0.004 (0.007)
Passive time with mother (14.6,26.9)	0.002 (0.005)	0.001 (0.005)	0.007 (0.005)
Passive time with mother (26.9,.)	0.003 (0.003)	-0.001 (0.003)	-0.009** (0.004)
Active time with father (0,.)	0.014** (0.005)	0.007 (0.006)	-0.000 (0.007)
Passive time with father (0,1.0)	0.131 (0.134)	0.204 (0.196)	0.120 (0.200)
Passive time with father (1.0,.)	-0.001 (0.004)	-0.001 (0.004)	0.009** (0.004)
Active time with grandparents (0,.)	0.021** (0.010)	0.021* (0.012)	0.035** (0.010)
Passive time with grandparents (0,.)	-0.004 (0.004)	-0.002 (0.005)	-0.004 (0.006)
Active time with siblings (0,.)	-0.002 (0.005)	-0.008 (0.006)	-0.014** (0.007)
Passive time with siblings (0,2.3)	-0.090** (0.044)	-0.083* (0.047)	-0.065 (0.045)
Passive time with siblings (2.3,.)	0.009** (0.003)	0.006* (0.003)	0.006 (0.004)
Active time with friends (0,4)	-0.016 (0.028)	-0.011 (0.030)	0.004 (0.032)
Active time with friends (4,.)	0.007** (0.003)	0.003 (0.003)	0.000 (0.004)
Passive time with friends (0,5)	-0.032**	-0.035**	-0.044**

	(0.014)	(0.016)	(0.016)
Passive time with friends (5,.)	0.005	-0.002	0.004
	(0.003)	(0.003)	(0.003)
Self active time (0,34.6)	0.003	-0.001	0.001
	(0.003)	(0.003)	(0.003)
Self active time (34.6,37.9)	0.013	-0.017	-0.019
	(0.013)	(0.014)	(0.015)
Self active time (37.9,.)	0.006**	0.001	0.005
	(0.003)	(0.003)	(0.003)
Self passive time (0,7.0)	-0.019	-0.000	-0.022
	(0.013)	(0.014)	(0.015)
Self passive time (7.0,11.5)	0.011	0.001	0.008
	(0.011)	(0.011)	(0.012)
Self passive time (11.5,.)	0.004*	-0.001	0.002
	(0.003)	(0.003)	(0.003)
Active time with others (0,.)	0.001	-0.008*	-0.004
	(0.005)	(0.004)	(0.005)
Passive time with others (0,1)	-0.210	-0.006	-0.502**
	(0.134)	(0.115)	(0.162)
Passive time with others (1,.)	0.002	-0.005	-0.004
	(0.003)	(0.004)	(0.004)
Don't know or refuse to answer(0,1.25)	-0.136	0.058	-0.108
	(0.097)	(0.096)	(0.124)
Don't know or refuse to answer(1.25,.)	0.005	-0.002	0.006*
	(0.003)	(0.003)	(0.004)
R-squared	0.666	0.638	0.576
Observations	1698	1698	1698
Exogeneity test F-statistic	1.561*	1.242	1.330
Exogeneity test p-value	0.077	0.233	0.175

Note: All estimates are for specification (6). See footnote 40 of the paper for a full description of the control variables. In the first column, the parentheses shown after each time input indicates the time intervals. For example, (0,2.5) means between 0 hours and 2.5 hours per week. Depending on the distribution, some time inputs have less than three time intervals because the time input was not complex enough to accommodate two knots. Standard errors corrected for heteroskedasticity are in parentheses. * Significant at the 10% level. ** Significant at the 5% level.

Table C.3: P-Values for Comparing Surviving and Non-surviving Specifications: B-spline

	Controls	Math	Vocabulary	Comprehension	Noncognitive
(1)	Lagged Score	0.000	0.000	0.000	0.958
(2)	Child Chrs.	0.064	0.593	0.012	0.949
(3)	Mother Demog. Chrs.	0.358	0.768	0.138	0.968
(4)	Family Demog. Chrs.	0.472	0.843	0.355	0.883
(5)	Family Environ. Chrs.	0.668	0.991	0.855	0.917

Note: This table shows the p-values of a test for whether the 26 coefficient estimates of Input_i for each specification are statistically the same as the corresponding ones from Specification (6) in Table C.1. Entries in bold are “surviving specifications” in the b-spline test for which we cannot reject exogeneity at 10% of significance. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics. All standard errors are corrected for heteroskedasticity. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity.

Table C.4: Do Coefficients Change as Controls are Added? (P-Value): B-spline

	Alternative Specifications	Math	Vocabulary	Comprehension	Noncognitive
(1')	(6) + more controls	1.000	1.000	0.967	0.969
(2')	(6) + lagged inputs	0.999	0.995	1.000	1.000
(3')	(6) + lagged skills	0.976	0.904	0.664	0.985
(4')	(6) + measurement error controls	0.996	0.999	0.999	1.000
(5')	(6), school time as a separate input	0.974	1.000	1.000	0.973
(6')	(6) + prop. educational activities	1.000	1.000	1.000	1.000
(7')	(6) + prop. general care	1.000	1.000	1.000	1.000
(8')	(6) + prop. watching TV	1.000	1.000	0.989	1.000
(9')	(6) + prop. at home	0.970	0.994	1.000	0.956
(10')	(6) + prop. participation time	1.000	1.000	0.997	0.996
(11')	(6) + prop. weekend time	1.000	1.000	1.000	0.957

Note: This table shows the p-values of a test for whether the coefficient estimates of Input_i for each alternative specification are statistically the same as the corresponding ones from Specification (6) in Table C.1. All specifications in this table are in the form of a linear B-Spline with 2 knots placed at 33rd and 67th percentiles of each time input, whenever possible. Alternative specifications: (1') the full list of added controls can be seen in footnote 4; (2') lagged time inputs of all 15 activities; (3') lagged skill measures of other types and interactions of any two skills; (4') full list of added controls can be seen in footnote 6; (5') 30 time inputs (27 original time inputs plus 3 school inputs), whereby the p-value refers to a test of whether the 27 coefficients of the original time inputs are statistically unchanged with respect to specification (6); (6') proportions of each time input spent in educational activities (e.g. reading): 7 additional covariates; (7') proportions of each time input spent in general care (i.e. having meals): 7 additional covariates; (8') proportions of each time input spent watching TV: 7 additional covariates; (9') proportions of each time input spent at home: 14 additional covariates; (10') proportions of each time input that partner actually participates in the activity: 12 additional covariates; (11') proportions of each time input spent during weekends: 15 additional covariates.

D Other Tables and Figures

Table D.1: Noncognitive Skills Loading Factors

	2002	2007
Cheats or tells lies	0.5253	0.5524
Bullies or mean to others	0.5667	0.5159
Feels no sorry after misbehaving	0.4575	0.4500
Breaks things on purpose	0.4853	0.4400
Has sudden changes in mood	0.5623	0.5764
Feels no love	0.5635	0.5606
Too fearful or anxious	0.4754	0.4807
Feels worthless or inferior	0.5937	0.6435
Sad or depressed	0.5860	0.6275
Cries too much	0.3343	0.3772
Easily confused	0.5270	0.5046
Has obsessions	0.5409	0.5877
Rather high strung, tense and nervous	0.5350	0.5187
Argues too much	0.5885	0.5880
Disobedient	0.6004	0.5728
Stubborn, sullen, or irritable	0.5988	0.6413
Has a very strong temper	0.6300	0.6305
Has difficulty concentrating	0.5756	0.5760
Impulsive, or acts without thinking	0.6490	0.6311
Restless or overly active	0.5171	0.5205
Has trouble getting along with other children	0.6204	0.5572
Not liked by other children	0.3998	0.4726
Withdrawn, does not get involved with others	0.4316	0.4537
Clings to adults	0.3193	0.2416
Demands a lot of attention	0.5462	0.5290
Too dependent on others	0.4507	0.4881
Thinks before acting, not impulsive	0.5140	0.5750
Generally well behaved, does what adults request	0.5953	0.5851
Can get over being upset quickly	0.4194	0.5195
Waits turn in games and other activities	0.4613	0.4719
Gets along well with other children	0.5838	0.6149
Admired by other children	0.4902	0.5335
Cheerful, happy	0.4497	0.5750
Tries things for himself/herself	0.3474	0.4255
Does neat, careful work	0.3801	0.4601
Curious and exploring, likes new experiences	0.2676	0.2448

Note: The larger is the factor loading, the larger is the conditional correlation between the variables and the factor (i.e. the measure of noncognitive skills).

Table D.2: Effects of Children's Time Allocation: Noncognitive Skill

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother	0.005 (0.003)	0.005 (0.003)	0.005 (0.003)	0.004 (0.003)	0.005 (0.003)	0.004 (0.003)
Passive time with mother	0.007** (0.003)	0.007** (0.003)	0.007** (0.003)	0.006** (0.003)	0.008** (0.003)	0.007** (0.003)
Active time with father	-0.000 (0.007)	-0.001 (0.007)	-0.000 (0.007)	0.001 (0.007)	0.000 (0.007)	-0.001 (0.007)
Passive time with father	0.011** (0.004)	0.010** (0.004)	0.010** (0.004)	0.010** (0.004)	0.010** (0.004)	0.009** (0.004)
Active time with grandparents	0.004 (0.015)	0.006 (0.015)	0.006 (0.015)	0.005 (0.015)	0.006 (0.016)	0.006 (0.016)
Passive time with grandparents	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.003 (0.006)
Active time with siblings	0.011* (0.007)	0.011* (0.006)	0.011* (0.006)	0.012* (0.006)	0.013* (0.007)	0.013** (0.006)
Passive time with siblings	0.006 (0.004)	0.005 (0.004)	0.005 (0.004)	0.004 (0.004)	0.006 (0.005)	0.005 (0.005)
Active time with friends	0.003 (0.004)	0.002 (0.004)	0.002 (0.004)	0.001 (0.004)	0.001 (0.004)	0.000 (0.004)
Passive time with friends	0.004 (0.004)	0.003 (0.004)	0.003 (0.004)	0.003 (0.004)	0.004 (0.004)	0.003 (0.004)
Self active time	0.007** (0.003)	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)
Self passive time	0.009** (0.003)	0.008** (0.003)	0.008** (0.003)	0.008** (0.003)	0.008** (0.003)	0.008** (0.003)
Active time with others	0.003 (0.006)	0.002 (0.006)	0.003 (0.007)	0.002 (0.007)	0.005 (0.006)	0.005 (0.006)
Passive time with others	-0.003 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.001 (0.006)	-0.002 (0.006)
Don't know or refuse to answer	0.004 (0.004)	0.003 (0.004)	0.003 (0.004)	0.003 (0.004)	0.004 (0.004)	0.004 (0.004)
R-Squared	0.375	0.386	0.388	0.395	0.408	0.418
Observations	1698	1698	1698	1698	1698	1698
Exogeneity test F-statistic	0.913	0.971	0.999	0.994	1.005	1.090
Exogeneity test p-value	0.549	0.484	0.453	0.459	0.447	0.360

The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity.

Table D.3: Type of Controls: Fiorini and Keane (2014)'s Time Inputs

Skills	Significance	Number of Variables	Number of Confounders	Type (a1)	Type (b)	Proportion of Confounders	Proportion of Type (a1)
Math	0.05	91	29	18	11	0.32	0.62
Vocabulary	0.05	91	30	18	12	0.33	0.60
Comprehension	0.05	91	30	18	12	0.33	0.60
Noncognitive	0.05	91	8	4	4	0.09	0.50
Math	0.10	91	32	23	9	0.35	0.72
Vocabulary	0.10	91	31	22	9	0.34	0.71
Comprehension	0.10	91	31	22	9	0.34	0.71
Noncognitive	0.10	91	10	7	3	0.11	0.70

Note: Column 3 shows the total number of variables in our initial pool of potential confounders, which includes lagged test scores, lagged time inputs, child characteristics, parental characteristics, family environmental characteristics, school environmental characteristics, school experience as well as variables related to misreporting of time diaries. Column 4 shows the number of confounders, which are identified if adding a variable significantly change the estimates of time inputs coefficients in a model with only time inputs as regressors (i.e. no controls). Column 5 shows number of type (a1) confounders, which are identified through a regression of a confounder on time inputs and their zero dummy variables: the confounder is of type (a1) if the coefficients of 15 time input dummies are jointly significantly different from zero. Column 6 shows number of type (b) confounders, which are confounders that do not belong to type (a1). Column 7 shows the ratio of number of confounders (i.e. column 4) over number of variables (i.e. column 3). Column 8 shows the ratio of number of type (a1) confounders (i.e. column 5) over number of confounders (i.e. column 4).

Table D.4: Effects of Children's Time Allocation: Math

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother	0.014** (0.003)	0.007** (0.003)	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	0.005* (0.003)
Passive time with mother	0.005** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.005** (0.002)	0.004** (0.002)
Active time with father	0.012** (0.006)	0.013** (0.005)	0.013** (0.005)	0.014** (0.005)	0.016** (0.005)	0.015** (0.005)
Passive time with father	-0.004 (0.004)	-0.003 (0.004)	-0.002 (0.004)	-0.002 (0.004)	0.000 (0.004)	-0.000 (0.004)
Active time with grandparents	0.021** (0.010)	0.020* (0.010)	0.019* (0.011)	0.020* (0.011)	0.020* (0.010)	0.020** (0.010)
Passive time with grandparents	-0.004 (0.005)	-0.005 (0.004)	-0.006 (0.004)	-0.005 (0.004)	-0.004 (0.004)	-0.004 (0.004)
Active time with siblings	-0.007 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.003 (0.005)
Passive time with siblings	-0.002 (0.003)	0.003 (0.003)	0.004 (0.003)	0.004 (0.003)	0.005* (0.003)	0.006* (0.003)
Active time with friends	0.010** (0.003)	0.008** (0.003)	0.007** (0.003)	0.007** (0.003)	0.007** (0.003)	0.005* (0.003)
Passive time with friends	-0.000 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.002 (0.003)	0.001 (0.003)
Self active time	0.005** (0.003)	0.006** (0.002)	0.006** (0.002)	0.006** (0.002)	0.006** (0.002)	0.005** (0.002)
Self passive time	0.002 (0.003)	0.004 (0.002)	0.003 (0.002)	0.003 (0.002)	0.004 (0.002)	0.004* (0.002)
Active time with others	-0.004 (0.006)	-0.002 (0.005)	-0.002 (0.005)	-0.001 (0.005)	0.001 (0.005)	0.001 (0.005)
Passive time with others	0.000 (0.003)	0.000 (0.003)	-0.000 (0.003)	-0.000 (0.003)	0.000 (0.003)	0.001 (0.003)
Don't know or refuse to answer	0.001 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
Child age (months)		-0.011** (0.005)	-0.009* (0.005)	-0.009* (0.005)	-0.010** (0.005)	-0.010** (0.005)
Child age squared		-0.001	-0.002	-0.002	-0.001	-0.001

	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Male	0.049	0.047	0.047	0.053*	0.072**
	(0.031)	(0.031)	(0.031)	(0.032)	(0.031)
Child white	0.064	0.034	0.050	0.033	0.056
	(0.081)	(0.078)	(0.079)	(0.080)	(0.081)
Child black	-0.343**	-0.347**	-0.324**	-0.291**	-0.283**
	(0.083)	(0.081)	(0.081)	(0.083)	(0.084)
Child hispanic	-0.297**	-0.160	-0.144	-0.110	-0.108
	(0.099)	(0.100)	(0.101)	(0.104)	(0.103)
Child birth order	-0.016	-0.014	-0.009	-0.011	-0.006
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)
Born in US	-0.127	-0.102	-0.114	-0.081	-0.095
	(0.142)	(0.136)	(0.140)	(0.142)	(0.144)
Child BMI	-0.003	-0.002	-0.001	-0.001	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mother education		0.042**	0.037**	0.040**	0.037**
		(0.008)	(0.009)	(0.009)	(0.009)
Mother age		-0.043	-0.042	-0.044	-0.052*
		(0.029)	(0.029)	(0.030)	(0.029)
Mother age at child birth		0.000	-0.005	-0.005	-0.003
		(0.006)	(0.007)	(0.007)	(0.007)
Mother age squared		0.001*	0.001*	0.001*	0.001**
		(0.000)	(0.000)	(0.000)	(0.000)
Mother married at child birth			-0.080	-0.101**	-0.102**
			(0.049)	(0.049)	(0.048)
Total family income (in \$10,000s)			0.001	0.0003**	0.002*
			(0.001)	(0.001)	(0.001)
Number of siblings			-0.007	-0.005	-0.004
			(0.005)	(0.005)	(0.005)
No parent lives with child			-0.008	-0.019	-0.007
			(0.039)	(0.038)	(0.038)
Grandparents live with child			0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)
Father education			0.009	0.013	0.008
			(0.009)	(0.009)	(0.009)
Father age			-0.005	-0.006	-0.005

					(0.004)	(0.004)	(0.004)
Father age at child birth					0.008*	0.009**	0.007*
					(0.004)	(0.004)	(0.004)
Annual tutoring cost (in \$100s)						-0.017**	-0.017**
						(0.004)	(0.004)
Annual cost of school supplies (in \$100s)						-0.005	-0.005
						(0.007)	(0.007)
Annual cost of extracurricular lessons (in \$100s)						0.001	0.000
						(0.003)	(0.003)
Annual cost of clothes (in \$100s)						-0.001	-0.002
						(0.003)	(0.003)
Musical instrument at home						-0.000**	-0.000
						(0.000)	(0.000)
Desk at home						0.157**	0.131**
						(0.057)	(0.057)
Working TV at home						0.000**	0.000*
						(0.000)	(0.000)
Neighborhood quality rating (1-5)						-0.018	-0.012
						(0.023)	(0.022)
Neighborhood safety rating (1-5)						0.030	0.030
						(0.022)	(0.022)
Number of books mother read last year						-0.011	-0.017
						(0.013)	(0.013)
Number of mother's weekly working hours						-0.001	-0.002
						(0.002)	(0.002)
Number of mother's weekly working days						0.005	0.012
						(0.016)	(0.015)
Ever attended private school							0.042
							(0.045)
Ever joined a gifted program							0.276**
							(0.037)
Number of school changes last year							-0.050
							(0.063)
R-Square	0.503	0.617	0.627	0.631	0.646	0.660	
Observations	1698	1698	1698	1698	1698	1698	
Exogeneity test F-statistic	5.237**	1.801**	1.611*	1.328	1.334	1.254	

Exogeneity test p-value	0.000	0.030	0.064	0.177	0.173	0.224
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The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity. Estimates for year indicators and grade indicators are not shown in the table above.

Table D.5: Effects of Children's Time Allocation: Vocabulary

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother	0.008** (0.003)	0.002 (0.003)	0.001 (0.003)	0.001 (0.003)	0.002 (0.003)	0.001 (0.003)
Passive time with mother	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)	0.001 (0.002)	0.001 (0.002)
Active time with father	0.004 (0.006)	0.007 (0.005)	0.007 (0.006)	0.007 (0.006)	0.008 (0.006)	0.007 (0.005)
Passive time with father	-0.007* (0.004)	-0.002 (0.004)	-0.002 (0.004)	-0.001 (0.004)	-0.000 (0.004)	-0.001 (0.004)
Active time with grandparents	0.022** (0.010)	0.018 (0.012)	0.020 (0.012)	0.020 (0.012)	0.020* (0.012)	0.020* (0.012)
Passive time with grandparents	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.003 (0.005)
Active time with siblings	-0.014** (0.007)	-0.010* (0.006)	-0.009 (0.006)	-0.009 (0.006)	-0.009 (0.006)	-0.009 (0.006)
Passive time with siblings	-0.006 (0.004)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.003 (0.003)	0.003 (0.003)
Active time with friends	0.002 (0.004)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.001 (0.003)
Passive time with friends	-0.007** (0.003)	-0.005* (0.003)	-0.006** (0.003)	-0.006** (0.003)	-0.005* (0.003)	-0.005* (0.003)
Self active time	-0.003 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Self passive time	-0.002 (0.003)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Active time with others	-0.014** (0.005)	-0.010** (0.004)	-0.010** (0.004)	-0.010** (0.004)	-0.008* (0.004)	-0.008* (0.004)
Passive time with others	-0.009** (0.004)	-0.006 (0.004)	-0.006* (0.004)	-0.006 (0.004)	-0.005 (0.004)	-0.005 (0.004)
Don't know or refuse to answer	-0.007** (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.003)
Child age (months)		-0.020** (0.005)	-0.017** (0.005)	-0.017** (0.005)	-0.019** (0.005)	-0.019** (0.005)
Child age squared		0.000	-0.000	-0.000	0.000	0.001

	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Male	-0.060*	-0.067**	-0.070**	-0.061*	-0.057*
	(0.033)	(0.033)	(0.034)	(0.033)	(0.033)
Child white	0.126*	0.102	0.094	0.099	0.116
	(0.073)	(0.073)	(0.074)	(0.073)	(0.072)
Child black	-0.251**	-0.242**	-0.213**	-0.184**	-0.168**
	(0.075)	(0.077)	(0.077)	(0.075)	(0.074)
Child hispanic	-0.312**	-0.174*	-0.202*	-0.161	-0.141
	(0.097)	(0.102)	(0.105)	(0.105)	(0.104)
Child birth order	-0.005	-0.008	-0.006	-0.005	0.000
	(0.018)	(0.020)	(0.021)	(0.021)	(0.021)
Born in US	-0.077	-0.056	-0.059	-0.037	-0.036
	(0.108)	(0.110)	(0.110)	(0.112)	(0.110)
Child BMI	-0.004	-0.003	-0.003	-0.003	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mother education		0.039**	0.040**	0.043**	0.041**
		(0.009)	(0.010)	(0.010)	(0.010)
Mother age		-0.045	-0.056*	-0.065*	-0.070**
		(0.033)	(0.034)	(0.033)	(0.033)
Mother age at child birth		0.011	0.011	0.014*	0.014*
		(0.008)	(0.008)	(0.008)	(0.008)
Mother age squared		0.000	0.001*	0.001*	0.001**
		(0.000)	(0.000)	(0.000)	(0.000)
Mother married at child birth			0.017	0.001	-0.003
			(0.052)	(0.051)	(0.051)
Total family income (in \$10,000s)			0.001	0.001	0.001
			(0.002)	(0.002)	(0.002)
Number of siblings			-0.004	-0.003	-0.003
			(0.006)	(0.006)	(0.006)
No parent lives with child			0.004	-0.009	-0.010
			(0.039)	(0.039)	(0.039)
Grandparents live with child			0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)
Father education			-0.004	-0.004	-0.007
			(0.010)	(0.009)	(0.009)
Father age			-0.004	-0.004	-0.002

					(0.004)	(0.004)	(0.004)
Father age at child birth					-0.000	-0.001	-0.002
					(0.005)	(0.005)	(0.005)
Annual tutoring cost (in \$100s)						-0.020**	-0.021**
						(0.005)	(0.005)
Annual cost of school supplies (in \$100s)						-0.007	-0.008
						(0.007)	(0.007)
Annual cost of extracurricular lessons (in \$100s)						0.000	0.000
						(0.002)	(0.002)
Annual cost of clothes (in \$100s)						0.006*	0.006*
						(0.003)	(0.003)
Musical instrument at home						-0.000**	-0.000**
						(0.000)	(0.000)
Desk at home						0.052	0.036
						(0.067)	(0.066)
Working TV at home						0.000	0.000
						(0.000)	(0.000)
Neighborhood quality rating (1-5)						0.042*	0.047**
						(0.023)	(0.023)
Neighborhood safety rating (1-5)						-0.018	-0.020
						(0.023)	(0.022)
Number of books mother read last year						-0.035**	-0.039**
						(0.014)	(0.014)
Number of mother's weekly working hours						0.002	0.002
						(0.002)	(0.002)
Number of mother's weekly working days						-0.014	-0.012
						(0.017)	(0.017)
Ever attended private school							0.133**
							(0.042)
Ever joined a gifted program							0.130**
							(0.035)
Number of school changes last year							-0.016
							(0.069)
R-Square	0.509	0.602	0.611	0.613	0.629	0.635	
Observations	1698	1698	1698	1698	1698	1698	
Exogeneity test F-statistic	3.559**	1.219	1.039	0.899	0.881	0.878	

Exogeneity test p-value	0.000	0.249	0.411	0.564	0.585	0.589
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The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity. Estimates for year indicators and grade indicators are not shown in the table above.

Table D.6: Effects of Children's Time Allocation: Comprehension

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother	0.010** (0.003)	0.005 (0.003)	0.003 (0.003)	0.002 (0.003)	0.002 (0.003)	0.001 (0.003)
Passive time with mother	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.003)
Active time with father	-0.002 (0.007)	-0.001 (0.006)	-0.001 (0.007)	-0.001 (0.007)	0.001 (0.007)	0.000 (0.007)
Passive time with father	0.000 (0.004)	0.005 (0.004)	0.006 (0.004)	0.007 (0.004)	0.008* (0.004)	0.008* (0.004)
Active time with grandparents	0.031** (0.010)	0.029** (0.011)	0.032** (0.011)	0.032** (0.011)	0.032** (0.011)	0.032** (0.010)
Passive time with grandparents	-0.007 (0.005)	-0.007 (0.005)	-0.006 (0.006)	-0.006 (0.006)	-0.006 (0.006)	-0.006 (0.006)
Active time with siblings	-0.019** (0.007)	-0.017** (0.006)	-0.016** (0.007)	-0.016** (0.007)	-0.015** (0.007)	-0.015** (0.007)
Passive time with siblings	-0.004 (0.004)	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	0.003 (0.004)	0.003 (0.004)
Active time with friends	0.003 (0.004)	0.002 (0.004)	0.001 (0.003)	0.001 (0.003)	-0.000 (0.003)	-0.001 (0.003)
Passive time with friends	0.000 (0.003)	0.000 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.001 (0.003)	-0.001 (0.003)
Self active time	0.001 (0.003)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.000 (0.002)
Self passive time	0.002 (0.003)	0.001 (0.003)	0.001 (0.003)	-0.000 (0.003)	0.000 (0.003)	0.000 (0.003)
Active time with others	-0.009 (0.006)	-0.008 (0.006)	-0.008 (0.005)	-0.007 (0.005)	-0.005 (0.005)	-0.005 (0.005)
Passive time with others	-0.010** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.008** (0.004)	-0.008** (0.004)
Don't know or refuse to answer	0.001 (0.004)	0.005 (0.004)	0.004 (0.004)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
Child age (months)		-0.021** (0.006)	-0.018** (0.005)	-0.019** (0.005)	-0.020** (0.005)	-0.020** (0.005)
Child age squared		0.004* (0.004)	0.003 (0.004)	0.003* (0.004)	0.004** (0.004)	0.004** (0.004)

	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Male	-0.104**	-0.112**	-0.110**	-0.110**	-0.104**
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
Child white	0.202**	0.181**	0.172*	0.188**	0.212**
	(0.091)	(0.090)	(0.090)	(0.090)	(0.089)
Child black	-0.181**	-0.157*	-0.083	-0.012	0.007
	(0.091)	(0.090)	(0.090)	(0.091)	(0.089)
Child hispanic	-0.314**	-0.167	-0.157	-0.079	-0.074
	(0.107)	(0.107)	(0.110)	(0.113)	(0.113)
Child birth order	-0.007	-0.021	-0.024	-0.021	-0.018
	(0.018)	(0.019)	(0.020)	(0.020)	(0.020)
Born in US	-0.161	-0.150	-0.155	-0.121	-0.137
	(0.127)	(0.123)	(0.119)	(0.120)	(0.117)
Child BMI	-0.008**	-0.006*	-0.007**	-0.007**	-0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mother education		0.041**	0.031**	0.035**	0.033**
		(0.009)	(0.010)	(0.010)	(0.010)
Mother age		-0.012	-0.031	-0.030	-0.035
		(0.033)	(0.034)	(0.034)	(0.033)
Mother age at child birth		0.007	0.004	0.002	0.004
		(0.008)	(0.009)	(0.009)	(0.009)
Mother age squared		0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Mother married at child birth			0.035	0.016	0.015
			(0.055)	(0.054)	(0.054)
Total family income (in \$10,000s)			0.001	0.002	0.001
			(0.001)	(0.001)	(0.001)
Number of siblings			0.009	0.011*	0.010*
			(0.006)	(0.006)	(0.006)
No parent lives with child			0.040	0.030	0.040
			(0.045)	(0.045)	(0.045)
Grandparents live with child			0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)
Father education			0.020*	0.020*	0.015
			(0.011)	(0.011)	(0.011)
Father age			-0.000	-0.001	0.001

					(0.005)	(0.005)	(0.005)
Father age at child birth					0.000	0.001	-0.001
					(0.005)	(0.005)	(0.005)
Annual tutoring cost (in \$100s)						-0.012**	-0.012**
						(0.005)	(0.005)
Annual cost of school supplies (in \$100s)						-0.005	-0.004
						(0.009)	(0.009)
Annual cost of extracurricular lessons (in \$100s)						0.006**	0.005*
						(0.003)	(0.003)
Annual cost of clothes (in \$100s)						0.000	-0.001
						(0.004)	(0.004)
Musical instrument at home						-0.000*	-0.000
						(0.000)	(0.000)
Desk at home						0.159**	0.134*
						(0.075)	(0.073)
Working TV at home						0.000	0.000
						(0.000)	(0.000)
Neighborhood quality rating (1-5)						0.021	0.028
						(0.025)	(0.025)
Neighborhood safety rating (1-5)						0.042*	0.044*
						(0.024)	(0.024)
Number of books mother read last year						-0.012	-0.019
						(0.015)	(0.015)
Number of mother's weekly working hours						-0.000	-0.001
						(0.002)	(0.002)
Number of mother's weekly working days						0.016	0.022
						(0.019)	(0.018)
Ever attended private school							0.039
							(0.049)
Ever joined a gifted program							0.250**
							(0.039)
Number of school changes last year							-0.059
							(0.077)
R-Square	0.443	0.516	0.529	0.536	0.554	0.565	
Observations	1698	1698	1698	1698	1698	1698	
Exogeneity test F-statistic	3.332**	1.548*	1.268	1.111	1.013	1.020	

Exogeneity test p-value	0.000	0.081	0.214	0.340	0.438	0.431
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The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. All standard errors are corrected for heteroskedasticity. Estimates for year indicators and grade indicators are not shown in the table above.

Table D.7: B-spline Estimation Results: Math

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother (0,2.3)	0.044 (0.053)	0.029 (0.048)	0.036 (0.047)	0.028 (0.047)	0.024 (0.048)	0.041 (0.047)
Active time with mother (2.3,9.5)	0.005 (0.009)	0.001 (0.008)	-0.001 (0.008)	-0.001 (0.008)	0.000 (0.008)	-0.003 (0.008)
Active time with mother (9.5,.)	0.014** (0.004)	0.008** (0.004)	0.008** (0.004)	0.007** (0.004)	0.007* (0.004)	0.006 (0.004)
Passive time with mother (0,14.6)	0.015** (0.007)	0.011* (0.006)	0.011* (0.006)	0.011* (0.006)	0.012* (0.006)	0.013** (0.006)
Passive time with mother (14.6,26.9)	0.005 (0.006)	0.005 (0.005)	0.004 (0.005)	0.005 (0.005)	0.004 (0.005)	0.002 (0.005)
Passive time with mother (26.9,.)	0.001 (0.003)	0.001 (0.003)	0.002 (0.003)	0.002 (0.003)	0.003 (0.003)	0.003 (0.003)
Active time with father (0,.)	0.011* (0.006)	0.012** (0.005)	0.012** (0.005)	0.013** (0.005)	0.015** (0.005)	0.014** (0.005)
Passive time with father (0,1.0)	-0.039 (0.144)	0.084 (0.141)	0.126 (0.137)	0.147 (0.137)	0.131 (0.137)	0.131 (0.134)
Passive time with father (1.0,.)	-0.004 (0.004)	-0.002 (0.004)	-0.002 (0.004)	-0.002 (0.004)	-0.000 (0.004)	-0.001 (0.004)
Active time with grandparents (0,.)	0.023** (0.010)	0.022** (0.010)	0.021* (0.011)	0.021** (0.011)	0.021** (0.010)	0.021** (0.010)
Passive time with grandparents (0,.)	-0.003 (0.005)	-0.004 (0.004)	-0.005 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.004 (0.004)
Active time with siblings (0,.)	-0.006 (0.005)	-0.003 (0.005)	-0.002 (0.005)	-0.002 (0.005)	-0.002 (0.005)	-0.002 (0.005)
Passive time with siblings (0,2.3)	-0.097** (0.049)	-0.089* (0.047)	-0.085* (0.046)	-0.089** (0.045)	-0.095** (0.045)	-0.090** (0.044)
Passive time with siblings (2.3,.)	0.001 (0.004)	0.006* (0.003)	0.006* (0.003)	0.007* (0.003)	0.008** (0.004)	0.009** (0.003)
Active time with friends (0,4)	-0.019 (0.030)	-0.006 (0.029)	-0.011 (0.029)	-0.010 (0.029)	-0.012 (0.029)	-0.016 (0.028)
Active time with friends (4,.)	0.012** (0.003)	0.009** (0.003)	0.009** (0.003)	0.009** (0.003)	0.009** (0.003)	0.007** (0.003)
Passive time with friends (0,5)	-0.043**	-0.032**	-0.034**	-0.031**	-0.029**	-0.032**

	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Passive time with friends (5,.)	0.004	0.005	0.004	0.004	0.005*	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self active time (0,34.6)	0.007*	0.003	0.003	0.004	0.004	0.003
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self active time (34.6,37.9)	0.015	0.020	0.018	0.019	0.021	0.013
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.013)
Self active time (37.9,.)	0.003	0.007**	0.006**	0.006**	0.007**	0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self passive time (0,7.0)	-0.030*	-0.015	-0.014	-0.014	-0.019	-0.019
	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)	(0.013)
Self passive time (7.0,11.5)	0.003	0.009	0.010	0.011	0.012	0.011
	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Self passive time (11.5,.)	0.005	0.004	0.004	0.003	0.004	0.004*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Active time with others (0,.)	-0.005	-0.003	-0.002	-0.001	0.001	0.001
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Passive time with others (0,1)	-0.292**	-0.228	-0.233	-0.230	-0.165	-0.210
	(0.145)	(0.148)	(0.144)	(0.144)	(0.139)	(0.134)
Passive time with others (1,.)	0.002	0.002	0.001	0.001	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Don't know or refuse to answer(0,1.25)	-0.178	-0.093	-0.119	-0.122	-0.148	-0.136
	(0.113)	(0.095)	(0.095)	(0.096)	(0.098)	(0.097)
Don't know or refuse to answer(1.25,.)	0.003	0.005	0.005	0.005	0.006*	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
R-squared	0.512	0.623	0.632	0.636	0.652	0.666
Observations	1698	1698	1698	1698	1698	1698
Exogeneity test F-statistic	2.392**	1.431	1.553*	1.487	1.591*	1.561*
Exogeneity test p-value	0.002	0.124	0.079	0.102	0.069	0.077

The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. In the first column, the parentheses shown after each time input indicates the time intervals. For example, (0,2.5) means between 0 hours and 2.5 hours per week. Depending on the distribution, some time inputs have less than three time intervals because the time input was not complex enough to accommodate two knots. Standard errors corrected for heteroskedasticity are in parentheses. * Significant at the 10% level. ** Significant at the 5% level.

Table D.8: B-spline Estimation Results: Vocabulary

	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother (0,2.3)	0.039 (0.052)	0.024 (0.048)	0.029 (0.047)	0.026 (0.047)	0.022 (0.048)	0.031 (0.047)
Active time with mother (2.3,9.5)	0.012 (0.010)	0.007 (0.009)	0.005 (0.009)	0.005 (0.009)	0.008 (0.009)	0.007 (0.009)
Active time with mother (9.5,.)	0.005 (0.004)	-0.000 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.002 (0.003)
Passive time with mother (0,14.6)	0.005 (0.007)	0.001 (0.006)	0.001 (0.006)	0.001 (0.006)	0.003 (0.006)	0.004 (0.006)
Passive time with mother (14.6,26.9)	-0.001 (0.006)	0.003 (0.005)	0.002 (0.005)	0.002 (0.005)	0.002 (0.005)	0.001 (0.005)
Passive time with mother (26.9,.)	-0.004 (0.004)	-0.003 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.001 (0.003)
Active time with father (0,.)	0.004 (0.007)	0.007 (0.006)	0.007 (0.006)	0.007 (0.006)	0.008 (0.006)	0.007 (0.006)
Passive time with father (0,1.0)	0.064 (0.207)	0.165 (0.199)	0.214 (0.196)	0.213 (0.200)	0.209 (0.198)	0.204 (0.196)
Passive time with father (1.0,.)	-0.007* (0.004)	-0.003 (0.004)	-0.002 (0.004)	-0.002 (0.004)	-0.001 (0.004)	-0.001 (0.004)
Active time with grandparents (0,.)	0.023** (0.010)	0.019 (0.012)	0.021* (0.012)	0.021* (0.012)	0.021* (0.012)	0.021* (0.012)
Passive time with grandparents (0,.)	-0.005 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.002 (0.005)	-0.002 (0.005)
Active time with siblings (0,.)	-0.014** (0.007)	-0.009 (0.006)	-0.009 (0.006)	-0.008 (0.006)	-0.008 (0.006)	-0.008 (0.006)
Passive time with siblings (0,2.3)	-0.073 (0.054)	-0.072 (0.049)	-0.069 (0.048)	-0.072 (0.048)	-0.084* (0.047)	-0.083* (0.047)
Passive time with siblings (2.3,.)	-0.003 (0.004)	0.004 (0.003)	0.004 (0.003)	0.004 (0.004)	0.006 (0.004)	0.006* (0.003)
Active time with friends (0,4)	-0.014 (0.031)	0.003 (0.031)	-0.005 (0.030)	-0.005 (0.031)	-0.009 (0.030)	-0.011 (0.030)
Active time with friends (4,.)	0.004 (0.004)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Passive time with friends (0,5)	-0.042**	-0.033**	-0.034**	-0.033**	-0.035**	-0.035**

	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Passive time with friends (5,.)	-0.003	-0.002	-0.003	-0.003	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self active time (0,34.6)	-0.000	-0.001	-0.000	-0.000	-0.000	-0.001
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self active time (34.6,37.9)	-0.025	-0.011	-0.012	-0.013	-0.014	-0.017
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Self active time (37.9,.)	-0.001	0.001	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self passive time (0,7.0)	-0.004	0.005	0.006	0.005	-0.000	-0.000
	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Self passive time (7.0,11.5)	-0.007	-0.002	-0.001	-0.001	0.002	0.001
	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Self passive time (11.5,.)	-0.000	-0.001	-0.002	-0.002	-0.002	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Active time with others (0,.)	-0.014**	-0.010**	-0.010**	-0.010**	-0.008*	-0.008*
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Passive time with others (0,1)	-0.137	-0.078	-0.086	-0.080	0.001	-0.006
	(0.136)	(0.118)	(0.119)	(0.118)	(0.115)	(0.115)
Passive time with others (1,.)	-0.008*	-0.005	-0.006	-0.006	-0.005	-0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Don't know or refuse to answer(0,1.25)	0.024	0.074	0.058	0.071	0.059	0.058
	(0.112)	(0.097)	(0.096)	(0.098)	(0.095)	(0.096)
Don't know or refuse to answer(1.25,.)	-0.007**	-0.002	-0.003	-0.003	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
R-squared	0.513	0.605	0.614	0.616	0.633	0.638
Observations	1698	1698	1698	1698	1698	1698
Exogeneity test F-statistic	1.470	1.234	1.297	1.258	1.263	1.242
Exogeneity test p-value	0.108	0.239	0.195	0.221	0.218	0.233

The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. In the first column, the parentheses shown after each time input indicates the time intervals. For example, (0,2.5) means between 0 hours and 2.5 hours per week. Depending on the distribution, some time inputs have less than three time intervals because the time input was not complex enough to accommodate two knots. Standard errors corrected for heteroskedasticity are in parentheses. * Significant at the 10% level. ** Significant at the 5% level.

Table D.9: B-spline Estimation Results: Comprehension

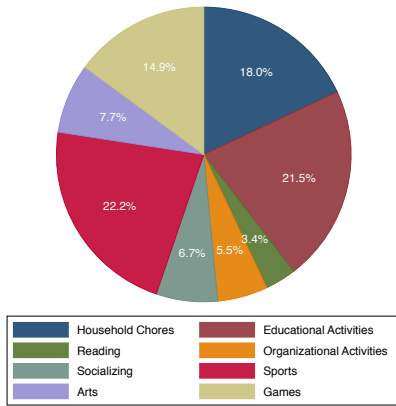
	(1)	(2)	(3)	(4)	(5)	(6)
Active time with mother (0,2.3)	0.043 (0.055)	0.013 (0.051)	0.019 (0.051)	0.015 (0.051)	0.015 (0.052)	0.027 (0.052)
Active time with mother (2.3,9.5)	0.017* (0.010)	0.014 (0.010)	0.012 (0.010)	0.011 (0.010)	0.012 (0.010)	0.010 (0.010)
Active time with mother (9.5,.)	0.005 (0.004)	0.000 (0.004)	-0.001 (0.004)	-0.002 (0.004)	-0.003 (0.004)	-0.004 (0.004)
Passive time with mother (0,14.6)	0.005 (0.008)	0.003 (0.007)	0.002 (0.007)	0.001 (0.007)	0.003 (0.007)	0.004 (0.007)
Passive time with mother (14.6,26.9)	0.010 (0.006)	0.012** (0.006)	0.011** (0.005)	0.011* (0.006)	0.010* (0.005)	0.007 (0.005)
Passive time with mother (26.9,.)	-0.011** (0.004)	-0.011** (0.004)	-0.011** (0.004)	-0.011** (0.004)	-0.010** (0.004)	-0.009** (0.004)
Active time with father (0,.)	-0.003 (0.007)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)	0.001 (0.007)	-0.000 (0.007)
Passive time with father (0,1.0)	-0.014 (0.202)	0.093 (0.199)	0.145 (0.198)	0.168 (0.200)	0.116 (0.204)	0.120 (0.200)
Passive time with father (1.0,.)	0.002 (0.004)	0.006 (0.004)	0.007 (0.004)	0.007* (0.004)	0.009** (0.004)	0.009** (0.004)
Active time with grandparents (0,.)	0.034** (0.010)	0.032** (0.010)	0.035** (0.011)	0.035** (0.011)	0.035** (0.011)	0.035** (0.010)
Passive time with grandparents (0,.)	-0.005 (0.005)	-0.006 (0.005)	-0.004 (0.005)	-0.005 (0.006)	-0.004 (0.006)	-0.004 (0.006)
Active time with siblings (0,.)	-0.018** (0.007)	-0.016** (0.006)	-0.015** (0.006)	-0.014** (0.007)	-0.014** (0.007)	-0.014** (0.007)
Passive time with siblings (0,2.3)	-0.081 (0.053)	-0.071 (0.049)	-0.065 (0.048)	-0.064 (0.049)	-0.071 (0.046)	-0.065 (0.045)
Passive time with siblings (2.3,.)	-0.000 (0.004)	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.006 (0.004)	0.006 (0.004)
Active time with friends (0,4)	0.017 (0.034)	0.028 (0.032)	0.020 (0.031)	0.020 (0.032)	0.010 (0.032)	0.004 (0.032)
Active time with friends (4,.)	0.004 (0.004)	0.002 (0.004)	0.002 (0.004)	0.001 (0.004)	0.001 (0.004)	0.000 (0.004)
Passive time with friends (0,5)	-0.045**	-0.045**	-0.046**	-0.041**	-0.041**	-0.044**

	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Passive time with friends (5,.)	0.006	0.006*	0.005	0.005	0.004	0.004
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self active time (0,34.6)	0.002	0.001	0.002	0.002	0.002	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Self active time (34.6,37.9)	-0.020	-0.010	-0.010	-0.012	-0.013	-0.019
	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Self active time (37.9,.)	0.005	0.005	0.005	0.005	0.005	0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Self passive time (0,7.0)	-0.021	-0.017	-0.015	-0.021	-0.024	-0.022
	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)
Self passive time (7.0,11.5)	0.011	0.009	0.009	0.010	0.009	0.008
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Self passive time (11.5,.)	0.003	0.003	0.001	0.001	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Active time with others (0,.)	-0.009	-0.007	-0.007	-0.006	-0.005	-0.004
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Passive time with others (0,1)	-0.575**	-0.563**	-0.563**	-0.551**	-0.468**	-0.502**
	(0.186)	(0.184)	(0.182)	(0.181)	(0.166)	(0.162)
Passive time with others (1,.)	-0.006*	-0.005	-0.005	-0.005	-0.004	-0.004
	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Don't know or refuse to answer(0,1.25)	-0.153	-0.086	-0.105	-0.105	-0.126	-0.108
	(0.124)	(0.116)	(0.116)	(0.120)	(0.123)	(0.124)
Don't know or refuse to answer(1.25,.)	0.004	0.007*	0.006*	0.006*	0.007*	0.006*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
R-squared	0.457	0.530	0.542	0.549	0.565	0.576
Observations	1698	1698	1698	1698	1698	1698
Exogeneity test F-statistic	1.749**	1.373	1.456	1.382	1.296	1.330
Exogeneity test p-value	0.037	0.152	0.114	0.147	0.196	0.175

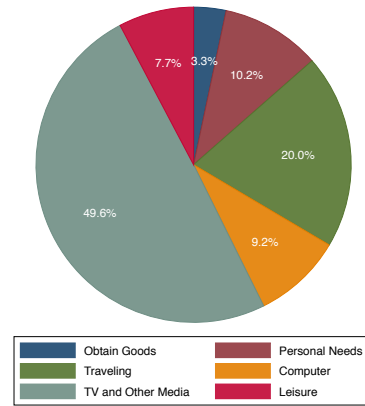
The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for the lagged corresponding input; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables. In the first column, the parentheses shown after each time input indicates the time intervals. For example, (0,2.5) means between 0 hours and 2.5 hours per week. Depending on the distribution, some time inputs have less than three time intervals because the time input was not complex enough to accommodate two knots. Standard errors corrected for heteroskedasticity are in parentheses. * Significant at the 10% level. ** Significant at the 5% level.

Figure D.1: Activity Composition

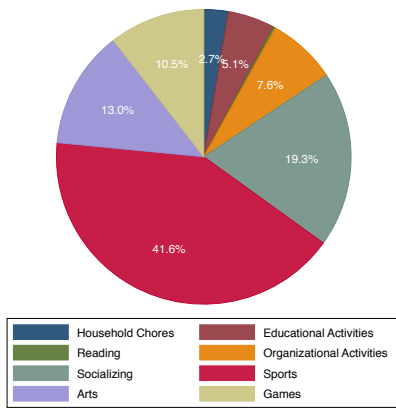
(a) Active Time with Siblings



(b) Passive Time with Siblings



(c) Active Time with Friends



(d) Passive Time with Friends

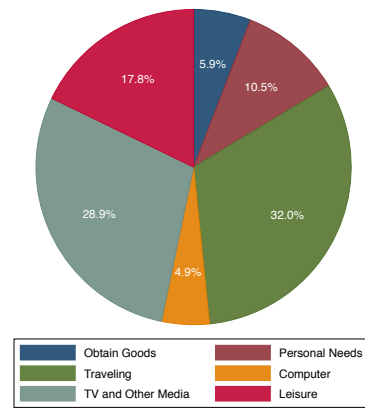
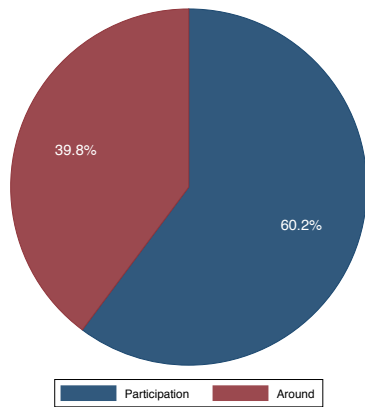


Figure D.2: Activity Composition

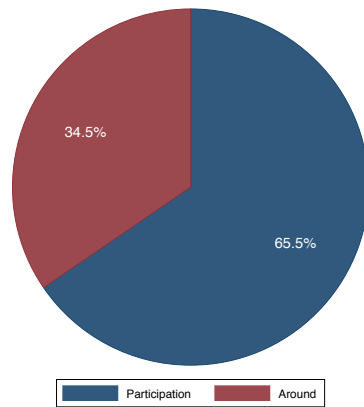


Figure D.3: Participation Time

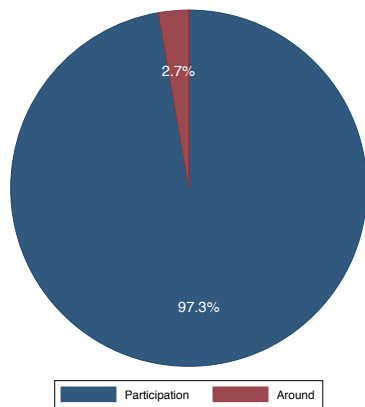
(a) Active Time with Siblings



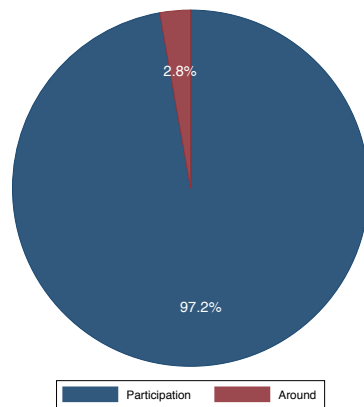
(b) Passive Time with Siblings



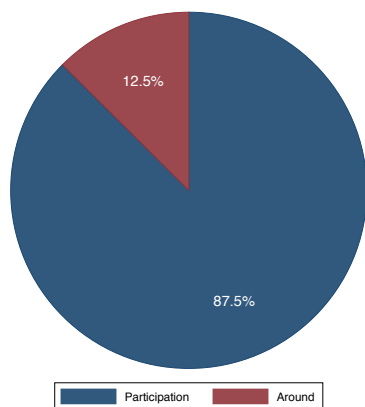
(c) Active Time with Friends



(d) Passive Time with Friends



(e) Active Time with Others



(f) Passive Time with Others

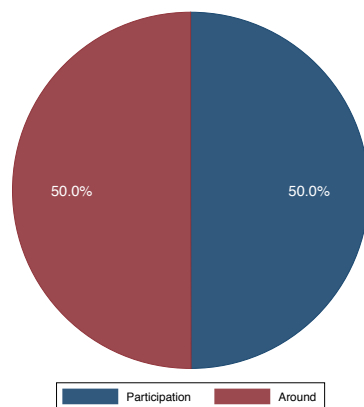
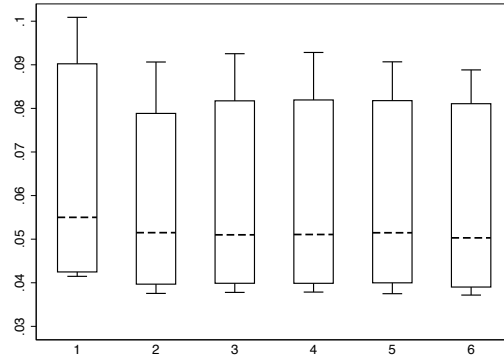
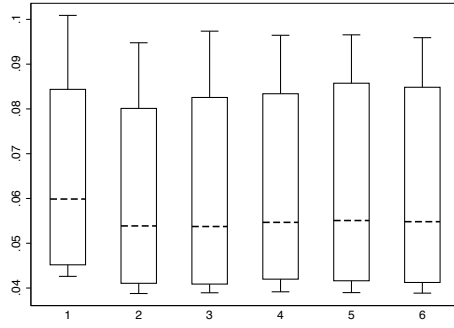


Figure D.4: Average Standard Error of Time Input Indicators

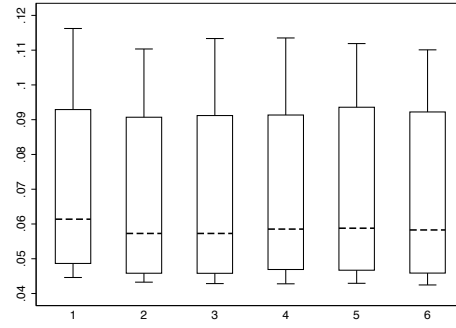
(a) Math Skill



(b) Vocabulary Skill



(c) Comprehension Skill



Note: In each plot, the horizontal axis represents the specifications we specify in the main result section, and the vertical axis represents the distribution of the standard errors of the 15 time input dummy variables for a given specification. The box shows the interquartile range (25th-75th) with median highlighted (i.e. the horizontal line inside the box). The caps show upper adjacent value and lower adjacent value separately (the upper and lower adjacent values are as defined in Turkey (1977)). The specifications above refer to the ones used in Section 4 of the paper. Each specification contains different control variables: (1) no controls, except for lagged skill; (2) child characteristics; (3) mother demographic characteristics; (4) family demographic characteristics; (5) family environmental characteristics; (6) child's school experience. See footnote 40 of the paper for a full description of the control variables.