

Increasing the Human Capital of Children in Latin American Countries: The Role of Parents' Time in Childcare

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ABSTRACT *In this paper, we focus on the relationship between parents' education and activities aimed at increasing the human capital of children (for example, educational childcare). Using time use surveys from Mexico, Peru, Ecuador, and Colombia we find that in Mexico, Peru, and Colombia the level of education of both father and mother has a positive association with the time devoted to educational childcare, while in Ecuador only fathers' level of education has a positive association with father's time devoted to educational childcare. Furthermore, we find that the time devoted to educational childcare by parents is positively related in all four countries.*

1. Introduction

In this paper, we analyse how parents' education is related to the time devoted to childcare activities in four Latin-American countries, with a focus on those childcare activities aimed at increasing the human capital of children. The role of parents in this task has long been recognised (Becker, 1981), as more time devoted to childcare is positively related to the human capital of children (Blau & Grossberg, 1992; Brooks-Gunn, Han, & Waldfogel, 2002; Cooksey & Fondell, 1996; Datcher-Loury, 1988; Han, Waldfogel, & Brooks-Gunn, 2001; Hsin & Felfe, 2014; Kalenkoski & Foster, 2008; Leibowitz, 1972, 1974, 1977; Marsiglio, 1991; Sayer, Gauthier, & Furstenberg, 2004). The existing literature clearly shows that parents with high levels of education tend to spend more time with their children, compared with parents with low levels of education (Bianchi, Cohen, Raley, & Nomaguchi, 2004; Craig, 2006b; Gimenez-Nadal & Molina, 2013; Guryan, Hurst, & Kearney, 2008; Hofferth, 2001; Marsiglio, 1991; Sayer, Bianchi, & Robinson, 2004; Sayer et al., 2004), partly due to the fact that more educated parents recognise and acknowledge the importance of time investments in their children (Kalenkoski & Foster, 2008; Marsiglio, 1991; Sayer et al., 2004; Sevilla & Borra, 2015). To the extent that human capital influences earnings that individuals will obtain in the future, as they enter the labour market, one possible source of inequality is the time devoted by parents to their children in the early years, and thus our analysis will serve to identify and analyse this potential source of income inequality.

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The importance of analysing the relationship between parents' education and the time devoted to childcare by parents has been widely accepted in developed countries (Bianchi, 2000; Gauthier, Smeeding, & Furstenberg, 2004; Gimenez-Nadal & Molina, 2013; Gimenez-Nadal & Sevilla, 2012; Guryan et al., 2008; Kimmel & Connelly, 2007), but we find no evidence from Latin-American countries, probably due to the scarcity of time use statistics for that region (Canelas & Salazar, 2014).¹ The analysis of childcare time of parents is of special relevance in Latin-American countries, as income/earnings inequality is relatively high in comparison with developed countries. For example, Colombia, Ecuador, Mexico, and Peru have scores on the Gini Index of 53.5, 46.6, 48.1 and 45.1, respectively, in the period 2005–2010 (World Bank, 2015), and scores at this level place these countries among the most inegalitarian in the world. If childcare time contributes to the formation of human capital of the children, public policies aimed at decreasing inequalities in parental childcare time will serve to reduce the high levels of earnings inequality in these countries.

In this paper, we use data from time use surveys in Mexico (2009), Peru (2010), Colombia (2012), and Ecuador (2012) to analyse the time devoted to childcare by parents, with a focus on the level of education of the parents. We consider two types of childcare activities: basic childcare and educational childcare.² Basic childcare includes activities such as breastfeeding, bathing, dressing children, and making sure they receive medical attention, and educational childcare includes activities aimed at increasing children's human capital, such as playing with children, reading stories, taking them to the park, attending meetings and events at the school, and helping with homework, among others. We find, for all four countries, that when we compare the levels of education of the parents, the fathers and mothers with the highest levels of education spend more time in educational childcare, compared to their counterparts with lower levels of education, and that what really matters at the couple level is the level of education of the mothers.

In particular, fathers in Mexico, Peru, and Ecuador with university education devote 0.85, 0.97 and 0.94 more hours per week to educational childcare, compared to fathers with only primary education, respectively, and in Colombia, fathers with university education devote 0.21 more hours per day compared to fathers with only primary education. Mothers in Mexico, Peru, and Ecuador with university education devote 1.04, 2.58 and 0.91 more hours per week to educational childcare, compared to mothers with only primary education respectively, and in Colombia, mothers with university education devote 0.21 more hours per day compared to mothers with only primary education. These differentials are statistically significant, and we can say with confidence that better-educated parents spend more time in educational childcare activities, including reading, playing, and helping with homework (Gimenez-Nadal & Molina, 2013; Hill & Stafford, 1985; Kalenkoski & Foster, 2008; Sayer et al., 2004), that promote the development of human capital of children (Brooks-Gunn et al., 2002).

In our econometric analysis, we take into account that the time one spouse devotes to a given childcare activity and paid work can affect the time the other spouse devotes to the same activity, or to other childcare activities and paid work, and we estimate a linear model of six seemingly unrelated regressions (SUR), where the partners' uses of time (three uses of time for males, that are basic childcare, educational childcare, and paid work, and three uses of time for females, that are basic childcare, educational childcare, and paid work) are allowed to be correlated in the regressions. In the case of Mexico, Peru, and Colombia, the level of education of both father and mother has a positive association with both own and partner's time devoted to educational childcare. In the case of Ecuador, we find that fathers' level of education has a positive association with father's time devoted to educational childcare, but we find no associations for mother's education and childcare time. Looking at the relationship between childcare activities, we find no consistent cross-country results, which may be explained by differences in institutions, social norms, and/or preferences.

Our contribution to the literature is threefold. First, we focus on the time devoted to childcare in Latin-American countries, and with an emphasis on educational childcare. Despite the wealth of research on childcare time (Bianchi, 2000; Gauthier et al., 2004; Guryan et al., 2008; Hallberg & Klevmarken, 2003; Hill & Stafford, 1974; Kalenkoski, Ribar, & Stratton, 2009; Kimmel & Connelly, 2007; Sayer et al., 2004; Zick & Bryan, 1996), few papers have directly analysed the time that couples

specifically devote to activities aimed at increasing the human capital of the child. Second, we analyse four countries with different welfare regimes, in an attempt to extract common patterns in the time devoted to educational childcare. The differential effects of a range of factors may imply that national welfare regimes influence the time devoted to childcare activities. Third, our analysis at the couple level takes into account that the time one parent spends may serve as a substitute for the time of the other parent, providing specific evidence of the relationship between the total time devoted to childcare activities by both members of the couple. To the best of our knowledge, there is only one precedent (Gimenez-Nadal & Molina, 2013) and we add to this field by complementing prior results.

The rest of the paper is organised as follows. [Section 2](#) describes the data. [Section 3](#) describes the empirical strategy and variables analysed. [Section 4](#) presents our results and interpretations, and [Section 5](#) concludes.

2. Data

To analyse the time devoted by fathers and mothers to childcare in Latin American countries, we use the data from time-use surveys in Mexico (2009), Peru (2010), Colombia (2012), and Ecuador (2012). These are the first independent time-use surveys in these countries, since data was only previously available through other sources, such as integrated household surveys. Time-use surveys provide us with information on individual time use, and have become the typical instrument used to analyse the time-allocation decisions of individuals (Aguiar & Hurst, 2007; Bianchi, 2000; Folbre, Yoon, Finnoff, & Fuligni, 2005; Gershuny, 2000; Gimenez-Nadal & Sevilla, 2012). The targeted population are all members of households, age 12 and above, for Mexico, Peru, and Ecuador, and age 10 and above for Colombia; the first three surveys take as reference period the previous week, while for Colombia the previous day is the reference period.³

Our sample consists of heterosexual couples (married or living together) when both partners have answered all sections of the survey, who are not students or retirees and are between 21 and 65 years old (inclusive). We consider these restrictions to minimise the role of time-allocation decisions, which have a strong inter-temporal component of the life cycle; the omitted individuals are studying or are retired, so individuals in our sample are considered to be of working age.⁴ Further, the couples in our sample have at least one child under age 18. After these restrictions are fulfilled, our sample is comprised of 5731 couples in Mexico, 1657 couples in Peru, 2938 couples in Ecuador, and 12,385 couples in Colombia. Following Gimenez-Nadal and Molina (2013), this paper analyses only the time spent on child care as a primary activity (that is, main activity) as the data at hand does not include information on secondary activities, nor on the presence of others during the activities. It is important to recognise that this study focuses only on the time spent on childcare as ‘active care’, while passive childcare (that is, non-childcare activities done in the presence of children) is not considered.⁵

We consider two types of childcare activities: basic childcare and educational/supervisory childcare.⁶ Basic childcare includes the time devoted to activities such as breastfeeding, bathing, dressing, or taking a child to the doctor. In this sense, basic childcare includes all the activities aimed at satisfying the child’s basic needs. Educational childcare includes the time spent in activities like playing with children, reading stories, attending meetings/support activities and events at school, helping with or supervising homework, and taking to and picking up from school. (See Online Appendix B for a description of all the activities included in the two types of childcare). Hence, educational/supervisory – educational henceforth – childcare includes activities aimed at increasing the human capital of children. The time devoted to childcare is measured in hours per week for Mexico, Peru, and Ecuador and in hours per day for Colombia.

[Table 1](#) shows the time devoted to basic and educational childcare by fathers and mothers in the four countries. The average time spent by mothers on total childcare (the sum of basic and educational childcare) is 9.23, 8.39 and 9.93 hours per week in Mexico, Peru, and Ecuador, respectively, while in Colombia it is 1.02 hours per day. Regarding the time devoted to basic and educational childcare, we observe considerable differences between countries. In Mexico, mothers devote more time to basic

Table 1. Hours spent in childcare, Mexico, Peru, Ecuador, and Colombia

	Basic childcare						Educational childcare						Total childcare											
	México		Ecuador		Colombia		México		Perú		Ecuador		Colombia		México		Perú		Ecuador		Colombia			
	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per day)	(Hours per day)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per day)	(Hours per day)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per week)	(Hours per day)	(Hours per day)		
All fathers	1.32	0.34	0.33	0.33	0.06	0.06	1.35	2.77	1.88	0.32	0.32	2.67	3.11	2.21	0.38	(3.18)	(0.97)	(1.38)	(1.38)	(3.33)	(4.18)	(3.59)	2.21	0.38
(N Total = 22711)	(3.18)	(0.97)	(1.38)	(1.38)	(0.24)	(0.24)	(2.43)	(3.26)	(3.33)	(0.70)	(0.70)	(4.18)	(3.59)	(3.91)	(0.81)									
Full-time working fathers	1.32	0.30	0.32	0.32	0.05	0.05	1.26	2.51	1.78	0.31	0.31	2.58	2.81	2.10	0.36									
(N Total = 18637)	(3.16)	(0.87)	(1.36)	(1.36)	(0.22)	(0.22)	(2.30)	(3.06)	(3.18)	(0.67)	(0.67)	(4.08)	(3.34)	(3.75)	(0.77)									
Part-time working fathers	1.20	0.48	0.31	0.31	0.08	0.08	1.59	3.71	2.11	0.41	0.41	2.79	4.19	2.43	0.49									
(N Total = 2860)	(2.81)	(1.24)	(1.31)	(1.31)	(0.27)	(0.27)	(2.74)	(3.72)	(3.65)	(0.78)	(0.78)	(4.21)	(4.14)	(4.11)	(0.91)									
Non-working fathers	1.65	0.50	1.29	1.29	0.12	0.12	1.76	3.46	4.23	0.43	0.43	3.41	3.96	5.52	0.55									
(N Total = 1214)	(3.97)	(1.37)	(2.60)	(2.60)	(0.38)	(0.38)	(3.00)	(3.92)	(5.81)	(0.85)	(0.85)	(5.00)	(4.47)	(7.34)	(1.02)									
All mothers	5.40	4.21	4.20	4.20	0.48	0.48	3.83	4.18	5.72	0.54	0.54	9.23	8.39	9.93	1.02									
(N Total = 22711)	(8.15)	(6.60)	(5.26)	(5.26)	(0.77)	(0.77)	(4.37)	(4.50)	(5.80)	(0.91)	(0.91)	(9.47)	(8.53)	(9.06)	(1.41)									
Full-time working mothers	4.00	1.56	3.03	3.03	0.32	0.32	2.97	2.48	4.54	0.39	0.39	6.94	4.04	7.57	0.70									
(N Total = 6115)	(6.66)	(3.29)	(4.49)	(4.49)	(0.61)	(0.61)	(3.72)	(3.24)	(4.99)	(0.76)	(0.76)	(8.01)	(5.06)	(7.90)	(1.17)									
Part-time working mothers	4.17	3.95	4.04	4.04	0.43	0.43	4.19	3.96	5.43	0.52	0.52	8.36	7.91	9.47	0.95									
(N Total = 4303)	(7.24)	(6.05)	(5.36)	(5.36)	(0.71)	(0.71)	(4.60)	(4.12)	(5.74)	(0.86)	(0.86)	(8.86)	(7.77)	(9.25)	(1.33)									
Non-working mothers	6.27	5.96	4.73	4.73	0.60	0.60	4.00	5.34	6.29	0.64	0.64	10.27	11.30	11.03	1.23									
(N Total = 12293)	(8.74)	(7.90)	(5.44)	(5.44)	(0.85)	(0.85)	(4.46)	(5.13)	(6.06)	(0.99)	(0.99)	(9.93)	(9.68)	(9.28)	(1.53)									

Notes: The sample is restricted to heterosexual couples aged 21–65 (inclusive) who are not students or retired, with at least one child under age 18. Full-time work is defined as working 40 hours or more a week. Part-time work is defined as working less than 40 hours a week. See Online Appendix B for a description of the activities included in basic childcare and educational childcare time. Standard deviations in parentheses.

childcare (5.40 hours per week) compared to educational childcare (3.83 hours per week), mothers in Peru and Colombia devote almost the same time to each of the two types of care (around 4.20 hours per week in Peru and 0.51 hours per day in Colombia). In Ecuador, mothers devote more time to educational childcare (5.72 hours per week) compared to basic childcare (4.20 hours per week).

When we compare our results with prior findings, such as Connelly and Kimmel (2010) and Gimenez-Nadal and Molina (2013), we find that these authors show mothers devoting more time to basic childcare, relative to other types of childcare, while we find that this pattern is less clear for the four countries under consideration. Delgado and Canabal (2006) and Fuller, Holloway, and Liang (1996) show that members of Hispanic families allocate their time according to their strong family orientation (focusing on the family group), and parents tend to use other family members to care for their children; mothers may delegate part of the basic childcare to others, in order to devote more time to educational childcare.

Regarding the time devoted to total childcare by fathers, they spend around 2.67 hours per week in Mexico, 3.11 and 2.21 hours per week in Peru and Ecuador, respectively, and 0.38 hours per day in Colombia, on total childcare. Additionally, Mexican parents spend almost the same time on basic childcare and educational childcare (1.32 and 1.35 hours per week, respectively), while in Peru, Ecuador, and Colombia, more than 80 per cent of parents' childcare time is educational. One of the reasons given to explain why parents devote comparatively more time to educational childcare is that they prefer childcare activities that are more rewarding, like playing with children or helping with homework (Craig, 2006a; Darling-Fisher & Tiedje, 1990; Gimenez-Nadal & Molina, 2013; Grossman, Pollack, & Golding, 1988; Kahneman & Krueger, 2006; Kahneman, Krueger, & Schkade, 2004). Furthermore, compared to fathers, Mexican and Ecuadorian mothers dedicate more than triple the time to total childcare, while Peruvian and Colombian mothers dedicate more than twice the time to total childcare. Possible explanations for these findings may be institutional factors, lower female work-force participation, and differential gender roles (Campaña, Giménez-Nadal, & Molina, 2015).

Table 1 also shows the time devoted to basic and educational childcare according to the work status of individuals.⁷ Mothers in Mexico and Ecuador spend just over two hours less per week on total childcare when the mothers are working (compared to non-working mothers), in Colombia mothers spend approximately 0.4 hours less per day on total childcare when the mothers are working (compared to non-working mothers), while Peruvian working mothers spend around five hours less on total childcare, with the most pronounced declines coming from basic childcare. Regarding fathers, comparing working and non-working parents, in Mexico, Peru, and Colombia, the difference in the total time devoted to childcare is almost zero, while working fathers in Ecuador devote around three hours less to total childcare, relative to non-working fathers. Thus, work status appears to have little effect on the time devoted to childcare by fathers, but in the case of mothers, we find differences in the time devoted to childcare between working and non-working mothers.

2.1. Differences by Level of Education and Number of Children

Prior research has shown that parents with a higher level of education devote more time to childcare, relative to their counterparts with lower levels of education (Bianchi et al., 2004; Craig, 2006b; Gimenez-Nadal & Molina, 2013; Guryan et al., 2008; Hofferth, 2001). Accordingly, Table 2 shows the time devoted to basic and educational childcare, by the level of education of the parents. We consider three levels of education: primary education (less than high school degree), secondary education (high school degree), and university education (more than high school degree) and we check whether the statistical variation is significant between the highest (university) and the lowest (primary) level of education.

We observe that highly-educated fathers devote more time to basic and educational childcare, compared to their low-educated counterparts, with these differences being statistically significant at standard levels. In particular, we observe that highly-educated fathers devote, in comparison to low-educated fathers, 0.37, 0.12 and 0.06 more hours to basic childcare in Mexico and Peru (hours per week) and Colombia (hours per day), respectively, and 0.85, 0.97, 0.94 and 0.21 more hours to

Table 2. Hours spent in childcare, by educational attainment

(1)	(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Mexico (Hours per week)		Peru (Hours per week)		Ecuador (Hours per week)		Colombia (Hours per day)							
	Basic childcare	Educational childcare	Basic childcare	Educational childcare	Basic childcare	Educational childcare	Basic childcare	Educational childcare	Basic childcare	Educational childcare	Basic childcare	Educational childcare	Basic childcare	Educational childcare
Panel A: Fathers														
Primary education	1.23	1.15	0.30	2.40	0.30	1.64	0.04	0.25	0.04	0.07	0.10	0.06	0.21	0.21
Secondary education	1.52	1.64	0.35	2.98	0.43	2.31	0.07	0.36	0.07	0.10	0.06	0.21	0.21	0.21
University education	1.60	2.00	0.42	3.37	0.33	2.58	0.10	0.46	0.10	0.06	0.06	0.21	0.21	0.21
Diff. University-Primary education	0.37	0.85	0.12	0.97	0.03	0.94	0.06	0.21	0.06	0.06	0.06	0.21	0.21	0.21
(p-value difference)	(<0.01)	(<0.01)	(0.06)	(<0.01)	(0.68)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Panel B: Mothers														
Primary education	5.33	3.52	4.40	3.44	4.09	5.48	0.43	0.43	0.43	0.53	0.52	0.09	0.21	0.21
Secondary education	5.55	4.82	3.78	4.90	4.75	6.25	0.53	0.63	0.53	0.64	0.52	0.09	0.21	0.21
University education	5.61	4.57	4.16	6.02	3.99	6.40	0.52	0.64	0.52	0.64	0.09	0.21	0.21	0.21
Diff. University-Primary education	0.27	1.04	-0.24	2.58	-0.10	0.91	0.09	0.21	0.09	0.09	0.09	0.21	0.21	0.21
(p-value difference)	(0.41)	(<0.01)	(0.62)	(<0.01)	(0.76)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)

Notes: The sample is restricted to heterosexual couples aged 21–65 (inclusive) who are not students or retired, with at least one child under age 18. Full-time work is defined as working 40 hours or more a week. Part-time work is defined as working less than 40 hours a week. See Online Appendix B for a description of the activities included in basic childcare and educational childcare time. Primary education is equivalent to less than high school degree, secondary education is equivalent to high school degree and university education is equivalent to more than a high school degree. Difference university education-primary education indicates the differences between highly- and lower-educated parents in the time devoted to basic childcare and educational/supervisory childcare. P-value difference indicates whether the difference is statically different from zero.

educational childcare in Mexico, Peru, and Ecuador (hours per week) and Colombia (hours per day), respectively. Similar conclusions can be drawn when we focus on women, as highly-educated mothers devote more time to basic and educational childcare compared to their low-educated counterparts, with these differences being statistically significant at standard levels. We observe that highly-educated mothers devote, in comparison with their low-educated counterparts, 0.09 more hours per day to basic childcare in Colombia, and 1.04, 2.58, 0.91 more hours per week and 0.21 more hours per day to educational childcare in Mexico, Peru, Ecuador, and Colombia, respectively. The results for these four countries are similar to those found by Guryan et al. (2008) in the United States, and Gimenez-Nadal and Molina (2013) for Spain and the United Kingdom, where parents with higher education spend more time on educational childcare compared to their counterparts with lower levels of education. While we do find cross-country differences in the positive gradient between education and basic childcare, the positive gradient between education and educational childcare is robust in the four analysed countries.⁸

3. Empirical Strategy and Variables

We now analyse the time devoted to basic and educational childcare, to explore factors influencing the time parents devote to their children. In this analysis, failing to account for joint household decisions and joint provision of childcare would affect the interpretation of the results, and thus we must consider that the time one parent spends in childcare activities may serve as a substitute for the time the other parent spends in the same activities. Furthermore, it is important to also consider the time devoted to paid work by the parents, because this time also affects the time devoted to childcare activities, since employment affects the opportunity cost of time and leaves less time available for other activities, including childcare. However, we cannot use either individual's or partner's time in any specific childcare activity or paid work as an explanatory variable, since it would lead to endogeneity problems. Thus, we estimate a Seemingly Unrelated Regression (SUR) system on the time devoted to basic childcare educational childcare, and paid work by both members of the couple (six equations) and, where it seems more appropriate, to estimate Tobit (Tobin, 1958) regressions, given that time use is a non-negative dependent variable.⁹

Regarding the selection of the econometric models, Stewart (2009) shows that OLS models are preferred for use in the analysis of time-allocation decisions, since the zeros in time-use data arise from a mismatch between the reference period of the data (the diary day) and the period of interest. As a result, the tobit model generates biased estimates in certain circumstances, while OLS models generate unbiased estimates in all situations. Foster and Kalenkoski (2013) compare the use of tobit and OLS models in the analysis of the time devoted to childcare activities, and find that the qualitative conclusions are similar for the two estimation methods, although there are certain differences in the magnitudes and statistical significance of the estimates. Thus, we rely on linear models.

The statistical model is as follows. For a given household 'i', T_{bf_i} , T_{ef_i} and T_{pf_i} represent the time devoted to basic childcare, educational childcare and paid work by the father, while T_{bmi} , T_{emi} and T_{pmi} represents the time devoted to basic childcare, educational childcare and paid work by the mother. X_i is a vector of individual and household characteristics, and ε_{bf} , ε_{ef} , ε_{pf} , ε_{bm} , ε_{em} and ε_{pm} are the random variables representing unmeasured factors. Based on this, we estimate the following equations:

$$T_{bj_i} = \alpha_{bj} + \beta_{bj}X_{i+} + \varepsilon_{bj_i} \quad (1)$$

$$T_{ej_i} = \alpha_{ej} + \beta_{ej}X_{i+} + \varepsilon_{ej_i} \quad (2)$$

$$T_{pj_i} = \alpha_{pj} + \beta_{pj}X_{i+} + \varepsilon_{pj_i} \quad (3)$$

where $j = f, m$ ($f = \text{father}$ and $m = \text{mother}$). We allow for correlations at the household level in the unobserved determinants of the activities by allowing the error terms to be jointly normally distributed, with no restrictions on the correlation. This specification takes into account that time is limited, and if individuals devote more time to one particular activity, they may devote less time to other activities, and that the time a parent devotes to childcare activities can serve as a substitute for the other parent's childcare time. We further assume that the error components are independent across households.

$$\begin{pmatrix} \varepsilon_{bf} \\ \varepsilon_{ef} \\ \varepsilon_{pf} \\ \varepsilon_{bm} \\ \varepsilon_{em} \\ \varepsilon_{pm} \end{pmatrix} \sim N \left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{bf}^2 & \rho_{bfe} \sigma_{bf} \sigma_{ef} & \rho_{bpf} \sigma_{bf} \sigma_{pf} & \rho_{bfm} \sigma_{bf} \sigma_{bm} & \rho_{bfe} \sigma_{bf} \sigma_{em} & \rho_{bfp} \sigma_{bf} \sigma_{pm} \\ \rho_{efb} \sigma_{ef} \sigma_{bf} & \sigma_{ef}^2 & \rho_{epf} \sigma_{ef} \sigma_{pf} & \rho_{efm} \sigma_{ef} \sigma_{bm} & \rho_{efe} \sigma_{ef} \sigma_{em} & \rho_{efp} \sigma_{ef} \sigma_{pm} \\ \rho_{pfb} \sigma_{pf} \sigma_{bf} & \rho_{pfe} \sigma_{pf} \sigma_{ef} & \sigma_{pf}^2 & \rho_{pfb} \sigma_{pf} \sigma_{bm} & \rho_{pfe} \sigma_{pf} \sigma_{em} & \rho_{pfp} \sigma_{pf} \sigma_{pm} \\ \rho_{mbf} \sigma_{bm} \sigma_{bf} & \rho_{mbe} \sigma_{bm} \sigma_{ef} & \rho_{mpf} \sigma_{bm} \sigma_{pf} & \sigma_{bm}^2 & \rho_{bme} \sigma_{bm} \sigma_{em} & \rho_{bpm} \sigma_{bm} \sigma_{pm} \\ \rho_{emb} \sigma_{em} \sigma_{bf} & \rho_{eme} \sigma_{em} \sigma_{ef} & \rho_{emp} \sigma_{em} \sigma_{pf} & \rho_{emb} \sigma_{em} \sigma_{bm} & \sigma_{em}^2 & \rho_{emp} \sigma_{em} \sigma_{pm} \\ \rho_{pmb} \sigma_{pm} \sigma_{bf} & \rho_{pme} \sigma_{pm} \sigma_{ef} & \rho_{pmp} \sigma_{pm} \sigma_{pf} & \rho_{pmb} \sigma_{pm} \sigma_{bm} & \rho_{pme} \sigma_{pm} \sigma_{em} & \sigma_{pm}^2 \end{pmatrix} \right)$$

X_i includes individual and household characteristics, such as father's and mother's age, education levels of both parents, non-labour income of the father and mother, predicted wages of the partners, number of household members, number of children by age group, ethnicity of the parents, urban or rural residence, and the various regions of each country (see Table A3 in the Online Appendix for summary statistics of the variables in the four countries). The education of the father and the mother probably has the greatest influence on the opportunity cost of time. Following prior analyses, we consider three levels of education, primary (father/mother has less than a high school degree), secondary (father/mother has a high school degree) and university (father/mother has more than high school degree), and we consider as the reference category those individuals with primary education.

We also consider the wages of the members of the couple. Research has shown that higher wages lead to a better position at home as it increases the bargaining power within the couple (Bourguignon, Browning, & Chiappori, 2009; Chiappori, 1988, 1992; Lundberg & Pollak, 1993), and this higher bargaining power may be used to take responsibility for more rewarding childcare activities, such as playing with or reading to children. Pollak (2005) goes a step further and considers the relative salary (mother's salary divided by father's salary), to interpret the effect of changes in the relative wage as a change in the bargaining power of the couple itself. It is expected that, as the bargaining power of the mother increases, the distribution of household chores within the couple will become more egalitarian, including the time devoted to childcare. Therefore, we define the relationship between father's and mother's hourly wage as the logarithm of the ratio of predicted wages for the mother and the father, as follows: $\text{relative wage}_i = \log(\text{mother's predicted wage}_i / \text{father's predicted wage}_i)$, where we sum the value of '1' to the value predicted in order to have all values for all the partners, including those couples where the original ratio is equal to '0' or negative.¹⁰ We also include the squared term to allow non-linear effects.

To calculate the predicted wages, we use the Heckman technique (1979), and we include all individuals who have answered all the sections of the Time Use survey in the four countries and are of legal working-age (that is, we do not include those workers older than the legal retirement age, nor those supposed to be in compulsory education). Results of estimated regressions are shown in Tables A4 and A5 of Online Appendix A. In the case of Mexico and Peru, the legal limits are between 14 and 65 years, for Ecuador legal limits are between 15 and 65 years, and in Colombia, for women, the limits are between 15 and 55 years and for men between 15 and 60 years.¹¹

Non-labour income may also affect the time parents devote to childcare, given that households may be more likely to outsource home production activities, including childcare. Kalenkoski, Ribar, and Stratton (2005) show that mothers reduce the time devoted to active childcare when household income increases. For Mexico, Colombia, and Ecuador we obtain the non-labour income of the parents through the question related to income earned from rent of properties, foreign remittances, financial investments, subsidies provided by government, and so forth. In the case of Peru, we cannot consider

the non-labour incomes of the father and mother because this time-use survey does not provide that information.

We also control for the number of household members, since in larger households more members may be available to help with childcare activities. In fact, prior evidence has shown that Hispanic parents rely on relatives' help to care for their children (Delgado & Canabal, 2006; Fuller et al., 1996). Regarding the time devoted by parents to the types of childcare, this varies in intensity, depending on the age of the children. While children are young, parents need to spend more time in activities such as bathing, dressing, and taking them to the doctor (Silver, 2000) while as children grow up, parents must begin to devote more time to activities like reading and teaching (Miller & Mulvey, 2000). From this, we consider three groups in the number of children: 0–4 years, 5–12 years, and 13–17 years. Racial origin, living in a rural or urban area, or region of residence may also influence the time devoted by parents to their children. Regarding racial differences, Hofferth (2003) and McLoyd (1990) show that black parents have more financial limitations, worse working schedules, and more precarious jobs, in comparison to whites, which may affect the time parents devote to their children. To measure racial differences, we consider whether the father and mother are indigenous, or not.¹²

Finally, regarding geographical differences, Canelas and Salazar (2014) show that, in Latin America, living in rural areas involves much more limited access to education, and other services such as healthcare, which could influence the time devoted to childcare. For the region of residence of respondents, in Mexico we consider four regions (Centre, West-Centre, North, South-South-East), in Peru four regions (Rest of the Coast, Sierra, Selva, Lima), in Ecuador three regions (Sierra, Costa, and Amazon) and in Colombia, six regions (Atlantic, Central, Eastern, Pacific, Bogota, and San Andres). The reference category for Mexico is the Centre region, for Peru, the Selva region, for Ecuador, the Amazon region and for Colombia, the Bogota region.

Table A3 in the Online Appendix shows summary statistics for the variables that we include in our econometric model. The prevailing level of education of parents and mothers in the four countries is primary education. Regarding monthly non-labour incomes, Mexican fathers receive an average of 91.6 Mexican pesos, Ecuadorian fathers receive an average 9.90 US dollars, and Colombian fathers receive an average 52,494.2 Colombian pesos, while Mexican mothers receive an average 79.3 Mexican pesos, Ecuadorian mothers receive an average 19.17 US dollars and Colombian mothers receive 27,122 Colombian pesos. In terms of relative wages (relative wage_{*t*} = log (mother's predicted wage_{*t*} /father's predicted wage_{*t*})), the relative wage in Mexico is 0.40, for Peru it is 0.52, for Ecuador it is 0.47 and for Colombia it is 0.38. The number of members per household has an average of 4.70, 4.88, 5.00 and 4.35 for Mexican, Peruvian, Ecuadorian, and Colombian families, respectively. In terms of numbers of children between 0 and 4 years there is an average of 0.48, 0.49, 0.52 and 0.41 children for Mexican, Peruvian, Ecuadorian, and Colombian families respectively. Regarding numbers of children between 5 and 12 years there is an average of 1.04, 1.08, 1.15 and 0.87 children for Mexican, Peruvian, Ecuadorian, and Colombian families, respectively, and for the number of children between 13 and 17 there is an average of 0.60, 0.64, 0.65 and 0.54 children for Mexican, Peruvian, Ecuadorian, and Colombian families, respectively.

4. Results

Table 3 to Table 6 show the results of estimating the SUR model according to Equations (1), (2) and (3), for Mexico, Peru, Ecuador, and Colombia, respectively. Columns (1) and (2) of the four tables show the results of estimating Equation (1) for men and women, respectively, columns (3) and (4) of the four tables show the results of estimating Equation (2) for men and women, while columns (5) and (6) of the four tables show the results of estimating Equation (3) for men and women. Given that we are using generated regressors in our models, we follow Gimenez-Nadal and Molina (2013, 2015), Murphy and Topel (1985), and Pagan (1984) and bootstrap the standard errors of such regressions. In doing so, we have carried out 1000 replications, where

Table 3. SUR estimates on the time devoted to childcare and paid work in Mexico (hours per week)

	(1)		(2)		(3)		(4)		(5)		(6)	
	Basic childcare				Educational childcare				Paid work			
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Mothers	
Father's age	-0.0279*** (0.00757)	-0.0507*** (0.0167)	-0.00395 (0.00698)	-0.0111 (0.0110)	-0.185*** (0.0592)	-0.0514 (0.0606)						
Mother's age	-0.0107 (0.00882)	-0.0900*** (0.0195)	-9.55e-05 (0.00758)	-0.0315** (0.0125)	0.0285 (0.0678)	0.109 (0.0696)						
Non-labour income father	-3.93e-05 (4.13e-05)	7.27e-05 (9.57e-05)	5.18e-05 (6.13e-05)	6.97e-05 (7.36e-05)	-0.000656* (0.000361)	-0.000861*** (0.000224)						
Non-labour income mother	-5.59e-05 (0.0836)	6.59e-05 (0.195)	2.61e-05 (0.0641)	-9.66e-05 (0.136)	-0.000770* (0.795)	-0.000495 (0.629)						
Relative predicted wages	0.0416 (0.0386)	-0.443** (0.0883)	-0.121* (0.0280)	0.549*** (0.0771)	1.480* (0.504)	3.383*** (0.278)						
Relative predicted wages squared	-0.0636* (0.0256)	-0.180** (0.0736)	-0.116*** (0.0256)	-0.157** (0.0403)	-0.202 (0.259)	0.459* (0.268)						
N. household members	0.0265 (0.0965)	0.178** (0.197)	-0.0752*** (0.0696)	-0.196*** (0.106)	0.156 (0.560)	-0.504* (0.588)						
N. younger child 0-4	1.486*** (0.0490)	6.796*** (0.122)	0.0290 (0.0425)	0.0718 (0.0701)	-0.469 (0.360)	-2.838*** (0.382)						
N. younger child 5-12	-0.175*** (0.0521)	-0.276** (0.128)	0.696*** (0.0548)	1.962*** (0.0918)	-0.254 (0.476)	-0.774** (0.534)						
N. younger child 13-17	-0.315*** (0.188)	-0.783*** (0.440)	-0.0682 (0.161)	-0.351*** (0.252)	0.154 (1.402)	1.597*** (1.367)						
Father indigenous	-0.102 (0.196)	-0.233 (0.487)	0.146 (0.156)	-0.157 (0.266)	-0.357 (1.430)	1.390 (1.415)						
Mother indigenous	0.188	0.513	-0.256	-0.782***	-0.167	-1.046						
Rural Area	-0.123 (0.0894)	0.193 (0.188)	-0.307*** (0.0680)	-0.683*** (0.117)	-4.523*** (0.675)	-6.636*** (0.619)						
Region 1	0.0372 (0.104)	-0.603*** (0.213)	-0.316*** (0.0846)	-0.910*** (0.137)	-2.804*** (0.727)	0.687 (0.796)						
Region 2	0.0849 (0.115)	-0.565** (0.228)	-0.211** (0.0961)	-0.675*** (0.149)	-3.832*** (0.757)	0.959 (0.857)						
Region 3	-0.0172 (0.106)	-0.121 (0.240)	-0.208** (0.0949)	-0.848*** (0.156)	-1.337* (0.812)	-1.614* (0.839)						
Father's education	0.130 (0.136)	0.0258 (0.258)	0.314*** (0.108)	0.408** (0.177)	1.990** (0.884)	2.480** (1.011)						
Secondary education												
Father's education	0.150 (0.132)	-0.111 (0.295)	0.585*** (0.126)	0.786*** (0.180)	0.0843 (0.886)	-0.891 (1.010)						
University education												

(continued)

Table 3. (Continued)

	(1)		(2)		(3)		(4)		(5)		(6)	
	Basic childcare				Educational childcare				Paid work			
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Mother's Secondary education	0.0901 (0.127)	0.356 (0.269)	0.260** (0.106)	0.655*** (0.182)	-0.451 (0.863)	3.586*** (0.993)						
Mother's University education	0.475*** (0.158)	0.578* (0.322)	0.427*** (0.137)	0.321 (0.200)	-0.645 (0.998)	12.229*** (1.149)						
Constant	2.255*** (0.290)	7.716*** (0.602)	1.302*** (0.225)	4.882*** (0.366)	61.11*** (1.871)	15.73*** (1.882)						
R-squared	0.176	0.453	0.094	0.232	0.025	0.100						
Observations	5,731	5,731	5,731	5,731	5,731	5,731						

Notes: Bootstrapped standard errors in parentheses. The sample is restricted to heterosexual couples aged 21–65 (inclusive) who are not students or retired with at least one child under age 18. See Online Appendix B for a description of the activities included in basic childcare, educational childcare and paid work time. Primary education is equivalent to less than high school degree, secondary education is equivalent to high school degree and university education is equivalent to more than a high school degree. Non-labour incomes are in Mexican pesos for Mexico, US dollars for Ecuador and Colombian pesos for Colombia. Rural area is considered in Mexico, Peru, and Ecuador while for Colombia it is considered not to be a municipality. *p = 0.90; **p = 0.95; ***p = 0.99.

Table 4. SUR estimates on the time devoted to childcare and paid work in Peru (hours per week)

	(1)		(2)		(3)		(4)		(5)		(6)
	Basic childcare		Educational childcare		Paid work		Fathers		Mothers		
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	
Father's age	-0.000652 (0.00430)	-0.00170 (0.0271)	0.00544 (0.0138)	-0.0297* (0.0163)	-0.229*** (0.0803)	0.0392 (0.0986)	-0.229*** (0.0803)	0.0392 (0.0986)	-0.229*** (0.0803)	0.0392 (0.0986)	
Mother's age	-0.0117*** (0.00449)	-0.0735*** (0.0283)	-0.0582*** (0.0158)	-0.0632*** (0.0186)	0.0820 (0.0945)	0.114 (0.117)	0.0820 (0.0945)	0.114 (0.117)	0.0820 (0.0945)	0.114 (0.117)	
Non-labour income father	-	-	-	-	-	-	-	-	-	-	-
Non-labour income mother	-	-	-	-	-	-	-	-	-	-	-
Relative predicted wages	0.743 (0.698)	-1.441 (4.425)	1.430 (2.780)	3.324 (4.050)	30.28* (16.95)	13.84 (19.83)	30.28* (16.95)	13.84 (19.83)	30.28* (16.95)	13.84 (19.83)	
Relative predicted wages squared	-0.982 (0.611)	0.448 (3.888)	-2.571 (2.491)	-2.557 (3.754)	-26.98* (15.51)	-6.606 (18.33)	-26.98* (15.51)	-6.606 (18.33)	-26.98* (15.51)	-6.606 (18.33)	
N. household members	0.0111 (0.0203)	-0.0754 (0.0982)	-0.0575 (0.0571)	-0.127 (0.0804)	-0.190 (0.402)	-0.0542 (0.515)	-0.190 (0.402)	-0.0542 (0.515)	-0.190 (0.402)	-0.0542 (0.515)	
N. younger child 0-4	0.332*** (0.0601)	6.153*** (3.303)	0.304* (0.157)	0.622*** (0.197)	-1.095 (0.809)	-5.660*** (0.996)	-1.095 (0.809)	-5.660*** (0.996)	-1.095 (0.809)	-5.660*** (0.996)	
N. younger child 5-12	-0.0448 (0.0316)	0.243 (0.175)	0.634*** (0.101)	0.994*** (0.125)	0.755 (0.586)	-0.737 (0.698)	0.755 (0.586)	-0.737 (0.698)	0.755 (0.586)	-0.737 (0.698)	
N. younger child 13-17	-0.00847 (0.0406)	-0.0856 (0.207)	-0.0761 (0.132)	-0.558*** (0.153)	0.314 (0.755)	0.678 (0.947)	0.314 (0.755)	0.678 (0.947)	0.314 (0.755)	0.678 (0.947)	
Father indigenous	0.0833 (0.0840)	0.374 (0.491)	-0.0695 (0.284)	-0.126 (0.403)	-0.519 (1.647)	2.924 (2.238)	-0.519 (1.647)	2.924 (2.238)	-0.519 (1.647)	2.924 (2.238)	
Mother indigenous	-0.113 (0.0809)	-0.0678 (0.506)	-0.364 (0.284)	-0.397 (0.420)	1.708 (1.671)	4.540*** (2.313)	1.708 (1.671)	4.540*** (2.313)	1.708 (1.671)	4.540*** (2.313)	
Rural Area	-0.0571 (0.0485)	-0.225 (0.312)	0.487*** (0.188)	-0.641*** (0.220)	-8.389*** (1.032)	-4.268*** (1.293)	-8.389*** (1.032)	-4.268*** (1.293)	-8.389*** (1.032)	-4.268*** (1.293)	
Region 1	-0.102* (0.0535)	0.679** (0.345)	0.137 (0.212)	0.655*** (0.252)	1.677 (1.100)	-0.640 (1.462)	1.677 (1.100)	-0.640 (1.462)	1.677 (1.100)	-0.640 (1.462)	
Region 2	0.0431 (0.0718)	0.180 (0.384)	-0.344 (0.222)	-0.613** (0.259)	1.640 (1.216)	0.554 (1.509)	1.640 (1.216)	0.554 (1.509)	1.640 (1.216)	0.554 (1.509)	
Region 3	0.0266 (0.0926)	0.576 (0.391)	-0.586** (0.263)	1.751*** (0.384)	7.262*** (1.485)	-3.018 (1.963)	7.262*** (1.485)	-3.018 (1.963)	7.262*** (1.485)	-3.018 (1.963)	
Father's Secondary education	-0.0623 (0.0727)	-0.00648 (0.343)	0.495** (0.214)	0.287 (0.280)	-0.187 (1.202)	2.923** (1.453)	-0.187 (1.202)	2.923** (1.453)	-0.187 (1.202)	2.923** (1.453)	
Father's University education	-0.111 (0.0896)	0.464 (0.463)	0.923*** (0.278)	0.674** (0.341)	-2.521 (1.688)	0.581 (2.120)	-2.521 (1.688)	0.581 (2.120)	-2.521 (1.688)	0.581 (2.120)	
Mother's Secondary education	0.121 (0.0800)	-0.489 (0.408)	0.415 (0.259)	0.304 (0.349)	-1.582 (1.434)	1.050 (1.846)	-1.582 (1.434)	1.050 (1.846)	-1.582 (1.434)	1.050 (1.846)	
Mother's University education	0.308*** (0.109)	-0.161 (0.562)	0.601* (0.355)	1.196*** (0.460)	-3.446* (2.047)	4.638** (2.313)	-3.446* (2.047)	4.638** (2.313)	-3.446* (2.047)	4.638** (2.313)	
Constant	0.548** (0.254)	4.553*** (1.507)	3.763*** (0.911)	5.967*** (1.248)	54.04*** (5.242)	11.44* (6.007)	54.04*** (5.242)	11.44* (6.007)	54.04*** (5.242)	11.44* (6.007)	
R-squared	0.103	0.441	0.114	0.231	0.084	0.083	0.084	0.083	0.084	0.083	
Observations	1,657	1,657	1,657	1,657	1,657	1,657	1,657	1,657	1,657	1,657	

Notes: Bootstrapped standard errors in parentheses. The sample is restricted to heterosexual couples aged 21-65 (inclusive) who are not students or retired with at least one child under age 18. See Online Appendix B for a description of the activities included in basic childcare, educational childcare and paid work time. Primary education is equivalent to less than high school degree, secondary education is equivalent to high school degree and university education is equivalent to more than a high school degree. Non-labour incomes are in Mexican pesos for Mexico, US dollars for Ecuador and Colombian pesos for Colombia. Rural area is considered in Mexico, Peru, and Ecuador while for Colombia it is considered not to be a municipality. *p = 0.90; **p = 0.95; ***p = 0.99.

Table 5. SUR estimates on the time devoted to childcare and paid work in Ecuador (hours per week)

	(1)		(2)		(3)		(4)		(5)		(6)	
	Basic childcare				Educational childcare				Paid work			
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Father's age	-0.0101*** (0.00367)	0.0166 (0.0147)	-0.00731 (0.00998)	0.0153 (0.0180)	0.00707 (0.0529)	-0.0280 (0.0767)						
Mother's age	-0.00204 (0.00429)	-0.102*** (0.0168)	-0.0212* (0.0117)	-0.146*** (0.0206)	-0.101 (0.0617)	0.144 (0.0883)						
Non-labour income father	0.000569 (0.000529)	0.000273 (0.00124)	0.000965 (0.000827)	-8.56e-05 (0.00114)	-0.000900 (0.00325)	0.00937** (0.00436)						
Non-labour income mother	-0.000377 (0.000577)	-0.000526 (0.00188)	-0.00125 (0.00189)	0.00187 (0.00347)	-0.0168* (0.00932)	-0.0298* (0.0158)						
Relative predicted wages	0.223** (0.110)	0.299 (0.483)	-0.0159 (0.346)	2.367*** (0.512)	1.044 (1.511)	-0.988 (2.540)						
Relative predicted wages squared	-0.0767 (0.0787)	-0.341 (0.297)	0.109 (0.300)	-0.730* (0.391)	-0.00655 (1.181)	0.508 (1.827)						
N. household members	0.0315* (0.0167)	0.153** (0.0699)	-0.0470 (0.0517)	-0.0525 (0.0873)	0.310 (0.246)	0.602* (0.353)						
N. younger child 0-4	0.312*** (0.0621)	3.766*** (0.169)	0.486*** (0.114)	0.924*** (0.194)	-0.285 (0.507)	-3.267*** (0.704)						
N. younger child 5-12	-0.0372 (0.0305)	0.0383 (0.103)	0.420*** (0.0722)	1.237*** (0.130)	0.123 (0.352)	-0.197 (0.512)						
N. younger child 13-17	-0.0550* (0.0299)	-0.450*** (0.114)	-0.287*** (0.0883)	-0.764*** (0.154)	0.484 (0.486)	-0.545 (0.686)						
Father indigenous	-0.0559 (0.139)	0.549 (1.029)	-0.0119 (0.593)	-0.522 (1.157)	-0.582 (4.517)	-1.710 (7.635)						
Mother indigenous	-0.0331 (0.140)	-0.576 (1.020)	0.337 (0.608)	-1.472 (1.168)	-1.771 (4.504)	12.57* (7.556)						
Rural Area	-0.0604 (0.0642)	-0.266 (0.171)	-0.361** (0.141)	-0.397* (0.232)	-3.482*** (0.669)	-4.120*** (0.916)						
Region 1	0.127* (0.0730)	0.337 (0.223)	0.127 (0.177)	0.789*** (0.273)	-0.591 (0.749)	3.366*** (1.276)						
Region 2	-0.0363 (0.0751)	-0.379* (0.228)	0.112 (0.177)	1.040*** (0.278)	-1.696** (0.805)	-5.572*** (1.245)						
Father's Secondary education	-0.00983 (0.0708)	0.106 (0.235)	0.452** (0.192)	-0.0370 (0.279)	1.459* (0.822)	1.012 (1.212)						
Father's University education	-0.127 (0.0853)	0.00732 (0.350)	0.695*** (0.252)	0.512 (0.431)	-1.695 (1.111)	-0.558 (1.778)						
Mother's Secondary education	0.112 (0.0940)	0.227 (0.261)	-0.0835 (0.193)	-0.290 (0.297)	0.994 (0.873)	1.257 (1.340)						
Mother's University education	0.164 (0.104)	0.0608 (0.391)	0.240 (0.291)	0.00400 (0.502)	-0.472 (1.241)	15.57*** (1.868)						
Constant	0.485** (0.189)	4.893*** (0.550)	2.507*** (0.454)	8.103*** (0.689)	54.75*** (2.000)	13.16*** (2.885)						
R-squared	0.056	0.385	0.072	0.192	0.028	0.123						
Observations	2,938	2,938	2,938	2,938	2,938	2,938						

Notes: Bootstrapped standard errors in parentheses. The sample is restricted to heterosexual couples aged 21-65 (inclusive) who are not students or retired with at least one child under age 18. See Online Appendix B for a description of the activities included in basic childcare, educational childcare and paid work time. Primary education is equivalent to less than high school degree, secondary education is equivalent to high school degree and university education is equivalent to more than a high school degree. Non-labour incomes are in Mexican pesos for Mexico, US dollars for Ecuador and Colombian pesos for Colombia. Rural area is considered in Mexico, Peru, and Ecuador while for Colombia it is considered not to be a municipality. *p = 0.90; **p = 0.95; ***p = 0.99.

Table 6. SUR estimates on the time devoted to childcare and paid work in Colombia (hours per day)

	(1)		(2)		(3)		(4)		(5)		(6)	
	Basic childcare		Mothers		Fathers		Mothers		Fathers		Mothers	
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Father's age	-0.000129 (0.000322)	-0.000764 (0.000867)	-0.000130 (0.00100)	-0.000529 (0.00122)	-0.0276*** (0.00629)	-0.000533 (0.0365)	-0.0276*** (0.00629)	-0.000533 (0.0365)	-0.0276*** (0.00629)	-0.000533 (0.0365)	-0.0276*** (0.00629)	-0.000533 (0.0365)
Mother's age	0.00122*** (0.000381)	-0.00721*** (0.00101)	-0.00506*** (0.00110)	-0.00931*** (0.00141)	0.000970 (0.00719)	0.0826 (0.0804)	0.000970 (0.00719)	0.0826 (0.0804)	0.000970 (0.00719)	0.0826 (0.0804)	0.000970 (0.00719)	0.0826 (0.0804)
Non-labour income father	-2.75e-09 (4.95e-09)	-5.22e-09 (1.29e-08)	2.90e-08 (2.11e-08)	-1.76e-08 (1.98e-08)	0.138*** (0.0570)	-0.144*** (0.0524)	0.138*** (0.0570)	-0.144*** (0.0524)	0.138*** (0.0570)	-0.144*** (0.0524)	0.138*** (0.0570)	-0.144*** (0.0524)
Non-labour income mother	4.66e-09 (9.99e-09)	2.43e-08 (2.31e-08)	-4.43e-08* (2.45e-08)	2.08e-09 (3.95e-08)	0.149*** (0.0725)	0.0676 (0.0720)	0.149*** (0.0725)	0.0676 (0.0720)	0.149*** (0.0725)	0.0676 (0.0720)	0.149*** (0.0725)	0.0676 (0.0720)
Relative predicted wages	0.00376 (0.00328)	-0.000770 (0.0104)	0.00867 (0.0100)	0.0204 (0.0125)	-0.0456 (0.0125)	0.189*** (0.0599)	-0.0456 (0.0125)	0.189*** (0.0599)	-0.0456 (0.0125)	0.189*** (0.0599)	-0.0456 (0.0125)	0.189*** (0.0599)
Relative predicted wages squared	-0.00152* (0.000916)	-0.000443 (0.00431)	-0.00420 (0.00336)	-0.00502 (0.00557)	0.000249 (0.00211)	-0.00936 (0.0206)	0.000249 (0.00211)	-0.00936 (0.0206)	0.000249 (0.00211)	-0.00936 (0.0206)	0.000249 (0.00211)	-0.00936 (0.0206)
N. household members	-0.000991 (0.00176)	0.0173*** (0.00560)	0.00992* (0.00515)	0.0254*** (0.00748)	0.0557 (0.0367)	0.0557 (0.0367)	0.00992* (0.00515)	0.0254*** (0.00748)	0.0557 (0.0367)	0.0557 (0.0367)	0.00992* (0.00515)	0.0254*** (0.00748)
N. younger child 0-4	0.0795*** (0.00564)	0.712*** (0.0156)	0.335*** (0.0147)	0.466*** (0.0204)	-0.685*** (0.0707)	-0.685*** (0.0707)	0.335*** (0.0147)	0.466*** (0.0204)	-0.685*** (0.0707)	-0.685*** (0.0707)	0.335*** (0.0147)	0.466*** (0.0204)
N. younger child 5-12	-0.00666** (0.00293)	-0.0298*** (0.00852)	-0.0315*** (0.00869)	0.00567 (0.0126)	-0.144*** (0.0524)	-0.144*** (0.0524)	-0.0315*** (0.00869)	0.00567 (0.0126)	-0.144*** (0.0524)	-0.144*** (0.0524)	-0.0315*** (0.00869)	0.00567 (0.0126)
N. younger child 13-17	-0.0126*** (0.00273)	-0.0784*** (0.00898)	-0.0760*** (0.00892)	-0.122*** (0.0140)	0.0676 (0.0720)	0.0676 (0.0720)	-0.0760*** (0.00892)	-0.122*** (0.0140)	0.0676 (0.0720)	0.0676 (0.0720)	-0.0760*** (0.00892)	-0.122*** (0.0140)
Father indigenous	0.0296** (0.0121)	0.0297 (0.0294)	0.101*** (0.0364)	-0.00572 (0.0464)	0.420* (0.229)	0.420* (0.229)	0.101*** (0.0364)	-0.00572 (0.0464)	0.420* (0.229)	0.420* (0.229)	0.101*** (0.0364)	-0.00572 (0.0464)
Mother indigenous	-0.00240 (0.0111)	-0.0668** (0.0312)	-0.0575* (0.0330)	-0.0398 (0.0474)	-0.0704 (0.207)	-0.0704 (0.207)	-0.0575* (0.0330)	-0.0398 (0.0474)	-0.0704 (0.207)	-0.0704 (0.207)	-0.0575* (0.0330)	-0.0398 (0.0474)
Rural Area	-0.00494 (0.00462)	0.00855 (0.0149)	-0.00794 (0.0151)	-0.0592*** (0.0196)	-1.196*** (0.0842)	-1.196*** (0.0842)	-0.00794 (0.0151)	-0.0592*** (0.0196)	-1.196*** (0.0842)	-1.196*** (0.0842)	-0.00794 (0.0151)	-0.0592*** (0.0196)
Region 1	-0.0340*** (0.00791)	0.0225 (0.0177)	-0.105*** (0.0192)	-0.110*** (0.0247)	-1.376*** (0.118)	-1.376*** (0.118)	-0.105*** (0.0192)	-0.110*** (0.0247)	-1.376*** (0.118)	-1.376*** (0.118)	-0.105*** (0.0192)	-0.110*** (0.0247)
Region 2	-0.0396*** (0.00696)	0.0169 (0.0172)	-0.0737*** (0.0198)	-0.0494* (0.0253)	-1.239*** (0.123)	-1.239*** (0.123)	-0.0737*** (0.0198)	-0.0494* (0.0253)	-1.239*** (0.123)	-1.239*** (0.123)	-0.0737*** (0.0198)	-0.0494* (0.0253)
Region 3	-0.0221*** (0.00796)	0.0487** (0.0191)	-0.0487** (0.0205)	-0.0241 (0.0267)	-0.785*** (0.136)	-0.785*** (0.136)	-0.0487** (0.0205)	-0.0241 (0.0267)	-0.785*** (0.136)	-0.785*** (0.136)	-0.0487** (0.0205)	-0.0241 (0.0267)
Region 4	-0.0365*** (0.00744)	-0.0613*** (0.0181)	-0.0669*** (0.0214)	-0.0881*** (0.0267)	-0.728*** (0.136)	-0.728*** (0.136)	-0.0669*** (0.0214)	-0.0881*** (0.0267)	-0.728*** (0.136)	-0.728*** (0.136)	-0.0669*** (0.0214)	-0.0881*** (0.0267)
Region 5	-0.0284* (0.0150)	-0.1155*** (0.0298)	-0.0869** (0.0358)	-0.343*** (0.0366)	-0.222 (0.248)	-0.222 (0.248)	-0.0869** (0.0358)	-0.343*** (0.0366)	-0.222 (0.248)	-0.222 (0.248)	-0.0869** (0.0358)	-0.343*** (0.0366)
Father's Secondary education	0.00918* (0.00549)	0.0259* (0.0147)	0.0338** (0.0152)	0.0554*** (0.0210)	-0.0672 (0.0933)	-0.0672 (0.0933)	0.0338** (0.0152)	0.0554*** (0.0210)	-0.0672 (0.0933)	-0.0672 (0.0933)	0.0338** (0.0152)	0.0554*** (0.0210)
Father's University education	0.0257*** (0.00777)	0.0321* (0.0183)	0.0971*** (0.0206)	0.0591*** (0.0250)	-0.260** (0.120)	-0.260** (0.120)	0.0971*** (0.0206)	0.0591*** (0.0250)	-0.260** (0.120)	-0.260** (0.120)	0.0971*** (0.0206)	0.0591*** (0.0250)
Mother's Secondary education	0.00503 (0.00596)	0.00468 (0.0155)	0.0407** (0.0160)	0.0738*** (0.0211)	0.433*** (0.102)	0.433*** (0.102)	0.0407** (0.0160)	0.0738*** (0.0211)	0.433*** (0.102)	0.433*** (0.102)	0.0407** (0.0160)	0.0738*** (0.0211)
Mother's University education	0.0276*** (0.00807)	-0.00612 (0.0194)	0.0906*** (0.0212)	0.0707*** (0.0257)	1.580*** (0.132)	1.580*** (0.132)	0.0906*** (0.0212)	0.0707*** (0.0257)	1.580*** (0.132)	1.580*** (0.132)	0.0906*** (0.0212)	0.0707*** (0.0257)
Constant	0.120*** (0.0172)	0.462*** (0.0430)	0.522*** (0.0526)	0.697*** (0.0618)	2.290*** (0.260)	2.290*** (0.260)	0.522*** (0.0526)	0.697*** (0.0618)	2.290*** (0.260)	2.290*** (0.260)	0.522*** (0.0526)	0.697*** (0.0618)
R-squared	0.080	0.416	0.159	0.183	0.121	0.121	0.159	0.183	0.121	0.121	0.159	0.183
Observations	12,385	12,385	12,385	12,385	12,385	12,385	12,385	12,385	12,385	12,385	12,385	12,385

Notes: Bootstrapped standard errors in parentheses. The sample is restricted to heterosexual couples aged 21-65 (inclusive) who are not students or retired with at least one child under age 18. See Online Appendix B for a description of the activities included in basic childcare, educational childcare and paid work time. Primary education is equivalent to less than high school degree, secondary education is equivalent to high school degree and university education is equivalent to more than a high school degree. Non-labour incomes are in Mexican pesos for Mexico, US dollars for Ecuador and Colombian pesos for Colombia. Rural area is considered in Mexico, Peru and Ecuador while for Colombia it is considered not to be a municipality. We include in Colombia dummy variables to control for the day of the week (Ref.: Sunday). *p = 0.90; **p = 0.95; ***p = 0.99.

in each replication a random sample with replacement is drawn from the total number of observations.

Regarding the relationship between the level of education of fathers and mothers, and the time devoted to basic childcare, we find mixed cross-country evidence. In Mexico, mothers' university education is related to more time devoted to basic childcare by the mothers, while we find no statistically significant relationship in Peru, Ecuador and Colombia. Additionally, mothers' university education is related to more time in basic childcare by fathers in Mexico, Peru, and Colombia. In particular, mother's university education is related to an increase in mother's basic childcare time of 0.578 hours per week in Mexico, while it is also related to an increase in fathers' basic childcare time of 0.475, and 0.308 hours per week in Mexico and Peru, and 0.028 hours per day in Colombia, respectively, with the reference category being their counterparts with primary education. It is interesting to note that education has no relationship with time in basic childcare in Ecuador, and that father's university education is related to more time in basic childcare of fathers in Colombia, and generates a positive influence on the time devoted by the mother to the basic childcare. Thus, it appears that what really matters at the couple level is the level of education of mothers, as in couples where the mother has university education, both fathers and mothers devote comparatively more time to basic childcare.

Looking at the time devoted to educational childcare, in Mexico, Peru, and Colombia there is a positive gradient between parents' education and the time devoted to this activity by both members of the couple. Relative to parents with primary levels of education, mother's university education is related to an increase of 0.427 and 0.601, hours per week in the educational childcare time of fathers in Mexico and Peru, respectively, and 0.0906 hours per day in the educational childcare time of fathers in Colombia, to an increase of 1.196 hours per week in the educational childcare time of mothers in Peru, and to an increase of 0.0707 hours per day in the educational childcare time of mothers in Colombia. Furthermore, and in comparison with parents with primary levels of education, fathers' university education is related to an increase of 0.585 and 0.923 hours per week in the educational childcare time of fathers in Mexico and Peru, respectively, to an increase of 0.0971 hours per day in the educational childcare time of fathers in Colombia, to an increase of 0.786 and 0.674 hours per week in the educational childcare time of mothers in Mexico and Peru, respectively, and to an increase of 0.0591 hours per day in the educational childcare time of mothers in Colombia. Thus, the educational level of both parents is important in determining own and partner's time in educational childcare in these three countries, while the evidence does not support this conclusion in the case of Ecuador, since fathers' university education is related to more time in educational childcare only for fathers.

Table 7 shows the correlation matrix of residuals of our estimated models of childcare time. We find that the time devoted to educational childcare by parents is positively related in the four countries, so that more time devoted by the father to educational childcare is positively related to mother's educational childcare time. These results are consistent with Gimenez-Nadal and Molina (2013). Furthermore, the basic childcare, educational childcare, and paid work time of parents are positively related. For the remaining relationships, we do not find robust cross-country evidence. The fact that we find the time spent by parents in these three activities (mainly educational childcare) is complementary, and not a substitute, could be explained in part by partners attempting to synchronise their activities. Hamermesh (2000) argues that partners have higher preferences over their joint time, not only their individual time. Thus, partners prefer to adjust the timing of their activities so that they maximise the time they spend together. Hallberg (2003) argues that the most important factor influencing an individual's timing of daily activities is the timing of others, and the decisions about time for activities with children and market work are interdependent (Hallberg & Klevmarken, 2003). Hallberg and Klevmarken (2003) indicate that the degree of substitution between activities appears to have become smaller as more women work full time, and couples prefer joint activities with their children. Under these circumstances, given that parents attempt to synchronise their activities, including work schedules, both parents may be present during childcare activities, leading to a complementarity between the activities.

Table 7. Correlation matrix of residuals

		Basic childcare		Educational childcare		Paid work	
		Father	Mother	Father	Mother	Father	Mother
Mexico							
Basic childcare	Father	1.000					
	Mother	0.324	1.000				
Educational childcare	Father	0.098	-0.041	1.000			
	Mother	-0.044	0.028	0.119	1.000		
Paid work	Father	-0.049	-0.001	-0.090	0.085	1.000	
	Mother	0.033	-0.063	0.087	-0.116	0.020	1.000
Peru							
Basic childcare	Father	1.000					
	Mother	0.088	1.000				
Educational childcare	Father	0.171	0.108	1.000			
	Mother	0.027	-0.009	0.110	1.000		
Paid work	Father	-0.118	-0.021	-0.216	0.031	1.000	
	Mother	0.026	-0.166	-0.041	-0.250	0.080	1.000
Ecuador							
Basic childcare	Father	1.000					
	Mother	0.045	1.000				
Educational childcare	Father	0.219	0.050	1.000			
	Mother	0.034	0.236	0.286	1.000		
Paid work	Father	-0.063	0.019	-0.093	0.016	1.000	
	Mother	0.081	-0.104	0.052	-0.097	0.125	1.000
Colombia							
Basic childcare	Father	1.000					
	Mother	0.051	1.000				
Educational childcare	Father	0.240	0.081	1.000			
	Mother	0.075	0.204	0.334	1.000		
Paid work	Father	-0.133	0.021	-0.179	0.010	1.000	
	Mother	0.047	-0.162	0.016	-0.147	0.078	1.000

Notes: Correlation matrix of residuals obtained from Tables 3, 4, 5 and 6. The sample is restricted to heterosexual couples aged 21–65 (inclusive) who are not students or retired with at least one child under age 18. See Online Appendix B for a description of the activities included in basic childcare, educational childcare and paid work time.

5. Conclusions

In this paper, we analyse how parents' education is related to the time devoted to childcare activities, in four Latin American countries, with a focus on childcare activities aimed at increasing the human capital of children. Our analysis is based on prior research showing that parents with higher levels of education devote more time to childcare activities that foster human capital development, compared to parents with lower levels of education. We use Time-Use Surveys from four Latin American countries, Mexico (2009), Peru (2010), Ecuador (2012), and Colombia (2012), and we find that in all four countries parents with higher levels of education devote more time to educational childcare, compared to parents with lower levels of education. Furthermore, we estimate a SUR model on the time devoted to basic and educational childcare and we find that higher levels of education of the parents are associated with more time devoted to educational childcare by both parents in Mexico, Peru, and Colombia. We also we find evidence of complementarities between parents' educational childcare time, in that more time devoted to educational childcare by any member of the couple is related to more time in educational childcare time by the other member of the couple This finding is consistent with Gimenez-Nadal and Molina (2013).

Additionally, in Mexico, Peru, and Colombia, we find that the university education of the mother has a positive relationship with the father's time devoted to basic childcare, and with own mother's time devoted to basic childcare in Mexico, which may be due to the scarcity of childcare centres in the

region (Araujo, López Bóo and Puyana, 2013). On this point, governments and policy-makers should provide more support to families, to facilitate access to these childcare centres, requiring childcare centres to have better-qualified employees and instituting more comprehensive regulations so that private centres can offer better childcare services.

This study would be of interest in terms of public policy, in that it focuses on the importance of the transmission of human capital by parents to children, especially when the parents are better educated. Despite evidence that more educated parents are those who spend more time on activities that contribute to the human capital of the children, more than half of the parents and mothers surveyed have only primary education. Education benefits all members of a family and society as a whole, as prior research in developing countries shows that one of the most appropriate mechanisms for poverty reduction and preventing the transmission of poverty between generations is education (Basant & Sen, 2014; Harper, Marcus, & Moore, 2003). Governments, and other policy-makers should implement more effective programmes to enable the population to attain higher levels of education.

We acknowledge certain data limitations of our study. First, we cannot ascertain whether differences by education arise from different preferences, different productivities in the provision of childcare, or differences in the value of time, even though our examination of the channel through which mother's education affects the time devoted to *educational childcare* reveals its significance. Unfortunately, no panels of time use data are currently available, so we leave this issue for future research. Second, we only consider the childcare that is reported as primary childcare, as a main activity, despite prior evidence showing that primary childcare cannot be equated with the time that parents spend with their children (Folbre et al., 2005), and childcare reported as primary activity substantially under-reports total childcare time (Bianchi, Wight, & Raley, 2006; Budig & Folbre, 2004; Folbre & Bittman, 2004). We leave the inclusion of passive childcare, and its classification into basic and educational childcare, for future research. Third, we can only study the quantity of time devoted by parents to their children but not the quality of this time. To measure the quality of parents' childcare, investigations such as Brinkman et al. (2007), Forget-Dubois et al. (2007), Guhn, Gadermann, and Zumbo (2007), and Janus and Offord (2007) consider information provided by teachers, which allows for a better assessment of the quality of parents' childcare time. For Colombia, Bernal, Fernández, and Peña (2011), using the survey 'Hogares comunitarios', find that the quality of maternal time has a positive effect on both cognitive and socio-emotional development of children. However, time use surveys do not allow us to analyse the quality of childcare time, and thus we leave this issue for future research.

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The data and STATA codes for the replication of our results are available upon request.

Disclosure statement

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Notes

1. Prior research in Latin America using time-use surveys are Campaña, Gimenez-Nadal and Molina (2015), who analyse gender differences in total work and show that these differences vary across countries, and Durán and Milosavljevic (2012),

who forecast the demand for child and adult care of the population until 2050, showing that, while the demand for eldercare will increase in Latin America, the demand for childcare will decrease.

2. See Online Appendix B for a description of all the activities included in basic childcare and educational childcare.
3. The methodologies for the time use surveys used in this paper have been defined by the relevant institutes of statistics in each country: INEGI (National Institute of statistics and geography) in Mexico, INEI (National Institute of Statistics and Informatics) in Peru, DANE (National Administrative Department of statistics) in Colombia; and INEC (National Institute of statistics and censuses) in Ecuador. Lists of activities based on the following international classifications are used in the data collection: Peru (ICATUS, classification international activities of use of time); Mexico (CMAUT, classification of time use); Ecuador and Colombia (CAUTAL, classification of activities of the use of time for Latin America and the Caribbean). The four surveys are perfectly comparable, since the scheme from ICATUS is the benchmark for CMAUT and CAUTAL. For further details regarding the list of activities in these four countries, see Campaña et al. (2015).
4. Prior studies, such as Aguiar and Hurst (2007) and Gimenez-Nadal and Sevilla (2012) considered these aspects to restrict their sample in time-use studies. The Time Use Survey of Peru does not provide information on whether people are retired or not, but we know that the legal age of retirement is 65 years (Superintendency of Banking and Insurance of Peru), and thus we assume that people younger than 65 are not retired.
5. See Bianchi et al. (2006), Budig and Folbre (2004), Folbre and Bittman (2004), Guryan et al. (2008) and Sevilla-Sanz, Gimenez-Nadal, and Fernandez (2010) for an understanding of the various dimensions of childcare.
6. Although Guryan et al. (2008) and Gimenez-Nadal and Molina (2013) consider three categories of childcare (basic, education, and supervisory childcare), we consider only two types of childcare activities due to data limitations, as we cannot distinguish efficiently between education and supervisory childcare.
7. It is important to define the terms of employment status, since the time spent by parents with their children depends on the time available for work (Haas, 1999). Fathers or mothers with better work schedules, or if they are not working at all, may devote more time to childcare. Table A1 in the Online Appendix shows that the majority of fathers surveyed work full-time. Colombian mothers have the highest percentage of working full-time, at 31.62 per cent, while only 19.75 per cent of Mexican mothers work full-time. Regarding part-time work, Peruvian mothers present the highest percentage, at 42.85 per cent of the sample, while only 15.08 per cent of Ecuadorian mothers work part-time. Considering non-working mothers, 60 per cent of Mexican and Ecuadorean mothers fall into this category, followed by Colombian mothers, at 52.13 per cent, and Peruvian mothers, at 37.12 per cent.
8. An important point to consider is the number of children of the couple. Becker (1981) predicts that women with higher education will spend less time on household chores, so those women are likely to have fewer children because the opportunity costs involved in not participating in the labour market are higher, and the highest costs are for those who are more educated (Becker & Lewis, 1973). Bachu (1999) and Beets (1999) demonstrate that women with a relatively high level of education have fewer children than women with a comparatively low level of education. Table A2 in the Online Appendix shows that the average number of children decreases with the level of education for the four countries (with the level of education of the mother being more important than the level of education of the father, in terms of reducing the number of children) as parents with lower levels of education have more children compared to parents with higher levels of education. Thus, parents with higher levels of education devote more time to their children, but have fewer children, indicating that the time invested per child increases with the education of the parents, consistent with the quantity-quality trade-off theory.
9. Examples of studies estimating SUR systems are Connelly and Kimmel (2009), Kalenkoski et al. (2005), Kimmel and Connelly (2007), Gimenez-Nadal, Marcen, and Ortega (2010) and Gimenez-Nadal and Molina (2013).
10. This procedure is also performed by Gimenez-Nadal and Molina (2013) in their study for Spain and the UK.
11. The information comes from: Child Labour module of the National Survey of Occupation and Employment 2009 and IMSS (Mexican Institute of Social Security) for Mexico; Ministry of Labour and Employment Promotion and Superintendency of Banking and Insurance for Peru; Constitution of the Republic of Ecuador (2008) and IESS (Ecuadorian Institute of Social Security) for Ecuador; and Ministry of Labour for Colombia.
12. In the case of Mexico and Peru, we have no information on the indigenous origin of respondents, but these surveys provide information on whether the respondent speaks an indigenous language. We assign value '0' to the indigenous variable if the respondent does not speak an indigenous language, and value '1' if the respondent speaks an indigenous language. In Colombia and Ecuador, respondents are asked to identify themselves according to their indigenous origin, so that we assign to the indigenous variable value '0' if the respondent does not identify himself/herself as indigenous, and value '1' if he/she is identified as such.

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