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Child Health Insurance Coverage and Household Activity toward Child Development in Four South American Countries

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Abstract

Objectives—We evaluate the association between child health insurance coverage and household activities that enhance child development.

Methods—We use micro-level data on a unique sample of 2,370 children from four South American countries. Data were collected by physicians via in-person interviews with the mothers. The regression models compare insured and uninsured children seen within the *same* pediatric care practice for routine well-child care and adjust for several demographic and socioeconomic characteristics. We also stratify these analyses by selective household demographic and socioeconomic characteristics and by country.

Results—We find that insurance coverage is associated with increasingly engaging the child in development-enhancing household activity in the total sample. This association significantly varies with ethnic ancestry and is more pronounced for children of Native or African ancestry. When stratifying by country, a significant positive association is observed for Argentina, with two other countries having positive but insignificant associations.

Conclusions—The results suggest that insurance coverage is associated with enhanced household activity toward child development. However, other data and research are needed to estimate the causal relationship.

Keywords

Health insurance; child health; child development; household activity; household investments; parent-child engagement

Several studies have shown improvements in children's access to routine and preventive healthcare with insurance expansions in both developed and less developed settings (1–5). However, little is known about the relationship between child health insurance coverage and household activities that are relevant for child development. Specifically, not much known about whether insurance coverage is related at all to engaging the child in activities within the household that are expected to enhance child development such as reading to the child and playing activities (6).

Whether the child has insurance coverage or not may relate to the intensity of household activities that are relevant for child development through several correlational and causal pathways. Beginning with the correlational relationship, parents who have stronger preferences for and greater knowledge about investing in their child's health and

development may be more likely to obtain health insurance coverage for their child but also to provide a healthier household environment for their child's development by engaging the child in more activities. Similarly, parents of children with health or developmental problems may be more likely to seek insurance coverage for their children (adverse self-selection) but also engage them in more activities to improve their development. Furthermore, parents of higher socioeconomic status may have better access to insurance coverage but also greater awareness of the benefits of household activities for child development. In all these cases, insurance does not have any causal effects on household activity but is only correlated with activity due to other variables.

On the other hand, insurance may have causal effects on the extent of engaging the child in development-enhancing household activities. Through improved access to routine pediatric care, parents of insured children may gain knowledge from pediatricians and primary care providers about optimal household activities that positively affect child development. Indeed, routine pediatric care guidelines recommend that pediatricians screen the child for developmental problems early in life and counsel parents about household activities to enhance child development (7). Furthermore, insurance may enhance the content and quality of routine pediatric care (5). Also, insurance plans and programs may directly provide information to parents about household activities to enhance child development such as through health promotion and awareness-raising campaigns.

All of the above discussed correlational and causal pathways are expected to result in a positive relationship between child insurance coverage and household activity toward child development. However, studies of this relationship are, to our knowledge, rare. We are aware of no study that directly examines this relationship. The lack of empirical evaluation highlights the need for such research in order to better understand the pathways through which insurance coverage may affect child health and development.

This paper examines the association between child health insurance coverage and the extent of engaging the child in development-enhancing household activities. We hypothesize that insurance coverage is associated with increased household activity toward child development.

Methods

Data sample

The data for this paper are from a study of early normal child neurodevelopment in South America. That study, referred to hereafter as the "parent study", obtained developmental data between 2005 and 2006 from a large sample of children between ages 3 and 24 months from South America (8). The sample we employ includes 2,370 children from Argentina (784 children), Brazil (615), Ecuador (540) and Chile (431). The parent study identified and enrolled infants without major health complications who were attending 30 pediatric practices for routine well-child visits. The pediatric practices were conveniently selected because they are attended by physicians (mostly pediatricians) who are affiliated with the Latin American Collaborative Study of Congenital Anomalies (ECLAMC), a South American epidemiological surveillance and research network, which has been in operation since 1967 and has a long-standing history of researching birth defects and infant health (9–11). ECLAMC-affiliated physicians routinely monitor the occurrence of birth defects among infants born at their hospitals and obtain health and epidemiological data on affected and unaffected births. About 82% of the hospitals attended by the physicians who participated in the parent study are publicly owned; 29%, 40% and 7% are national, provincial and municipal hospitals, respectively. About 19% of these hospitals are specialized in maternity care, and about 53% are affiliated with a university. Even though the pediatric practices may

not be nationally representative because they were conveniently selected for the parent study and located in urban settings, these practices serve demographically and socioeconomically diverse populations as shown below. Therefore, the children who attend these clinics may be representative of a large proportion of the child population in the study countries, although we cannot formally assess the extent of that because several of the main sample characteristics are not readily measured at the population level for this age group and study years. We discuss below the implications for the generalizability of the results.

The parent study providing the data for our paper only enrolled infants without major health complications given its focus on measuring normal neurodevelopment (8). The study physicians identified infants who were attending their clinics for routine pediatric care and evaluated their eligibility to participate. Eligible children were those born with normal birth outcomes (birth weight $\geq$ 2500 grams, gestational age $\geq$ 37 weeks and Apgar scores $\geq$ 6) who did not have any of the following health complications: admission to the neonatal intensive care unit, remaining hospitalized for more than five days after birth, needing oxygen at birth, undergoing major surgeries, chronic illnesses that required treatment or medicine for more than two weeks (excluding allergies and ear infections), and documented developmental delay. The study physicians collected data via interviews with the mothers using the same questionnaires and study procedures across all study clinics after receiving the same training in all data collection and study procedures. The parent study was observational and did not provide any interventions to the children.¹

The fact that the sample is limited to children without major health complications who at least have some basic access to routine pediatric care (given that they were enrolled during a routine pediatric visit) provides several advantages for our study. First, it significantly limits the extent of adverse selection into insurance as a potential link between insurance and household activity. Second, it allows us to compare insured and uninsured children who had at least some level of access to pediatric care and who were attending the *same* pediatric clinic at the time of their enrollment into the study; as mentioned above, all children were recruited during their visit to one of the study practices for routine pediatric care. As detailed below, we condition our analysis on the study clinic where the child is recruited and only utilize within-clinic variation, comparing all insured to all uninsured children recruited at the *same* clinic instead of arbitrarily matching a specific ratio of insured to uninsured children. This comparison limits differences in parental preferences toward child health/development since children were brought by their parents for a well-child visit at the *same* pediatric practice regardless of insurance coverage. Together, these controls are expected to reduce, although not omit, differences in unobservable confounders between insured and uninsured children. However, these sampling criteria may also limit the generalizability of the results as we discuss in detail below. The study was approved by the University of Iowa Institutional Review Board.

Empirical Model and Study Measures

We study the relationship between insurance and household activities using a regression model that controls for several relevant demographic and socioeconomic characteristics as follows:

¹The children may have received interventions from the pediatricians as part of the routine pediatric care. The definition of routine care was broad in the parent study and included seeking care for no specific health problems – only for the regular recommended well-child evaluations. We have no data on the content and intensity of the provided pediatric care and on other aspects of provider behavior (such as extent of providing information to parents and counseling them about child development and household activity) and how such factors may have varied between insured and uninsured children. The parent study collected data only on child development and household characteristics.

$$H_i = \alpha_0 + \alpha_1 INSURANCE_i + \sum_{d=1}^D \omega_d DEMO_{di} + \sum_{s=1}^S \delta_s HUMAN_CAP_{si} + \sum_{e=1}^E \gamma_e ECONOMIC_{ei} + \sum_{l=1}^L \lambda_l HOUSEHOLD_{li} + \sum_{c=1}^C \psi_c CLINIC_{ci} + e_i, \quad (1)$$

where for child i , H represents an index of household activities that have been shown to enhance child development (6), and *INSURANCE* is an indicator for whether the child has health insurance coverage at the time of the visit as reported by the mother. We focus on estimating the overall association of being insured regardless of type (combining private and public status) with household activity because of the low insurance rate and the lack of apriori evidence for different relationships by insurance type in this sample. A detailed description of the insurance systems in these countries is provided elsewhere (5, 12). In this model, we include binary indicators (fixed effects) for the study clinic visited by the child at the time of enrollment in the study in order to compare all insured to all uninsured children attending the *same* clinic and avoid comparisons between children attending different clinics. These fixed effects also prevent comparing children across countries.²

Several studies report positive effects of household activities involving interactions with the child or engaging the child in cognitive or sensory tasks such as reading to the child, playing with board games, or other conceptually similar activities on various domains of child development including cognitive, motor, language, and social development (6, 13–16). We consider household activities that were measured in the parent study and that stimulate child's neurodevelopment (6). We measure household activity based on the frequency of engaging the child in the following activities: 1- someone reading to the child; 2- the child playing with puzzles, blocks and board games; and 3- the child playing with sound producing toys (such as drums). The activities were evaluated at the household level and are not specific to the mother or father which allows for capturing activities by other caregivers such as grandparents. The frequency of each activity was reported by the mother during the study interview on the following scale: 0, 1–2, 3–4, and 5 or more times per week. These activities are culturally appropriate for the study population and common in the study sample as shown below. The activities were measured contemporaneously at the time of the study visit. The study had no measures of household efforts to improve physical health such as nutritional patterns or prevent injuries and health problems such as respiratory diseases (such as by taking precautions against injury and avoiding smoking inside the house or close to the child), which is a shortcoming of the available dataset as we discuss below.

In order to evaluate a comprehensive measure of household activity toward child development that aggregates the three household activities listed above, we generate a household activity index using principal component analysis (PCA) of the frequencies of these activities and estimating by maximum likelihood the polychoric correlations between latent variables based on the three observed ordinal activity measures (17). PCA provides theoretical and practical advantages over approaches that arbitrarily assign weights to the index components, such as equal weights to each activity. The rationale for employing PCA in this particular case is that latent household preferences for development-enhancing activity explain most of the common variation in these activities. Therefore, the scoring coefficients of the first principal component, which by construction explains the maximum common variation in these household activities, can be used as weights for the frequencies of the household activities in order to generate a household activity index that would represent an aggregate measure of the frequency of engaging the child in these three activities.

²Note that country fixed effects cannot be included in the model once clinic fixed effects are included.

The three activity frequency variables/items are included in the PCA as ordinal variables each with 4 categories (not as 12 separate 0/1 variables). The PCA produces a weight for each frequency category within each activity item; these weights are used in generating the PCA scores (i.e. activity index values). Table 1 reports the scoring coefficients for each activity frequency that are used to construct the household activity index and the frequency of the activities for subgroups with positive and negative index values. The scoring coefficient on a certain activity frequency in Table 1 indicates how the index would change if the child were in that category. The index is centered at 0 and ranges from negative values (lowest of -1.45) indicating very little household activity to positive values (up to +2.41) indicating greater household activity. An increase in the index represents an increase in the frequency of the activities. The scoring coefficients of all activity-frequency categories and the differences in activity frequencies between the two subgroups below and above the zero value of the activity index are all in the expected direction; an increase in activity frequency increases the index in all cases. Also, the first principal component explains 51.3% of the variation between these three activities in this sample. Together the consistency of the scoring coefficients and the high explanatory power of the first principal component support the validity of this measure. Furthermore, a similar index of household activity had been further validated and found to have a strong and consistent effect on child neurodevelopment (6).

The regression model (equation 1) adjusts for several demographic and socioeconomic characteristics that are theoretically relevant for both having insurance coverage and household activity. *DEMO* includes a vector of child and maternal demographic characteristics, including child's ethnic ancestry, gender and age, and maternal age and marital status. These factors may relate to household preferences toward child health and development. Furthermore, the study countries have significant racial disparities in child development (6) and health insurance coverage (12, 18–21). *HUMAN_CAP* includes maternal human capital measured by maternal education and employment/occupation status, which may affect information about and access to insurance and household activity.

ECONOMIC includes an index of household wealth which is likely relevant for both household activity and insurance in the study countries where socioeconomic disparities in child development and/or insurance coverage have been reported (6, 12, 22). The wealth index is generated using PCA of a set of household assets and quality indicators (6).³ This approach has been shown to provide a reliable measure of long-run household economic status especially in less-developed settings (23). We apply the same PCA approach described above for the household activity index and use the scoring coefficients of the first principal component as weights for the household asset and quality indicators in the wealth index (6). The assumption is that long-run economic status explains the majority of the common variation in the household asset and quality indicators. The first principal component explains 34.4% of the variation in these indicators.

HOUSEHOLD includes the number of the child's siblings and the total number of household members (besides the child), which may also relate to preferences toward child health/development.

³These indicators include: ownership of radio, TV, fridge and car; having a domestic worker in the household; working on family's agricultural land; source of drinking water; type of toilet/sewage facility; type of house flooring; type of wall material; type of roofing material; and number of household members per sleeping room. Self-reported income and household expenditures are not measured in this study as they are generally considered unreliable in less developed settings due to interrupted income flows and lack of data on prices.

Model Estimation

We estimate the regression model for the household activity index using ordinary least squares (OLS) with fixed effects at the clinic-level. These fixed effects ensure that only within-clinic variation is used for estimating the association between insurance coverage and household activity, controlling for the model covariates. In other words, the model only compares insured and uninsured children attending the *same* pediatric clinic and not children attending different clinics. We estimate the variance-covariance matrix with a Huber-type variance estimator that accounts for the sample clustering across the study clinics (24, 25).

We first estimate the regression model pooling data from the four countries in order to evaluate the overall association between insurance and household activity across the entire sample. Including clinic fixed-effects ensures that insured and uninsured children are not compared between countries, but only within the *same* clinic. Therefore, utilizing only within-clinic variation accounts for country-level differences in insurance coverage and in other unobservable factors relevant for child activity. Therefore, such differences do not confound the estimate of the overall (average) association in the total sample. However, given that the study countries vary significantly in several demographic, socioeconomic, healthcare, and policy characteristics which may modify the relationship between insurance and household activity, we estimate in additional analyses this association specifically for each country.

We also stratify the model by household wealth, maternal education and marital status, and whether the child has siblings, as these characteristics may modify the relationship between insurance coverage and household activity. While conceptually relevant, the direction in which differences in such household factors may modify this relationship is unclear, highlighting the need to evaluate such potential changes empirically. On the one hand, higher socioeconomic status may strengthen the association between insurance and household activity if socioeconomic resources and insurance are complements rather than substitutes in their relation to household activity, such as if greater education allows parents to make better use of any information they gain (such as through increased access to healthcare providers because of insurance) for improving household activity toward child development. Also, insurance may not be sufficient to compensate for the lack of other socioeconomic and environmental resources in poor families. In contrast, parents of lower socioeconomic status may benefit more if insurance could compensate for some of the other lacked socioeconomic resources (such as through information from health providers), or if parents of higher socioeconomic status have several other ways for improving household activity toward child development regardless of insurance status (by finding information and resources on their own independent of health providers such as by internet searching). Therefore, empirical evaluations of whether and how the association between insurance and household activity varies with these household demographic and socioeconomic factors are needed.

We stratify the regression analysis instead of selectively including interactions terms between these characteristics and household activity in a pooled regression as we find that the regression coefficients are jointly different as a group between subgroups defined by these variables based on a Chow test as described below (25). We stratify the sample into two subgroups defined by one characteristic at a time in order to ensure a reasonable sample size in each subgroup regression. We also use a Chow-type test for the difference in insurance coefficients between the two subgroups within each stratified model (such as for comparing the insurance coefficient in the regression for the lower wealth subgroup to that for the higher wealth group). For the stratified models, we use the total sample instead of stratifying separately within each country as that would result in very small samples.

Results

Sample Description

Table 2 includes the description and distribution of the study variables. About 35% of the children have insurance coverage. The sample has wide demographic and socioeconomic diversity. About 13% of the children have African ancestry, while 42% have Native ancestry. About 16% of the mothers are single, and 37% are in a stable non-married relationship. About 27% of mothers have primary schooling or less, and only 23% have attended or completed university. About 65% of mothers have no employment, 13% have a clerical position, and 7% have an unskilled blue collar position.

Insurance Coverage and Household Activity

Table 3 reports the coefficients of insurance coverage in the regression model for the household activity index for the total sample and stratifying by selected demographic and socioeconomic characteristics.⁴ Since the activity index has a standard deviation of about one, the coefficients may be interpreted as an activity index change in standard-deviation units. Insurance coverage is significantly and positively associated with the household activity index. In the total sample, insurance coverage is associated with an increase in the household activity index by 0.19 points (or standard deviations). Given how the index is constructed, this result indicates that insurance is associated with an overall increase in the frequency of these household activities.⁵

When stratifying the analysis and running separate regressions for the two subgroups defined by each evaluated characteristic, we find the t association to be largest for children of African and Native ancestries, who have lower insurance rates than children of other ancestries in these countries (12). Specifically, insurance coverage is associated with a 0.36-point increase in the activity index for this group, but has a much smaller and insignificant association for children of other ancestries. The difference in association by ethnic ancestry is significant based on the Chow-type test ($p=0.017$). The association of insurance with household activity is also larger for unmarried, first time, less educated, and poorer mothers. However, the differences in this association by these characteristics are not significant and are smaller than when stratifying by ethnic ancestry.

Differences between Countries

Table 4 reports the coefficients of insurance coverage in regression models estimated separately for each country.⁶ Insurance coverage is significantly and positively associated with household activity in Argentina (0.23-point increase) which has the largest sample, but no significant associations are observed for the other countries. The association is positive and large (0.38-point increase) for Chile ($p=0.15$) which has the smallest sample, and is smaller in Ecuador. In contrast, the association is negative and small in Brazil. These heterogeneities are not surprising given the differences in insurance coverage rates and

⁴Table A1 in the Appendix reports the full OLS regression results for the total sample.

⁵As mentioned above, the activity index has a mean of 0 and a standard deviation of ~1 and ranges from -1.45 to +2.41. Furthermore, the variation in this index represents over 50% of the variation in the frequency of the three household activities. For easier interpretation, the magnitude of the regression coefficient has to be considered relative to the standard deviation and the range of the index. In order to further facilitate the interpretation of the magnitude of the association between insurance status and the household activity index, we show the sample distribution of the activity frequencies for insured and uninsured children in Table A2 in the Appendix. These differences are unadjusted for the model covariates. The magnitude of the insurance coefficient in the unadjusted regression for the activity index is about twice as large as that in the adjusted model (0.42 versus 0.19). Therefore, one could generally interpret the magnitude of the adjusted association between insurance and the activity index to be close to half of the unadjusted difference in the activity frequencies between insured and uninsured children.

⁶Table 4 shows the regressions using the household activity index generated for the total sample. However, we repeat these regressions using activity indices generated separately for each country and observe virtually similar results.

household activity between the four countries (shown in Table 4). The majority of children are uninsured except in Chile (83% insured), but the insured rate in Argentina (39%) is more than double that in Brazil and Ecuador (14%). Also, Argentina and Chile have markedly higher values on the household activity index than Brazil and Ecuador which on average have lower activity than the total sample combined. Both of these differences in insurance coverage and in the intensity of household activity may contribute to the observed difference in the magnitude (and sign in the case of Brazil) of the association between insurance and household activity for Argentina and Chile versus Ecuador and Brazil and suggest that the association is more pronounced in settings with greater insurance coverage and household activity levels. These countries also differ in several demographic and socioeconomic factors such as distributions of ethnic ancestry, education, and wealth (12), and in healthcare delivery systems and welfare policies, which may modify this relationship.

Robustness Checks/Falsification tests

As mentioned above, the included covariates and sample design are expected to account for some but not all of the potential differences between insured and uninsured children that may also affect household activity. For example, differences in parental health and preferences toward child health and development may contribute to a relationship between insurance coverage and household activity. We further evaluate such a potential source of bias by conducting robustness checks and falsification tests using the total sample to shed some light on how it may influence our results. First, we re-estimate the regression controlling for the mother's smoking during pregnancy, which has been shown to adversely affect child neurodevelopment (26), as a proxy for her attitudes toward child health, and find similar results.⁷ Next, we regress two indicators for physical and mental maternal chronic conditions, and an indicator for whether the child has siblings with chronic health/developmental conditions as dependent variables on the child's insurance coverage and the control variables in the main model and find no associations with insurance, indicating that the child's insurance coverage is not related to family health conditions.⁸ These results provide some assurance against a major role of unobservable maternal health behavior and family health factors in the observed association between insurance coverage and household activity, although such a bias cannot be ruled out.

Another potential limitation that we investigate is that all the household activity questions were asked in the same way regardless of the age of the child as these activities were considered culturally appropriate for all age groups and are frequent in the sample (see Table 1). However, one could question the applicability of the household activity questions to children of very young ages since household activity increases with child's age (Table A1). In order to ensure that the results are not driven by the very young subsample, we re-estimate the main regression excluding children younger than 9 months. We find a larger and more significant association when limiting the sample to the older group; insurance is associated with a 0.25-point increase in the household activity index ($p=0.005$). Therefore, the main finding is robust to including or excluding very young children.

Discussion

We find that child health insurance coverage is associated with an increase in development-enhancing household activity in a sample of children from four South American countries. This association is largest for children of African or Native ethnic ancestry. This finding is particularly relevant given that these children have been reported to face disparities in

⁷The regression coefficient of insurance in this model is 0.196 ($p=0.018$).

⁸The coefficients of insurance in these regressions cannot be rejected from being equal to 0 at $p > 0.7$.

developmental milestones and household investments compared to children of European ancestry in the study countries and highlights one potential pathway for how such disparities may develop that is worth investigation in future work (6). When stratifying by country, a significant positive association is only observed for Argentina, which has the largest sample. As discussed above, this heterogeneity may be driven by several factors including sample size and differences in insurance coverage rates, household activity, demographics socioeconomic characteristics, healthcare systems, and welfare policies between the country samples. A large positive yet insignificant association is observed for Chile. The lack of statistical significance may be due to the small sample (431 children) and limited power when using clustered standard errors (at the clinic level), since the insurance coefficient is significant without clustering ($p=0.006$).

The study only includes children without major health complications and with some basic access to well-child care and compares insured and uninsured children who were visiting the *same* pediatric care clinic for such care at the time of data collection. Therefore, adverse self-selection into insurance coverage based on unobserved child health risks is unlikely to be contributing to the observed relationship between insurance coverage and household activity. The other competing explanations of this relationship are: 1) unobservable confounders such as parental socioeconomic status and preferences for child health/development with higher socioeconomic status parents or those who value more their child's health/development being more likely to both obtain health insurance and engage the child in development-enhancing activities, and/or 2) insurance coverage may affect household activity.

We control for household wealth and maternal education and employment and several demographic characteristics. Together, these measures should somewhat reflect overall household socioeconomic status although they likely do not fully capture all socioeconomic variation. The fact that both insured and uninsured children were enrolled in the study at the time of obtaining routine well-child care and observing similar association between insurance and household activity after controlling for maternal smoking during pregnancy suggest that some differences in unobserved parental preferences toward child health/development are accounted for. Also, the lack of an association between the child's insurance coverage and maternal and siblings' health provides some assurance against a relationship through household health status. However, even though we compare insured and uninsured children without major health complications who were attending the *same* pediatric clinic for routine care and control for several observable confounders, we cannot rule out the possibility of unobservable differences between insured and uninsured children driving the observed association between insurance coverage and household activity. Such unobservables may include parental preferences toward child health and development, parental time costs such as number of work hours, income, and other socioeconomic factors. Furthermore, household activities and insurance status were only measured contemporaneously at the time of the pediatric visit when children were enrolled into the study and we have no data on the history of these variables. The cross-sectional nature of the data and sample and the lack of a clearly exogenous source of variation in insurance only allow us to estimate associations that may still be biased by unobservable confounders. Therefore, other research using longitudinal data and exogenous variation in insurance is needed to be able to infer causality.⁹

⁹Theoretically speaking, a causal effect may result from increased parental information about optimal household activity for child development due to greater access to well-child care and more frequent visits to pediatricians who may counsel parents about such activity or through awareness-raising programs provided by insurance plans. Even though our study compared insured and uninsured children who were visiting the *same* pediatric clinic for well-child care at the time of enrollment into the study and data collection, insured children in our sample may have obtained more routine well-child care visits than uninsured ones before their enrollment, which cannot be captured in the study, as we have no data on prior use of pediatric care.

The study has several strengths including a unique and diverse dataset and sample selection criteria that may help to account for some unobservable confounders. However, the study has some additional limitations that warrant discussion. The study lacks data on provider behavior and practice patterns such as the extent to which information was provided to parents about child development and optimal household and parenting activities. Certain theoretically relevant household characteristics such as the extent of parental knowledge about child development and how it can be enhanced by household activities and cultural factors related to parenting and household activities are also not measured. Such variables are needed to begin to explain the observed relationship between insurance and household activity and heterogeneity by country and evaluate if they modify this relationship so we leave that for future studies.

Another limitation is the generalizability of our results to the total population given that the sample only includes children without major health complications recruited at a convenience sample of pediatric practices in urban settings.¹⁰ Since all the children were recruited during their visit for routine well-child care, even uninsured children in this sample likely have some access to pediatric care. Therefore, the estimated association between insurance coverage and household activity may underestimate that in the general population by excluding association due to an effect of insurance on any use of routine pediatric care not just on intensity of use which may still vary between insured and uninsured children in our sample. The association in this sample may also underestimate that in the general population since children with major health problems were not enrolled.¹¹ Furthermore, the results may not be generalizable to rural settings and less urban settings. Also, the sample may be of higher socioeconomic status on average than the general population since all children had at least some access to care. As mentioned above, we cannot formally assess the extent to which this sample is representative of the general population given that many of the main sample characteristics are not readily available for the population of children at this age during the study years. However, as shown in Table 2, the sample has large socioeconomic and demographic diversity, and therefore may be representative of a large proportion of children in the study countries. Furthermore, the sample is recruited in pediatric practices in 27 cities; this geographic diversity is expected to enhance its representativeness. While insurance rates may be higher in this sample than the general population, we are estimating the conditional relationship between insurance and household activity, which should not be biased because of the higher insurance rate.

Finally, we have no data on other household activities that are relevant to child health and development and that may be affected by insurance such as nutritional patterns or efforts to prevent child injuries by providing a safe playing environment, using a child car seat, and avoiding smoking inside the home. Evaluating the relationship between insurance and such activities in future studies is important in order to better understand the relationship between insurance and household activity toward child health and development.

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¹⁰The data are not weighted by sampling probability weights as these weights are not available given that the study is based on a convenience sample. Each observation has the same weight in the analysis.

¹¹This underestimation may occur if healthcare professionals provide more counseling to parents of children at greater risk of developmental problems about household activities to reduce this risk.

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Appendix

Table A1

Regression Coefficients of the OLS Regression for Household Activity Index Using the Total Sample

Insurance	0.19** (0.08)
Native	−0.06 (0.09)
African	−0.21** (0.09)
Male	−0.06 (0.04)
Child age	0.05*** (0.01)
Maternal age	0.01 (0.00)
Single	0.02 (0.06)
Stable	−0.05 (0.04)
Primary or less	−0.23*** (0.06)
Incomplete secondary	−0.11** (0.05)
Attending university	0.18*** (0.06)
Unemployed	−0.06 (0.09)
Unskilled blue collar	−0.04 (0.13)
Skilled blue collar	−0.03 (0.12)
Independent worker	−0.05 (0.10)
Clerk	0.05 (0.08)
Wealth	0.06*** (0.02)
Siblings	−0.00 (0.02)
Household members	−0.00 (0.01)
Constant	−0.65*** (0.16)
<i>R-squared</i>	0.317
Observations	2370

Note: The table reports the regression coefficients and standard errors in parentheses from the full regression of the household activity index using the whole sample. *, ** and *** indicate $p < 0.1$, $p < 0.05$ and $p < 0.01$ respectively. Clinic fixed effects are suppressed from the table for brevity.

Table A2
Frequency of Household Activities by Child Insurance Status

	Frequency (%)	
	Insured (N=831)	Uninsured (N=1539)
Reading to the child		
0 times per week	50.54	69.79
1–2 times per week	23.35	17.09
3–4 times per week	14.68	6.69
5 or more times per week	11.43	6.43
Playing with puzzles, blocks and board games		
0 times per week	47.65	72.84
1–2 times per week	11.31	8.51
3–4 times per week	16.00	7.08
5 or more times per week	25.03	11.57
Playing with sound producing toys (such as drums)		
0 times per week	5.42	12.15
1–2 times per week	13.36	9.75
3–4 times per week	19.13	12.09
5 or more times per week	62.09	66.02

Note: The table reports the frequencies of the household activities separately for insured and uninsured children in the total sample without adjusting for any covariates.

Table 1

Principal Component Analysis of the Household Activity Index

	Scoring Coefficient	Frequency (%)		
		Overall sample (N=2370)	Index below 0 (N=1342)	Index above 0 (N=1028)
Reading to the child				
0 times per week	−0.39	63.04	92.7	24.32
1–2 times per week	0.40	19.28	6.11	36.48
3–4 times per week	0.74	9.49	1.19	20.33
5 or more times per week	1.20	8.19	0.00	18.87
Playing with puzzles, blocks and board games				
0 times per week	−0.38	64.01	91.65	27.92
1–2 times per week	0.32	9.49	4.25	16.34
3–4 times per week	0.53	10.21	3.43	19.07
5 or more times per week	0.99	16.29	0.67	36.67
Playing with sound producing toys (such as drums)				
0 times per week	−0.67	9.79	15.72	2.04
1–2 times per week	−0.39	11.01	13.93	7.2
3–4 times per week	−0.22	14.56	17.36	10.89
5 or more times per week	0.22	64.64	52.98	79.86
Total variance explained by 1 st principal component (%)		51.3		

Note: The table reports the first principal component scoring coefficients for the household activity index and the frequency of the index activities in the total sample and subgroups with negative and positive index values.

Table 2

Distribution of Study Variables

Variable	Definition	% or Mean (SD)
Household activity index	A PCA generated index of household activity	0.00 (0.98)
Insurance (%)	Indicator (0,1) for child having health insurance	35.06
Ancestry ^a (%)		
African	Indicator (0,1) that child has African ancestry	12.66
Native	Indicator (0,1) that child has Native ancestry	41.52
Male (%)	Indicator (0,1) for a male child	50.42
Child age	Child's age in months	11.63 (6.62)
Maternal age	Maternal age in years	26.96 (6.52)
Marital status ^b (%)		
Single	Indicator (0,1) for a single mother (including widow, divorced, separated)	16.41
Stable	Indicator (0,1) for a mother in a stable relationship	36.84
Maternal education (%)		
Primary or less	Indicator (0,1) for highest schooling level of primary school or less	26.54
Incomplete secondary	Indicator (0,1) for attending but not completing secondary school	19.79
Attending university	Indicator (0,1) for attending/completing university	23.46
Maternal employment/occupation ^d (%)		
Unemployed	Indicator (0,1) for an unemployed mother	65.36
Unskilled blue collar	Indicator (0,1) for an "unskilled blue collar" occupation	6.71
Skilled blue collar	Indicator (0,1) for a "skilled blue collar" occupation	3.71
Independent worker	Indicator (0,1) for an "independent worker" occupation	4.18
Clerk	Indicator (0,1) for a "clerk" occupation	13.25
Wealth	A PCA wealth index based on household asset and household quality indicators	-0.02 (1.06)
Siblings	Total number of child's siblings	0.97 (1.33)
Household members	Total number of people living in the household with the child	4.26 (2.06)

Notes:

^aReference is other ancestry (primarily European ancestry).^bThe reference is a married mother.^cThe reference is completed secondary school.^dThe reference is executive, professional, boss, chief, or owner.

Table 3

Insurance Status Coefficients in Total Sample and Subgroups defined by Selective Demographic and Socioeconomic Characteristics

Total sample (N=2370)	0.193** (0.079)
Child of African or Native ancestry (N=1284)	0.356*** (0.094)
Child of other ancestry (N=1086)	0.022 (0.108)
Chow-type test for difference: Chi2(1) [p value]	5.70 [0.017]
Unmarried mothers (N=1262)	0.244*** (0.086)
Married mothers (N=1108)	0.101 (0.102)
Chow-type test for difference: Chi2(1) [p value]	1.50 [0.22]
Child has no siblings (N=1144)	0.267** (0.117)
Child has siblings (N=1226)	0.139* (0.081)
Chow-type test for difference: Chi2(1) [p value]	1.3 [0.254]
Less than completed high school (N=1098)	0.226*** (0.077)
Completed high school or higher (N=1272)	0.132 (0.108)
Chow-type test for difference: Chi2(1) [p value]	0.61 [0.436]
Low household wealth (index <0; N=1102)	0.222** (0.083)
Average or high household wealth (index>0; N=821)	0.162 (0.103)
Chow-type test for difference: Chi2(1) [p value]	0.25 [0.616]

Note: The table reports the coefficients of child health insurance coverage in the OLS regressions for the household activity index in the total sample and subgroups (two at a time) defined by selective demographic and socioeconomic factors. Standard errors of the coefficients are in parentheses. *, ** and *** indicate $p < 0.1$, $p < 0.05$ and $p < 0.01$ respectively. The Chow-type test is for the difference in insurance coefficients between the two subgroup regressions in each stratified analysis and is based on a chi2 distribution with one degree of freedom.

Table 4**Heterogeneity by Country**

	Argentina	Brazil	Chile	Ecuador
% of children insured	39.3	14.3	83.1	14.3
Mean (SD) of the household activity index	0.19 (1.05)	−0.25 (0.84)	0.26 (1.01)	−0.20 (0.87)
Coefficient (SE) of insurance coverage in OLS regression for household activity index	0.228** (0.087)	−0.053 (0.223)	0.380 (0.212)	0.065 (0.19)
<i>N</i>	784	615	431	540

Note: The table reports descriptive statistics on insurance and household activity and the coefficients (with standard errors in parentheses) of insurance coverage in the OLS regression for the household activity index stratified by country. ** indicates $p < 0.05$.