Nuptiality Regimes and Educational Expansion in Latin America: Revisiting the Stability Hypothesis

Luis López Ruiz[1], Jeroen Spijker[12], Albert Esteve[1]

Paper to be presented at the Population Association of America Annual Meeting,
Washington, D.C. March 31 - April 2, 2011.

Session 62: Demography of Latin America Thursday, March 31 3:30 PM - 5:20 PM

Chair: Leticia J. Marteleto, University of Texas at Austin
Discussant: Emilio A. Parrado, University of Pennsylvania

Abstract

One of the most salient features of Latin American marriage regimes lies in the stability in union formation timing over time, despite changes that have taken place regarding educational expansion and the incorporation of women into the labor force. We use recently harmonized international census microdata for 10 Latin American countries from the 1970s and the 2000s to examine the mechanisms by which educational expansion did not have an influence on aggregated indicators of timing of union formation. Results from the decompositional analysis show that this apparent stability was produced by contrasting shifts that occurred in different educational groups. In most countries, the postponement effect that the educational expansion was expected to carry out was offset by earlier union formation (mostly through non-marital cohabitation) among the least (and formally largest) educational groups, while university graduates have delayed union formation.

[1] Centre d'Estudis Demogràfics, Universitat Autònoma de Barcelona, 08193 Bellaterra (Barcelona), Spain.

[2] Corresponding author. E-mail: jjaspijker@yahoo.es. Tel: +34 93 581 30 60.

1. Introduction

One of the most salient features of Latin American marriage regimes lies in the stability in union formation timing has shown over time. Several studies substantiate the existence of this pattern at least for the last three decades of the twentieth century (Weinberger et al., 1989; United Nations, 1990; Singh & Samara, 1996; García & Rojas, 2002; Heaton et al., 2002; Westoff, 2003; Fussell & Palloni, 2004; Mensch et al., 2005). Using census microdata from nine Latin American countries as a cross-sectional measure of timing of union formation. Our own calculations, as shown in Table 1, corroborate previous findings (De Vos, 1998; Fussell & Palloni, 2004; García, 2004). Despite cross-national and gender differences in levels of *Singulate Mean Age at Marriage* (SMAM), time trends show that it has remained relatively constant over time with very little fluctuation across censuses, except for a two-year increase among Chilean men between 1990 and 2000. Comparing between the oldest and the most recent census, we find that the difference does not exceed 0.5 years for men in Argentina, Brazil, Colombia, Ecuador and Peru and for women in Chile, Colombia, Costa Rica, Ecuador and Peru.

Paradoxically, this stable trend occurred in a context of intense sociodemographic changes. During the period between 1970 and 2000 global fertility rates in Latin America declined from 5.1 to 2.7 children per woman (CELADE, 2001). The percentage living in urban areas rose from 56.5 to 75.8% (CELADE, 2005). Female labor force participation increased from 28 to 37.1% between 1980 and 2000 (CELADE, 1999). At the same time, since the 1970s Latin America has experienced huge progress in making the access to basic education universal. For example, in 1970 the proportion of the population aged 20-29 years with at least nine years of schooling was, respectively 9.7, 19.2 and 15.0% in Brazil, Colombia and Mexico. In 2000, these proportions had reached 34.2, 47.4 and 54.9% (Table 1). The effect of this educational expansion were especially observed among women. In fact, the Economic Commission for Latin America and the Caribbean (CEPAL) recently stated that "virtually no gender inequality in access is recorded in the region" (CEPAL, 2002, p. 93).

These trends are puzzling to social scientists conscious of the classic association between most of the abovementioned transformations and the timing of union formation. The Latin American experience contrasts sharply with the case of European and North American countries, where these and other factors of modernization in both the public and private spheres have often been considered to explain observed delays at first marriage, especially since the 1970s. There have only been several attempts to explain the stable pattern of first marriage timing. While some authors suggested that it could be associated with levels of family control (Singh & Samara, 1996), or the value that Latinamericans confer to the tradition of family support networks (Fussell & Palloni, 2004); others consider that the observed stability in the SMAM values are produced as a result of structural compositional effects, related to differential marital behavior between the distinct social strata (Binstock & Cerrutti, 2009).

TABLE 1 ABOUT HERE

Few studies have examined the changing relationship between education and union formation over time. While surveys with more conceptual detail than census data may provide more insights about the causal mechanism behind educational attainment and union formation, they often lack historical perspective that prevent macro relationships to be tested. In this paper, we therefore focus exclusively on the association between education and union formation. We contend neither to prove causality nor to develop a framework to understand marriage timing in Latin America. The overarching aim of the paper is to illuminate how educational expansion and the stability in union formation timing co-existed in Latin America during the last decades. We also examine how this is interrelated with the rise of non-marital cohabitation and single parenthood and the decline of legal marriage. We will do this by first examining the association between education and union formation using logistic regression. Secondly, we will explore if this association changed over time and if time trends were similar for all educational groups. Third, we turn to multinomial logistic regression to investigate the interaction between time, education and type of union.

The analysis takes advantage of the recent availability of large samples of census microdata from the Latin America region, spanning from the 1960s to the 2000s. While census microdata is not appropriate to test some of the micro mechanisms between education and marriage timing (neither can integrate other factors that may be influencing this relationship, as for example labor-market trajectories, economic uncertainty and marriage market opportunities), they help broaden the perspective comparing countries over time and examine some macro-relationships often not examined when dealing with more focused surveys. As far as we are aware, nobody has yet exploited these data to examine these issues. Although the analysis by Fussell and Palloni (2004) used census data, these were aggregated. In their discussion, the authors mention the need to go further and disentangle the mechanisms: “future research on families in Latin America must distinguish the social processes that bring about family change in different social strata to understand the distinctive processes with which families cope with the widespread changes and economic stresses that continue in the region” (Fussell & Palloni, 2004, p. 1211). This paper is also a step forward in this direction.

2. On the influence of education on the timing of union formation

Contemporary demographic literature underlines the role of education as one of the principal factors of change and modernization associated with reproductive behavior. In general terms, schools – a as a social institution that enables different processes of socialization on based on modern values – provide us with the necessary knowledge to merge with the social environment and bestow us with the necessary credentials to gain access to jobs and expand our social networks (Castro & Juarez, 1995; Jejeebhoy, 1996). In the specific case of nuptiality, different studies carried out in low- to middle-income countries show that education tend to delay the entry

into a union, especially during adolescence (United Nations, 1990; Jejeebhoy, 1996; Singh & Samara, 1996; Heaton et al., 2002; Westoff, 2003; Mensch et al., 2005). The effect of education on union entry operates through diverse mechanisms, most notably by way of increasing levels in female autonomy, the acquisition of new knowledge, the transformation of traditional norms and values, the availability of distinct marriage opportunities and improved marriageability. These effects are described in more detail below:

In the first place, more time spend in the educational system tends to diminish the probability of entering into a union at an early age. For instance, in the majority of Latin-American countries an average of 11 years is required to finish secondary school and 16 to obtain a university degree. In general, during this period young adults lack the necessary financial capital to form a household (Dixon, 1978). Also, education and employment constitute alternatives to marriage in the majority of countries. When these alternatives are more attractive than the option to marry it is probable that women delay their entry into marriage and motherhood (Chowdhury & Trovato, 1994).

On the other hand, by augmenting the level of scholarization, women acquire greater control and autonomy on their reproductive conditions, including that related to partner selection. Participation in the formal educational system promotes a greater exposure to value and idea systems that are different to traditional ones that are associated with early marriage and childbearing. Education influences women's self-concept as well as the way that they are perceived by the rest of society. Unlike what happens in traditional societies where the status of women is closely linked to marriage and early motherhood (Caldwell et al., 1983; Westoff, 1986; Mason, 1987), in modern societies the status of men and women is increasingly determined by their educational level. Through education women also acquire better knowledge about their bodies and methods of family planning (in those areas where this is available). An adequate knowledge and use of such methods diminishes to a great extent unwanted pregnancies, which are usually associated with early marriage patterns (Heaton et al., 2002). Consequently, early and arranged marriages tend to decline in these contexts (Jejeebhoy, 1996).

Another aspect to consider is related to the dynamics of marriage markets. Educated women are less marriageable at young ages due to the increase in opportunity costs caused by the investment in education, as it is more difficult to find a suitable partner. In the higher educational levels, women maintain at university far beyond the time that most of them marry. Also, formal education tend to restrict the scope of potential candidates give that women generate expectations of partnering with someone who has an educational level that is equal or higher than their own (Oppenheimer, 1988).

The link between education and marital timing is not static, but rather varies according to different historical and social contexts. Early unions generally reflect a lack of female autonomy to make decisions related to one's own sexuality as well as an absence of socioeconomic alternatives to marriage. The degree of autonomy is narrowly associated with levels of gender

stratification. For example, authors such as Caldwell (1992), Mason (1987) and Jejeebhoy (1996) argue that in highly patriarchal societies, women need more education to overcome the barriers imposed by their gender.

3. Common patterns and recent trends in Latin-American marriage systems

The main features of nuptiality regimes in Latin-America have been well documented by a significant amount of research, especially since the 1990s (Camisa, 1977; United Nations, 1990; Zavala de Cosío, 1995; Rosero-Bixby, 1996; De Vos, 1998; Quilodrán, 2000; United Nations, 2000; Castro Martin, 2001; García & Rojas, 2002; Fussell & Palloni, 2004; Rodríguez, 2005). Overall, the central findings of this work can be summarized as follows: 1) the mean age at time of marriage is at an intermediate level between those observed in developed countries and those in Asia and Africa; 2) its contribution to the reduction in fertility levels has been rather modest; 3) this variable has shown relative stability over time; and 4) there is a dual marriage system, based on the coexistence of marriages and consensual union dating from the colonial era.

Despite the existence of these common characteristics, there are significant internal variations. This diversity has led to the grouping of countries in sub-categories, either in terms of age at union entry, or on the basis of the percentage of consensual unions. Traditionally, studies carried out during the 1970s, 1980s and 1990s usually identified three sub-regions (Camisa, 1977; United Nations, 1990; Zavala de Cosío, 1995; Quilodran, 2003):

a. Early marriage countries with mean age at first union between 18 and 19 years: Central America and the Caribbean. This group is characterized by a high incidence of consensual unions, with values exceeding 50%.

b. Intermediate marriage countries with mean age at first union between 20 and 21 years: Colombia, Costa Rica, Ecuador, Mexico, Paraguay, Peru and Venezuela. Traditionally, people from South America and the Mexican highlands don't marry as early as those from the previous group. Costa Rica is distinguished from other Central American countries as it adopted a pattern of later marriages, which could be associated with higher levels of female schooling (Zavala de Cosío, 1995). In this group consensual unions oscillate between 20 and 50% of all unions.

c. Late marriage countries with mean age at first union between 22 and 23 years: Argentina, Brazil, Chile and Uruguay. Generally, this group of countries is associated with populations that received significant influxes of European immigrants in the early twentieth century. Currently, the share of the population that completed at least secondary school is high and particularly in large cities marriage occurs later than in the previous groups. The proportion of unions that are marriages is often less than 20%.

Along with the stability in the timing of marriage, the other fact that has caught the attention of researchers corresponds to the issue of consensual unions and its trend. Differing from developed

countries, where this phenomenon forms part of the social changes brought about by the Second Demographic Transition, in Latin America non-marital cohabitation has coexisted with traditional marriage since colonial times. As Rodríguez (2005) pointed out in an earlier study, possible explanations for this can be grouped into a set of cultural-historical, economic and political factors. The first of these basically refers to: a) the difficulties encountered by the colonial administration to impose marriage as the only type of union between men and women, largely due to weak administrative institutions, the conflicts and cultural barriers that existed between the conquistadors and the natives (Quilodrán, 1999); b) the miscegenation process, encouraged by the imbalanced sex ratio (high rate of males among the conquistadors), and the ecclesiastic restrictions affecting interethnic relationships (McCaa, 1994; Bernard & Gruzinski, 1996; De Vos, 1998). The economic factor is related to poverty and to the costs which the formalization of a marriage entails (formalities, wedding celebration, etc.); together with the legal advantage obtained by keeping personal wealth away from eventual claims (Castro, 2002). Finally, the political factor is linked to the difficulties that the newly born Latin American states encountered to establish the minimum organizational and bureaucratic structure, so that people were able to legalize their unions (Rodríguez, 2005).

Explanations about intraregional diversity can be made on the basis of political, economic and socio-demographic factors. For example, Rodríguez (2005) argues that the low prevalence of cohabitation in the South American Cone is due to lower proportions of indigenous and Afro-American population; the influence of European immigration at the beginning of the XX century; a relatively higher income and higher social development compared to the rest of Latin American countries; as well as the existence of stronger and more organized states. By contrast, higher levels of consensual unions in the Caribbean and Central America are associated with poor living conditions; a large indigenous, mestizo, and Afro-American population (whose origin goes back to a historical past marked by the importation of African slaves to work on Spanish plantations (Charbit, 1987)); and the existence of weak and less organized states (Rodríguez, 2005, p. 20). As regards to the evolution of consensual unions in recent decades, the empirical evidence from the research carried out over the last years seems to point out that these type of unions are growing in countries where their levels used to be lowest, and are remaining steady or increasing slightly in countries whose levels used to be highest (De Vos, 1998; Quilodrán, 1999; Castro, 2002; Rodríguez, 2005). As common characteristic throughout the entire region, the poorest people have a higher propensity towards consensual unions. However, in the last decades consensual unions have been spreading in all social classes, especially among the groups with a higher education (Rodríguez, 2005; Castro & Martín, 2008; López et al., 2009). There is not a univocal meaning associated to this expansion. When trying to explain this phenomena, researchers argue that there exist both an intensification of the traditional predominant pattern (tied to less educated and poorer people), and the emergence of a consensual union type closer in meaning to those of second demographic transition, linked to the higher educational groups (De Vos, 1998; Castro, 2002; García, 2004; Rodríguez, 2005).

Education and union formation timing in Latin America

On the other hand, just as what occurs in other developed countries, the education variable exerts a strong influence on the age at first union entry. For example, analyses based on data from the World Fertility Survey (WFS) that was carried out during the late 1970s reveal that women with seven or more years of schooling enter later into a union compared to women without formal education (United Nations, 1990). The differences in the SMAM values fluctuated between one year in Haiti to five in Colombia between the groups of women with the highest and lowest level of scholarization. In ten countries the difference was four years. Similarly, data from the Demographic and Health Surveys (DHS) indicate that for the generation born between 1940 and 1970 age differences in the age at union entry between individuals without schooling and those with at least nine years was on average almost five years (Heaton et al., 2002). However, as discussed above, these same studies don't report significant changes in the aggregated SMAM values during the period 1970-2000. To Fussell and Palloni (2004), this stable pattern comes from what is known as Latin-American familiarism, whose key elements lie in the family support network. These networks not only contribute to the creation of wealth, but also absorb the negative effects generated from social and economic instability. For their part, Singh and Samara (1996) suggest that this type of behavior would be associated, at least partially, to social contexts where the family maintains a strong control over reproductive decisions. Finally, Binstock and Cerruti (2009) point out that behind this apparent stability in aggregated patterns, hide significant variations. Thus, the proposed stability would result from changes in the behavior of middle and upper social classes, combined with the trend towards early marriage characteristics of the lower social strata.

If we would thus accept this premise that formal education delays timing of first union (marriage and cohabitation), we would expect educational expansion to augment the proportion of young adults who are single (never in union) as well as the average age at marriage between successive cohorts. However, one condition that is required is that the positive relationship between education and union formation remains the same over time. On the contrary, if we would consider the stability hypothesis, as has been suggested in the past by other scholars, in that case the age at union entry remains the same despite people obtaining higher levels of education. This would result in educational expansion eventually eroding the relationship between education and marriage timing.

4. Data and methods

For our analysis we used the Integrated Public Use of Microdata Series (IPUMS) International database (Minnesota Population Center, 2009), the most complete database of global census microdata available today (55 countries, 159 censuses and 326 million individual records for the period 1960-2007). The Latin-American countries in our study were selected on the basis of the availability of at least two census samples between the 1970 and 2000 census rounds and comparable and available data on marital status (in particular consensual unions) and education. This left us with the following nine countries: Argentina, Brazil, Chile, Colombia, Costa Rica,

Ecuador, Mexico, Panama and Peru. Each of the three earlier mentioned Latin-American marriage systems sub-categories are thus represented in the study. As we are interested in union formation patterns, we only selected individuals aged 15-50. Table 2 provides a basic description of the data.

TABLE 2 ABOUT HERE

Ever in union

One restriction of using census data concerns the way "union status" is measured. As we know, many people never end up marrying but remain in (or change between) consensual unions, a pattern that is particularly common in Latin America (Camisa, 1977; United Nations, 1990; Zavala de Cosío, 1995; Rosero-Bixby, 1996; De Vos, 1998; Quilodrán, 1999, 2000; United Nations, 2000; Castro Martin, 2001; Castro, 2002; García & Rojas, 2002; Fussell & Palloni, 2004; Rodríguez, 2005). As in our study we are interested in distinguishing between those who have never been in a union and those that have – i.e. a dichotomous variable that serves as our dependent variable –, we initially selected the never-married, under the premise that first time marriage is an irreversible state as those who have experienced a marital separation, divorce or the loss of a spouse were once married. However, as a part of the population recorded as single may still have been in some other type of union, and particularly so in Latin America where people often live in consensual unions without ever formally entering into marriage, this group of people should also be excluded from the "never married" population. Fortunately, all selected Latin-American samples have "consensual union" as a specific marital status category, or included them in the "married/in union" category. Still, one problem with consensual unions is that after union dissolution one cannot be certain about whether individuals are recorded as single or not. As censuses do not contain data on marital history, usually there is no way of knowing if those who come from a dissolved consensual union, either through separation or the partner's death, declare themselves or are being registered as singles. Even if the possibility exists for individuals to declare themselves as having separated from a consensual union (as in Panama) this is not always done. Neither can non-cohabiting consensual unions be identified. Thus, to at least partly accommodate these shortcomings, we constructed for each sex a third way of identifying individuals who are or have been in a relationship: the existence of own children in the household (the variable "children ever born" was not asked to men and was therefore not used). The explicit assumption here is that those who have children have experienced a relationship (even if short) with someone from the opposite sex (McCaa et al., forthcoming). Although it is more effective for women and may erroneously capture a certain percentage of children resulting from sexual intercourse outside of relationships with functional resemblance to marriage, especially among younger adults, we accept these possible biases as we think that we would otherwise miss a greater number of persons that have never been in a union. The proportions according to the different union statuses are provided in Table 2. Both types of union variables have thus been constructed, one dichotomous that distinguishes the ever in union from

the never in union and a second one that makes a distinction between union type (never in union vs. ever married, consensual and single parent).

Cross-sectional measures of union formation

The use of census data rather than data from retrospective or panel surveys provides us with limited biographical information because only information on individual (and household) characteristics at the time of the interview is provided. For our purposes, this implies that we cannot say anything *directly* about the age at marriage or union, the existence of previous (consensual) unions, or the attained educational level at union entry. Neither can assumptions about changes in marital behavior of *cohorts* be made, especially in periods characterized by intense demographic transformations. However, one way approximate the age at which individuals enter a marriage for the first time is to calculate the singulate mean age at marriage (SMAM), a synthetic cohort measure from a cross-section of age-specific percentages single[3] that estimates the average age at marriage and is an effective way to summarize age-specific proportions (Hajnal, 1953; Xenos & Gultiano, 1992) and observe their trend over time. SMAM's were calculated employing data for single ages and under the assumption that no consensual unions, marriages or births occurred before age 15. The following formula was applied[4]:

$$SMAM = \frac{15 + (\sum_{x=15}^{50} S_x) - (50 S_{50})}{1 - S_{50}},$$

where S_x is thus the proportion that has never been in a union at age *x*.

Effectively, the procedure may be regarded as a means of computing the average number of years lived in the state of never having been in a union (termed single from now on for simplicity) by those who have before age 50. Results for the studied countries were shown in Table 1. As briefly described in the introduction, our results confirm the lack of any substantial change in Latin America as had been argued by others (except Chilean men).

The independent and control variables

Our second variable of interest, and our main independent variable, is the respondent's level of educational attainment in terms of years of schooling (the IPUMS International variable YRSCHL) which we grouped into the categories "none", "1-5 years", "6-8 years", "9-12 years" and "13+ years" of completed education. This scheme follows the United Nations recommendation of six years of primary, three years of lower secondary, three years of upper

[3] For the estimation of the single population non-marital relationships were also excluded as in Latin America non-marital cohabitation and single parenthood are common and their exclusion would have substantially increased the SMAM values. Even so, the potential problem of the marital status being misreported always remains, although it could also be stated that divorce and separation is in general accepted in Latin American society.

[4] As in some instances age heaping appeared to be a problem (especially multiples of 10), we approximated the required proportion single at age 50 – which has a large influence on the final SMAM value – by using the average proportion for ages 48-52.

secondary, as well as university/tertiary-level education, which is also typical in Latin America[5]. Sample proportions are provided in Table 1. Without going into too much detail, one can observe the sharp decline in the proportions of the population without any forming schooling as well as those who did not complete primary school, while in most Latin American countries the proportion with completed primary and/or some lower secondary school remained about the same over time. Conversely, proportions with between completed lower and completed higher secondary school as well as some or completed post-secondary school increased sharply. Overall, highest levels of schooling could be found in Chile and Peru (about 70% with at least 9 years of schooling) and lowest in Brazil (32%).

The analysis also includes several control variables, namely age (between 15 and 50) in order to ascertain age-specific changes in union formation patterns; time (taken as census year with 1970 being equal to 0), to see whether or not union formation regimes in Latin America indeed observed a rather stable pattern of change over the last three decades of the 20th century; and country (as fixed effects). Lastly, analyzes will be performed separately for men and women.

Modeling strategy

Logistic regression was used as way to standardize and simplify the presentation of results. The results of two types of models are presented in the paper: Firstly, binomial logistic regression models are used to assess the effects of the aforementioned characteristics on the likelihood of being in union. This was done in a stepwise manner. First, age, age squared, age cubed, year and country are included, as well as an interaction between age and time to test if changes over time have been of the same magnitude across age. Age-squared and age-cubed are included as a way to control for the non-linear relationship between age and union entry (Model 1). Country variation is controlled for by means of fixed effect as we assume that age, time and education works in a similar fashion manner in the selected countries. We also tested the same model separately for each country, yielding a similar set of results that are available from the authors upon request. Subsequently, educational attainment, our main independent variable of interest, is included, as well as an interaction term between age and education given the likelihood that the effect of education on union formation is not the same across age (Model 2). For the same reason, the interaction between education and time is tested in model 3.

As was mentioned in the description of the union status variable, in Latin America consensual unions is an acceptable alternative to marriage. Moreover, single parenthood, particularly among women, is a common consequence of a the dissolution of a non-marital union (married persons with children who divorce maintain part of the married category as they were once marred). Although their marital status is once again single, the fact that they have a child implies that they

[5] We preferred to use years of schooling instead of educational attainment because it is a more objective way to partition the different levels of formal education, something that other data sources like DHS have also adhered to in the past. An alternative classification based on the educational attainment categories themselves yielded similar results.

had been in some type of union. One way to test the possible change and difference in timing between marriages consensual unions or single parenthood, multinomial logit models were also constructed on the basis of the model parameters of Model 3.

5. Results

Age, time and educational effects on union timing

Model 1 predicts the probability of being in union as function of age, time and country. To capture the non-linear relationship between age and being in union we introduce age squared (the rate of union entry decreases after a certain age) and age cubed (to prevent the probability of never having been in a relationship to increase at the oldest ages). Although we could, in theory, find such a relationship in cross-sectional data, none of our samples shows this. Time is introduced as a continuous variable, taking 1970 as a reference category (1970 = 0). The model also controls for country fixed effects. Results for men show that the probability of being in a union increases with age but that this increase levels off as one gets older as is shown by the negative effect of the age squared. The time variable indicates to what extent the probabilities of being in union have changed over time. The coefficient should not be interpreted without taking into consideration the interaction term time*age that tests if changes over time have been of the same magnitude across age. Given the positive sign it would suggest that the proportion ever having been in union increased. However, upon closer inspection it appeared that this increase occurred above all among young men (until the age of 21) given its negative association with age*time after which the proportion in union had declined over time. On the other hand, among women the proportion ever having been in union increased over time across all ages. With regard to the single effect of age, the pattern was similar to that of men, although the rate that union formation increases with age is lower (but still statistically significant).

Model 2 adds years of education and an interaction between age and the education variable to control for the age-specific patterns between education and union formation. As our results showed, there is a strong negative association between education and entering in a union, but this is attenuated and even reversed with increasing age. For instance, according to the model results, until age 19 those with no education were most likely to be married/in union, between ages 20 and 26 those with 1-5 years of schooling, between ages 27 and 35 those with 6-12 years of schooling and from the age of 41 those with 13+ years of schooling. Given the educational expansion that occurred over the course of the three decades and education delays the entry into a union, by controlling for education a more independent effect of time can be obtained, that is, assuming that the effect of time is not affected by the change in the educational distribution. Results for men show that the effect of time (at constant age) is larger compared to Model 1, meaning that the change over time, after controlling for the delaying effect of increasing education on union formation, was, in fact, larger than at first appearance. The effect of the

inclusion of the education variable on the association between age and union formation remained about the same. Results were similar for women.

Model 3 adds an interaction between education and time as a way to test if educational groups are more likely to enter a union compared to previous cohorts, i.e. if the association between education and union formation has changed over time. This interaction resulted to be significant in all cases. First we observe that the effect of education varies over time, second that the direction of the change is different depending on the level (and relative to the "no education" category) and third that there are important sex differences. Among men, Over time, especially those with between 1 and 8 years of schooling were progressively more likely to enter a union, while those with at least 13 years of education were less likely to do so. On the other hand, the highest educated women showed no significant difference over time compared to those who never went to school. Moreover, for the remaining educational categories, which were more likely to enter into a union over time than the model observed for men.

Finally, country coefficients remained stable between models, suggesting that the associations between age, time and years of schooling and union formation timing is similar throughout Latin America (albeit at different levels).

TABLE 3 ABOUT HERE

Predicted change in SMAM between 1970 and 2000 by educational attainment

One way to get a better feel of the age-specific changes over time and across educational groups in union formation is to look at changes in the SMAM. These were calculated on the basis of the estimated probabilities that were derived from the Model 3 coefficients and the results for the change between 1970 and 2000 are provided in Table 4. As can be observed, men without education entered, on average, just over half a year earlier in 2000 than was the case in 1970. For the intermediate levels the decline was about a year, while for those with 9-12 years of education no change was observed, that is to say, the proportion of ever in union by age at these levels remained constant over time. Finally, for the higher educated a sharp increase in the age of union was observed: in 2000 they entered on average 2,2 years later than 30 years earlier. Among women the pattern is somewhat different, except for the no education group (as also a half-a-year decline in the SMAM was observed) as SMAM decreases were higher for women with 1 to 5, 6-8 and 9-12 years of education than for men as they entered in a union two to three years earlier in 2000 than in 1970) and even among the highest educated no change in the SMAM was observed.

After exploring the results in more detail, the apparent lack of change (or at the most a slight increase) in the SMAM at the population level (ie. the net change in SMAM) would appear to be caused by several contrasting trends. On the one hand, we know that there has been an important educational expansion in the regions that caused an important increase in the share of individuals with secondary and higher levels of education and a proportional decrease in those with little or no education (Table 1). We also know that the former is characterized by a higher SMAM and the later by a lower SMAM. Assuming, therefore, that no difference in the association between

education and union formation timing occurred between t0 and t30, the singulate age at union should have increased. However, as Table 4 shows, within each educational each category (except for the highest category among males), the SMAM decreased during the last 3 decades of the 20th century, meaning that most educational groups are entering a union at earlier ages compared to previous cohorts, but that due to the structural changes (i.e. substantially more people in the higher educational groups in 2000 than in 1970 that are characterized by higher SMAM), the net effect has been that SMAM stayed pretty much the same over the period. This also implies that the relationship between education and first-union formation has changed over time. Although cross-sectional data cannot actually prove this proposition, the increasing proportions ever in union by age do reflect individual trajectories at one point in time. The SMAM results also give weight to the argument that the effect of education on union formation is not linear nor direct: for instance, the fact that men marry at older ages makes the effect of education on union formation is less direct than for those that have less than higher education.

TABLE 4 ABOUT HERE

Differences in union timing patterns according to union type

Following the same logic, we've designed a set of multinomial models which will help to understand further the mechanisms surrounding the differences in union entry timing according to educational attainment as well as between men and women. In particular, we examined whether the specific patterns of union formation as suggested by the results of Model 3 is also observed for the three types of union, i.e. the ever married, cohabiting couples and single parents. Model 4 shows that the overall likelihood of being married decreased over time, while both cohabitation and single parenthood increased, although for a complete picture of the trend the interactions needed to be taken into account. In Figures 1a-d and 2a-d we therefore show the change in the probabilities (as derived from the Table 4 coefficients) of being married, cohabiting, a single parent and single between 1970 and 2000 by age, years of schooling categories for Argentina and separately for men and women. Argentina was chosen as it showed the most typical pattern (the results for the other countries can be obtained upon request from the authors). As one is able to observe, the proportion single women declined most during the last three decades of the 20th century and among all ages for those with 1-5 and 6-8 years of schooling. The sharpest decline occurred just before the 20th birthday (about 25%). On the other hand, for the population without any education, there was only a slight decline in the proportion single among adolescents (up to 7%), while the most educated actually observed up to a 4% increase. In the case of men the highest educated group also experienced an increase in the proportion single, particularly for those in their late twenties (up to 20%). Conversely , declines in the proportion single were observed for the first three education categories, although only up to the age of about 25 as the proportion single increased thereafter (though never more than 10%). Turning to the married population (Figures 1b and 2b), we observe sharp declines over the period and with a clear educational gradient: declines were highest for the least educated and lowest for

the most educated. In addition peak declines were observed at a younger age for the group without any form of formal education (-36% at age 25 to be exact) than for those with at least 13 years of education (-18% at age 28). With regard to men, the proportion married between 1970 and 2000 also declined and observed a similar educational gradient, although with few educational differences (peak declines ranging between 27% and 33% around the age of 30), which did increase after the peak age. While the proportion married declined (and to a lesser extent the singles), the proportion of the population who cohabited increased sharply between 1970 and 2000 (Figures 1c and 2c). Again, there is a clear educational gradient as the largest increases were observed among the least educated (particularly those who went 1-5 years to school) and the lowest increased among the highest educated. A similar pattern was observed for men and women, the only differences being that the peak increases were slightly higher and observed at an earlier age for women than for men (e.g., respectively +36% at age 22 and +30% at age 28 for those with 1-5 years of education). Finally, we also distinguished never married single parents as a population group who has been in a union. Results showed that between 1970 and 2000 the proportion of single mothers increased most among the three middle educational categories, but never more than about 7%. Given that children from separated parents usually end up living by the mother (and census data do not provide information on shared custody), the proportion of single fathers increased by less than 0,5%.

6. Summary and discussion

In this article we have investigated the relationship between education and the timing of first unions in 8 Latin American countries during the last three decades of the 20th century in the context of educational expansion, declining marriage rates and increasing non-marital cohabitation. Our research was motivated from the apparent contradiction between, on the one hand, the remarkable stability in first union timing in Latin America during this period, but on the other hand, the steady increase in the level of education of younger generations, as well as other known determinants such as female employment and urbanization. Knowing the influence that educational expansion has had on the delay in the union entry of young adults in other regions of the world (United Nations, 2003; Thornton et al., 2007), one would also expect such a delay in Latin America given the educational expansion that has taken place there during this time. However, as results from previous studies and those presented here have shown, this has not been the case. In this study we therefore set out to examine the association between education and union formation in more detail whereby we explored to see if there were educational differences and time changes in this association. We also investigated the interaction between time, education and type of union as patterns of union formation may differ between married and cohabiting persons.We carried out our analysis using census microdata from the IPUMS-International database, from which we obtained two or more census samples between the 1970 and 2000 census rounds for Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama and Peru. Logistic regression was used as way to standardize and simplify the presentation of results.

Additionally, the singulate mean age at marriage (SMAM) was used to summarize age-specific proportions.

What we tried to show in this paper is that the observed overall stability in first union entry timing was the result of opposing forces that offset each other. As in most countries, an educational expansion took place during this period, i.e. the population structure according to educational level changed. As there is clear negative association between years of education and union status among young adults (we observed few differences after the age of 35, especially in the case of men), one would expect a decline in the probability of being or having been in a union over time and delay the average age at union entry. However, we observed that the effects of higher education were offset by the bringing forward of the age at union formation, especially among women. In terms of SMAM, women with 1 to 5, 6 to 8 and 9 to 12 years of schooling entered into a union about 2 years earlier in 2000 than those with the same educational level 30 years earlier, while there was little variation over time among women with no schooling or university studies. From a cross-sectional perspective this means that the proportion of ever in union women aged 25 with 1-12 years of schooling was higher in 2000 than in 1970. Among men two opposing trends were observed. On the one hand, men with 8 or less years of schooling entered into a first relationship up to a year earlier in 2000 than in 1970, but men with 13 or more years of schooling approximately 2 years later.

These changes have occurred in a context of declining marriage rates and increasing cohabitation (and to a much lesser extent, increasing single parenthood). This caused the total proportion ever in union to only change (increase) marginally. However, an important additional results was that the decline in marriage and almost equal increase in cohabitation were not comparative across age. For instance, in the case of women with up to 12 years of schooling were more likely to be in a union in 2000 than in 1970, but only at younger ages and primarily through cohabitation. The progressive substitution of marriage by cohabitation between generations in the studied period were associated with a downward trend in the age at union formation. Despite the country differences regarding marriage and cohabitation timing, the patterns described here can be extrapolated to all Latin American countries represented in the study.

The results of this research, however, also raise new questions. For instance, future research should look into why women with certain levels of education entered have advanced the age of union formation while others haven't; why the trend in the age at union entry of the least and most educated men are so different; why cohabitation is replacing marriage and why this seems to occur at an earlier age.

We postulate that while increasing educational attainment has given individuals more influence over marriage timing and partner choice, there is still evidence of intergenerational transmission of behavior related to union formation. That is to say, despite the fact that younger generations have had more education than their parents had, their timing of union formation was similar. It suggests that behaviors may be transmitted from one educational level to another as new generations increase their levels of schooling. These findings call into question the independent relationship that education has with union formation, i.e. what does education

measure in a context such as Latin America? It is likely that educational expansion has blurred the gap between education groups. Indeed, our results showed that the association between the different levels of education and union formation timing changed between 1970 and 2000.

However, while our research has benefited from the availability of harmonized census data, we fully recognize the major limitations in making such causal links between variables as a cohort perspective would have been more appropriate than a cross-sectional one to illustrate the patterns shown here. For instance, more detailed (especially biographical) data would allow for the interrelationship between education, employment and union formation timing to be fully explored.

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Table 1. Singulate mean age at union (in years) and percentage of population with secondary or more by country, census round and sex

	Singulate mean age at union (in years)				% 20-29 years old with 12 or more years of school			
	1970	1980	1990	2000	1970	1980	1990	2000
Men								
Argentina	26.4	25.3	25.8	26.9	30.3	33.1	52.5	61.7
Brazil	26.1	25.5	25.9	26.3	9.7	19.7	24.8	34.2
Chile	25.5	25.7	25.7	27.6	31.2	56.6	63.8	79.4
Colombia	26.1	26.1	25.9	26.3	19.2	35.0	37.6	47.4
Costa Rica	24.9	25.1		26.0	22.9	38.6		41.2
Ecuador	24.9	24.9	25.1	24.7	19.8	35.2	49.8	50.3
Mexico	24.1	24.5		25.1	15.0	52.0		54.9
Panama	24.9	25.0	25.5	25.7	24.2	42.8	52.5	58.4
Peru			26.5	26.5			67.4	79.3
Women								
Argentina	22.6	22.1	22.4	23.2	30.8	37.0	57.4	69.1
Brazil	22.9	22.5	22.3	22.2	9.7	21.8	30.3	42.6
Chile	22.6	22.6	22.0	22.8	31.2	57.3	65.7	81.6
Colombia	21.8	22.1	21.8	21.4	16.0	36.9	41.3	54.2
Costa Rica	20.9	21.1		21.3	21.8	42.1		45.1
Ecuador	20.8	21.0	21.7	20.7	19.0	34.7	49.6	53.3
Mexico	21.2	22.2		22.4	9.5	47.0		52.7
Panama	19.9	20.6	21.0	21.0	25.1	46.3	59.5	64.1
Peru			22.7	22.6			59.1	74.4

Source: IPUMS-International (Minnesota Population Center 2011). Own calculations.

Table 2. Sample characteristics and description of main variables

					Marital / Union status (%)				Educational attainment (%)				
		Sample density	N after screening	% of total sample	Single	Ever married	Cohab,	Single parent	None	1 to 5	6 to 8	9 to 12	13 +
Argentina	1970	2.0%	231303	96.0%	37.9	54.9	6.0	1.2	5.3	30.6	39.6	18.4	6.2
	1980	10.0%	1285474	99.9%	36.2	52.0	9.8	2.0	6.3	26.4	38.0	20.7	8.5
	1991	10.0%	2076149	99.2%	35.0	50.9	12.6	1.5	2.1	12.2	37.8	29.1	18.7
	2001	10.0%	1820677	100.0%	39.0	41.0	17.0	3.0	2.2	7.1	32.1	39.0	19.7
Brazil	1970	5.0%	2391726	99.6%	41.1	54.3	3.9	0.6	34.6	51.0	7.5	5.5	1.4
	1980	5.0%	2889690	97.1%	38.6	53.2	7.3	0.8	23.0	47.1	14.8	11.1	4.1
	1991	5.8%	4336772	98.8%	36.9	50.2	11.4	1.5	15.6	44.1	18.5	16.2	5.6
	2000	6.0%	5471980	98.9%	37.0	41.7	17.9	3.4	8.0	37.7	22.4	25.5	6.5
Chile	1970	10.0%	422927	99.4%	41.5	53.7	2.5	2.3	6.8	34.0	33.7	21.5	4.0
	1982	10.0%	599690	100.0%	42.4	51.6	3.4	2.5	3.9	20.9	29.2	37.8	8.2
	1992	10.0%	725136	100.0%	36.4	53.8	6.1	3.7	2.1	13.2	27.5	44.0	13.2
	2002	10.0%	831192	100.0%	37.2	47.4	10.2	5.2	2.0	7.5	17.6	47.1	25.8
Colombia	1973	10.0%	889369	96.4%	43.5	43.9	9.5	3.1	18.5	55.2	14.0	10.1	2.3
	1985	10.0%	1362452	97.3%	41.7	40.4	15.6	2.3	8.9	46.0	18.2	21.0	5.9
	1993	10.0%	1682220	97.6%	37.2	35.7	24.4	2.6	6.7	40.1	19.0	34.1	
	2005	10.0%	1978718	96.3%	36.7	27.1	31.6	4.6	7.6	36.6	14.5	30.4	10.9
Costa	1973	10.0%	86207	100.0%	42.7	46.0	8.6	2.6	9.3	38.9	33.8	12.9	5.0
	1984	10.0%	125304	100.0%	39.6	46.5	10.2	3.6	5.2	22.2	40.2	24.2	8.3
	2000	10.0%	208125	100.0%	35.9	44.4	16.3	3.4	3.2	14.1	42.4	26.1	14.2
Ecuador	1974	10.0%	297035	96.1%	40.1	44.8	13.3	1.8	21.6	34.9	28.5	11.7	3.3
	1982	10.0%	340016	89.6%	37.4	44.3	16.1	2.2	13.8	24.7	34.3	19.1	8.1
	1990	10.0%	454910	93.3%	37.4	44.0	16.4	2.2	8.4	16.9	33.6	27.7	13.4
	2001	10.0%	561224	88.9%	35.2	41.7	20.8	2.4	6.5	15.6	30.3	30.3	17.2
Mexico	1970	1.0%	215640	100.0%	36.0	53.8	9.6	0.6	27.8	40.3	22.1	7.0	2.8
	1990	10.0%	4045206	98.1%	38.0	52.4	8.7	0.9	10.8	20.6	28.9	31.5	8.2
	2000	10.5%	5016901	97.4%	34.8	50.9	12.9	1.4	6.7	18.7	27.9	36.4	10.3
Panama	1970	10.0%	68196	99.4%	36.2	32.3	30.5	1.0	15.9	30.4	33.5	16.0	4.2
	1980	10.0%	93746	98.1%	37.9	32.1	28.4	1.6	9.8	19.1	34.7	27.5	8.9
	1990	10.0%	120393	98.7%	37.8	32.5	27.9	1.8	5.8	13.1	32.2	32.4	16.4
	2000	10.0%	149559	99.2%	35.6	31.0	31.6	1.8	4.6	8.9	29.0	37.1	20.4
Peru	1993	10.0%	1094642	97.2%	40.3	37.9	19.7	2.0	7.9	21.8	15.0	55.4	
	2007	10.0%	1482105	99.9%	38.5	28.6	30.6	2.3	4.1	12.5	13.2	70.3	

Source: IPUMS-International (Minnesota Population Center 2011). Own calculations.

Table 3. Logistic regression results for ever in union

	Men						Women					
	Binomial (vs. single)			Multinomial (vs. single)			Binomial (vs. single)			Multinomial (vs. single)		
	Ever in union			Ever married	Cohab.	Single parents	Ever in union			Ever married	Cohab.	Single parents
	M1	M2	M3	M4	M4	M4	M1	M2	M3	M4	M4	M4
Age	1.613	1.780	1.783	1.981	1.666	1.068	1.210	1.546	1.552	1.707	1.446	1,524
Age squared	-0,037	-0.043	-0.043	-0.048	-0.042	-0.024	-0.028	-0.038	-0.039	-0.043	-0.037	-0.040
Age cubic	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Time*10	0,127	0.361	0.296	-0.244	0.797	0.194	0.035	0.360	0.100	-0.417	0.516	0.346
Age by time*10	-0,006	-0.014	-0.013	-0.003	-0.017	-0.004	-0.001	-0.006	-0.004	0.007	-0.006	-0.002
Years of school												
none (ref.)												
1 to 5		-0.406	-0.525	-0.436	-0.617	-0.213		-0.336	-0.629	-0.478	-0.914	-0,279
6 to 8		-0.610	-0.767	-0.444	-1.077	-0.867		-0.900	-1.288	-0.943	-1.805	-0,816
9 to 12		-1.858	-1.847	-1.250	-2.794	-1.986		-2.288	-2.450	-1.875	-3.701	-2,160
13 +		-4.033	-3.690	-3.027	-5.288	-3.636		-4.270	-3.977	-3.287	-5.782	-4,231
Age by years of school												
Age by none (ref.)												
Age by 1 to 5		0.021	0.019	0.019	0.011	0.006		0.014	0.010	0.009	0.003	-0,005
Age by 6 to 8		0.029	0.027	0.022	0.018	0.013		0.022	0.018	0.013	0.006	*0,000*
Age by 9 to 12		0.064	0.063	0.050	0.054	0.031		0.046	0.042	0.032	0.030	0,021
Age by 13+		0.117	0.119	0.102	0.110	0.067		0.083	0.081	0.065	0.074	0,061
Time*10 by years of school												
Time by none (ref.)												
Time by 1 to 5			0.100	0.010	0.016	0.008			0.275	0.027	0.037	0,035
Time by 6 to 8			0.109	0.129	0.196	0.188			0.308	0.305	0.447	0,374
Time by 9 to 12			0.027	0.073	0.240	0.273			0.207	0.218	0.501	0,388
Time by 13 +			-0.154	-0.036	0.129	0.222			*0.001*	0.086	0.280	0,291
Country												
Argentina	-0.047	-0.051	-0.054	0.553	-0.910	0.224	-0.503	-0.503	-0.507	*0.002*	-1.350	-0,246
Brazil	0.118	0.039	0.033	0.727	-1.070	*-0.019*	-0.351	-0.787	-0.804	-0.204	-1.956	-0,577
Chile	-0.124	-0.112	-0.102	0.634	-1.608	1.321	-0.558	-0.566	-0.552	*0.004*	-2.025	0,277
Colombia	-0.123	-0.157	-0.149	0.185	-0.713	0.417	-0.384	-0.693	-0.681	-0.436	-1.335	*-0,003*
Costa Rica	0.061	*0.007*	*0.007*	0.619	-0.913	-0.378	-0.190	-0.404	-0.404	0.058	-1.395	0,297
Ecuador	0.291	0.288	0.287	0.775	-0.364	0.600	-0.083	-0.267	-0.268	0.148	-0.962	*0,005*
Mexico	0.495	0.522	0.523	1.333	-0.794	*-0.043*	-0.260	-0.464	-0.469	0.291	-1.787	-0,921
Panama (ref.)												
Intercept	-21,643	-22.953	-22.904	-26.049	-21.651	-20.012	-14.977	-17.602	-17.377	-19.869	-16.427	-19.997

Source: IPUMS-International (Minnesota Population Center 2011). Own calculations. P<0.01 for all coefficients except those in italics.

Table 4. Predicted time change in SMAM by years of school between 1970 and 2000

	Years of school					
	None (ref.)	1 to 5	6 to 8	9 to 12	13 +	**Overall**
Men						
Argentina	-0.64	-1.05	-1.00	0.21	2.33	**0.48**
Brazil	-0.60	-1.03	-0.99	0.19	2.27	**0.14**
Chile	-0.66	-1.06	-1.01	0.22	2.36	**2.11**
Colombia	-0.68	-1.07	-1.02	0.24	2.39	**0.25**
Costa Rica	-0.61	-1.04	-1.00	0.19	2.29	**1.05**
Ecuador	-0.52	-0.99	-0.97	0.12	2.10	**-0.25**
Mexico	-0.46	-0.96	-0.95	0.06	1.94	**0.95**
Panama	-0.62	-1.04	-1.00	0.19	2.29	**0.85**
Women						
Argentina	-0.40	-2.18	-2.65	-2.13	-0.04	**0.64**
Brazil	-0.47	-2.32	-2.82	-2.25	-0.03	**-0.77**
Chile	-0.41	-2.20	-2.68	-2.15	-0.04	**0.11**
Colombia	-0.44	-2.26	-2.75	-2.20	-0.03	**-0.37**
Costa Rica	-0.38	-2.13	-2.60	-2.09	-0.04	**0.41**
Ecuador	-0.35	-2.06	-2.52	-2.03	-0.05	**-0.03**
Mexico	-0.39	-2.16	-2.63	-2.11	-0.04	**1.21**
Panama	-0.31	-1.93	-2.38	-1.92	-0.06	**1.15**

Source: IPUMS-International (Minnesota Population Center 2011). Own calculations.

Figure 1. Population change in Argentina according to union status between 1970 and 2000. Women.

a. Single b. Ever married c. Cohabiting d. Single parent

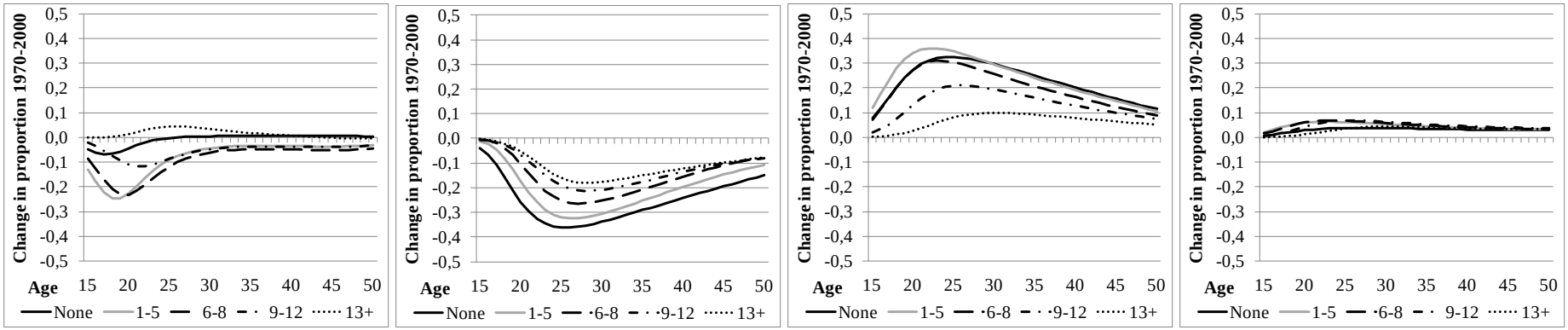

Figure 2. Population change in Argentina according to union status between 1970 and 2000. Men.

a. Single b. Ever married c. Cohabiting d. Single parent