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Literacy skills and family configurations

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LITERACY SKILLS AND FAMILY CONFIGURATIONS

OECD Education Working Paper No. 192

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Abstract

We study the links between family configuration and formation on the one hand and adult literacy skills on the other by analysing data from the Programme for the International Assessment of Adult Competencies (PIAAC), a survey of 250 000 people aged 16 to 65 conducted by the OECD in 33 countries and economies.

Literacy proficiency has an effect on many aspects of the formation and development of families, such as age of parents at birth of first child, or age of partners at cohabitation, even when educational attainment and age are taken into account.

Moreover, having children and living with a partner have consequences for adults' job opportunities and participation in the labour market, which can be particularly negative for the women with the highest literacy proficiency.

Résumé

Nous étudions les liens entre la morphologie et la formation de la famille d'une part et les compétences en littératie des adultes d'autre part en analysant les données du Programme pour l'évaluation internationale des compétences des adultes (PIAAC) portant sur 250 000 personnes âgées de 16 à 65 ans et mené par l'OCDE dans 33 pays et régions.

La maîtrise des compétences en littératie a un effet sur de nombreux aspects touchant à la dynamique des configurations familiales, comme l'âge au premier enfant ou l'âge de mise en couple, même après la prise en compte du niveau d'études et de l'âge.

Par ailleurs, le fait d'avoir des enfants et de vivre en couple a des conséquences sur les opportunités professionnelles et la participation au marché du travail des adultes, qui peuvent être particulièrement négatives pour les femmes les plus compétentes en littératie.

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Chapter 1. Introduction

The relationships between literacy skills (and cognitive skills more generally) and certain aspects of family life, such as fertility, parenthood, living with a partner or divorce, are issues of potential importance to social and educational policy for many reasons. First, cohabiting with a spouse or partner and having children are life-changing events, and fertility and family relationships are also at the heart of social policy in many countries. In this context, it is necessary to understand whether, and how, literacy skills are related to these stages of life. Second, like school, the family is one of the most fundamental settings in which children develop, grow up and improve their literacy skills. Understanding what parenting attitudes and characteristics are most decisive for the development of children's literacy (parents' level of education or their literacy practices and skills, for example) is crucial to understanding the mechanisms by which inequalities are passed on that are associated with varying degrees of literacy proficiency. Third, the family is a given, both as a constraint and as a resource, with which adults have to deal when they seek to pursue a professional career. It is useful to ask whether the effects of family configurations on success in the labour market are comparable between individuals, regardless of gender or proficiency level.

The OECD's PIAAC survey (Programme for the International Assessment of Adult Competencies) is one of the few to collect information both on respondents' cognitive skills (namely literacy, numeracy and problem-solving skills) and on their family and individual characteristics, including their educational situation and attainment and labour market status.

Data and methods

PIAAC is an international assessment of information-processing skills in adults aged 16 to 65 years. Thirty-three countries participated in the first wave of the survey, the data for which were mainly collected between August 2011 and March 2012, and nine more countries participated in the second wave, the data for which were collected between August 2014 and March 2015. In addition to answering a biographical questionnaire, the respondents completed an assessment in literacy and numeracy and, in 28 of the 33 participating countries, in problem-solving in technology-rich environments. The assessment was designed to be computer-based, although a pencil-and-paper version was used for cases where respondents were insufficiently comfortable with the computer tool to take the digital version of the test. In most countries, the sample size was about 5 000 adults. More detailed information on the survey can be found in the technical report (OECD, 2016[1]) and the international reports (OECD, 2013[2]; OECD, 2016[3]).

The analyses conducted in this report were based on data from 30 of the 33 countries that participated in the first wave of the survey.[1]

The PIAAC background questionnaire contains a series of questions about the composition of the household and certain characteristics of its members.[2] Specifically, these questions concern household size, marital status, partner's employment status and the number and age of the respondent's children.[3]

Some characteristics of the analyses that the reader needs to bear in mind are specified below.

The literacy proficiency indicator used in this report is the national quintile distribution of adult literacy proficiency scores. In other words, the adults in the first quintile are the 20% with the lowest literacy scores, while those in the fifth quintile are the 20% with the highest scores compared to the population as a whole of a given country. This approach has been favoured because the question under consideration is whether adults with more or less literacy proficiency compared to their peers are more or less likely to live in certain family configurations and are more or less likely to feel the influence of these family configurations on their career opportunities; we are not attempting to establish the

[1] Australia, Austria, Belgium (Flanders), Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Lithuania, the Netherlands, New Zealand, Norway, Poland, Singapore, Slovak Republic, Spain, Sweden, Turkey, the United Kingdom (England, Northern Ireland) and the United States. Cyprus*, Jakarta (Indonesia) and the Russian Federation are not included in the analyses: Cyprus* due to the excessively high proportion of missing answers as a result of language problems, Indonesia due to the restriction of the sample to the Jakarta region and the Russian Federation due to incomplete coverage of the Russian population. See OECD (2016[1]) for more details.

* *Note by Turkey*:
The information in this document with reference to 'Cyprus' relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey will maintain its position concerning the 'Cyprus issue'.

Note by all the European Union Member States of the OECD and the European Union:
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[2] The questionnaires may be viewed at http://www.oecd.org/skills/piaac/BQ_MASTER.HTM.

[3] One of PIAAC's main limitations for analyses of family formation and composition is, in the case of respondents living with a partner, the small quantity of information collected about the partner. Apart from the fact of his or her existence, all that is known about this person is his or her employment situation. As a result, the scope of many of the questions that can be asked about family configuration based on the PIAAC data is to some extent limited. For example, it is not possible to examine the propensity of individuals to find partners whose numeracy and literacy proficiency is similar to theirs, or to precisely characterise the social environment of the respondent's household, other than in the case of single-parent families.

influence of a given level of literacy, expressed in absolute terms, on these same variables.[4]

The population covered by PIAAC includes both adults who were still studying at the time of the survey (mainly those aged 16 to 29) and adults who had substantially completed their initial education (those aged 30 to 65). To account for this point, the educational analyses will look at younger and older adults separately and consider different aspects of education depending on the age group. For the youngest cohorts (16-29 years), the educational variable of interest is usually *student status* (i.e. a binary variable indicating whether the respondent is studying or not). For older adults (who have usually completed their education), the variable of interest is *educational attainment* (i.e. the highest level of education attained).

When examining the relationship between literacy proficiency level and family configuration on the basis of the PIAAC data, it is important to remember that: (1) the measure of literacy proficiency available is that *on the date of the survey* and (2) the PIAAC questionnaire contains very little information on the respondent's family and marital situation. First, literacy proficiency level is measured at a time after most of the family events discussed in this report, such as the birth of children and the date on which the respondent's household assumed its current form (for example, the date on which the respondent married or started cohabiting with his or her current partner or separated from his or her last partner) have taken place. In some cases, the interval between the date of birth of the respondent's first child, or the start of the relationship with his or her current partner, and the date on which literacy proficiency was measured can be as much as 45 years. It follows that any interpretation of the relationship between literacy proficiency and family configurations analysed in this report, and citing literacy level as an explanatory variable, is based on the strong assumption of a certain degree of stability in adults' literacy proficiency. Second, PIAAC provides some information about the living conditions and configuration of the respondent's family, but not about the history or length of current marriages, cohabitations or family configurations. The only exception is parenting, where information about the age of the oldest child can be used to calculate, for example, the age at which the respondent became a parent for the first time.

[4] Such an approach is also made necessary by the fact that the analysis covers a set of more than 30 countries in which the averages and distributions of the proficiency levels defined by PIAAC are extremely heterogeneous.

Chapter 2. Literacy, educational attainment and family formation

Introduction

This chapter examines the relationship between literacy proficiency level and the following dimensions of family formation and composition: (1) cohabitation with spouse or partner, (2) commencement of parenthood, (3) time of birth of first child, (4) teenage parents, (5) number of children, and (6) single parenthood. First, it provides an overview of the links between literacy proficiency and the main characteristics of family formation and composition by age and sex of respondents as collected in PIAAC. Second, given the well-established correlations between education-related variables (whether participation in education or educational attainment) and both literacy level (OECD, 2013[2]) and numerous other aspects of the family life cycle (Insee, 2015[4]; Mills et al., 2011[5]), this chapter examines the extent to which the relationship between family configuration and proficiency level is explained by various factors, and above all, the respondents' educational situation and attainment.

Literacy level and living with a partner

The percentage of adults aged 16 to 65 living with a partner by national literacy score quintile and sex is presented in Table 2.1.

Table 2.1. Percentage of 16-65 year-olds living with a partner, by sex, age and national literacy quintile

Age	Women						Men					
	1st	2nd	3rd	4th	5th	Together	1st	2nd	3rd	4th	5th	Together
16-19	8.0	4.7	4.0	3.1	2.2	4.2	2.5	1.8	1.6	1.5	0.8	1.6
20-24	34.8	29.9	27.1	24.2	20.6	25.9	19.3	17.2	16.0	14.0	12.1	15.1
25-29	64.2	61.7	58.5	58.1	55.3	58.5	47.3	45.8	45.4	44.6	42.0	44.4
30-34	71.8	72.7	72.9	74.4	74.7	73.4	63.4	65.2	66.3	66.1	66.6	65.7
35-39	74.6	77.2	77.8	78.6	79.7	77.9	68.1	74.0	77.2	79.4	81.3	76.9
40-44	72.5	76.1	78.1	78.8	79.4	77.2	69.6	76.6	78.5	80.5	83.1	78.2
45-49	72.5	75.2	75.5	76.1	76.7	75.3	70.0	76.6	79.1	80.4	83.6	77.8
50-54	70.3	73.1	74.3	76.0	76.1	73.7	70.2	76.9	79.4	80.2	83.7	77.5
55-59	69.9	72.0	72.1	72.2	72.0	71.8	73.1	80.1	82.5	84.1	84.6	79.8
60-65	66.8	69.3	69.2	69.7	69.8	68.9	77.6	82.3	83.4	84.6	85.9	81.7
Total	64.8	63.8	62.3	61.6	61.1	62.8	61.0	62.5	61.8	61.1	60.9	61.4

Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

If we consider the entire population of adults aged 16 to 65, the level of literacy proficiency is not related to the probability of living with a partner. The proportion of men and women aged 16 to 65 living with a partner reveals little or no variation

according to level of literacy and is comparable in its frequency between men and women in each quintile.

A slightly different picture emerges when the results are considered by age group. First, women are on average more likely than men to live with a partner when they are young (between 16 and 34 years old) and less likely when they are older (between 55 and 65 years old). This result is confirmed for all quintiles in the distribution of literacy scores. It reflects the fact that: (1) men tend to live with younger partners,[5] (2) men are more likely to start living with a new partner after a divorce or separation or the death of their spouse or partner[6], and (3) men have a lower life expectancy than women (OECD, 2017[6]).

Second, younger women and men (16-29 years old) with a relatively low level of literacy proficiency are more likely to live with a partner than highly proficient adults, although this is more pronounced for young men than for young women. However, in the oldest age groups, the relationship between proficiency level and the probability of living with a partner is reversed. Men aged 35 to 65 in the lowest quintile of the national distribution of literacy scores are much less likely to live with a partner than their counterparts in the highest quintile. Among older adults, the link between proficiency and living with a partner is stronger for men than for women. The difference in the probability of living with a partner between men aged 35 to 65 in the top and bottom quintiles of the national literacy score distribution is between 8 and 14 percentage points, depending on the age group, and between 2 and 7 percentage points for women.

Although it would have been interesting to study the relationship between the level of literacy proficiency and the probability that a respondent had already lived with a partner according to his age, this is not possible to do with the PIAAC data. The only aspect that can be examined is marital status at the time of the survey. However, the data strongly suggest that: (1) the most proficient adults start living with a partner later than the least proficient, and (2) the risk of separation (or the death of the partner) not being followed by living with a new partner is higher, after the age of 30, among the least proficient adults than among the most proficient.

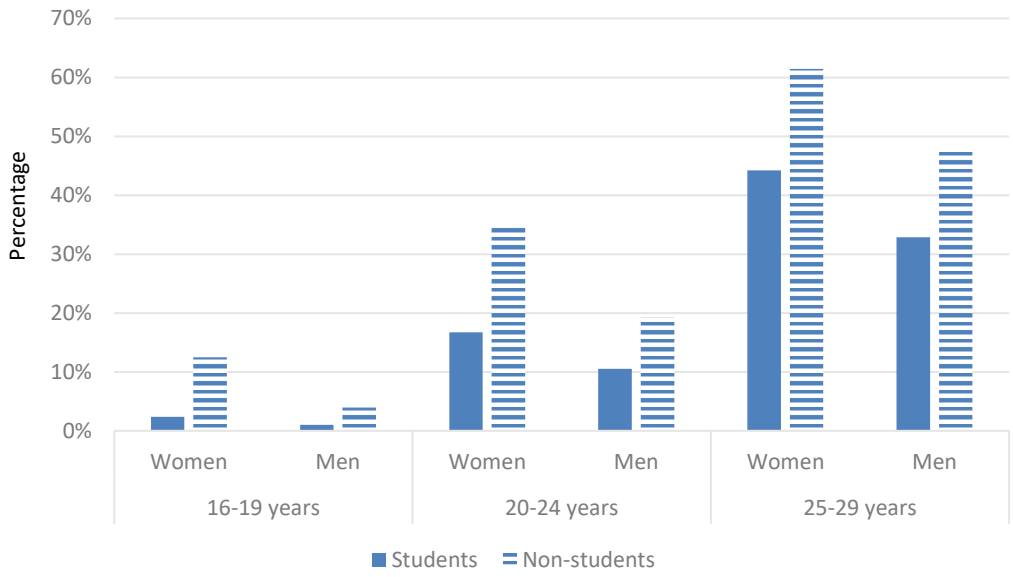
The higher proportion of young adults with a low level of proficiency living with a partner is to some extent related to the fact that young people with lower literacy skills are more likely to have already completed (or abandoned) their studies than their more proficient peers (see Figure A.1). They will hence have already achieved a certain degree of practical, financial and emotional independence from their parents, making it more likely that they will be able to get married or live with their partner. As can be seen from Figure 2.1, young adults who are not studying are more likely to be living with a partner than students[7] regardless of age. At the same time, in relative terms, the difference in probability of living with a partner for non-students and for students decreases with age. Thus young women between the ages of 16 and 19 who are not students are 5.9 times more likely to be living with a partner than female students of the same age, but only 2.7 times more likely between the ages of 20 and 24, and 2 times more likely between the ages of 25 and 29.

[5] See UN (2013[32]) for global data on marriage.

[6] See Schimmele and Wu (2016[35]) for Canada.

[7] Students tend to have higher average literacy scores than non-students.

Figure 2.1. Percentage of adults aged 16 to 29 living with a partner, by age, student status and sex

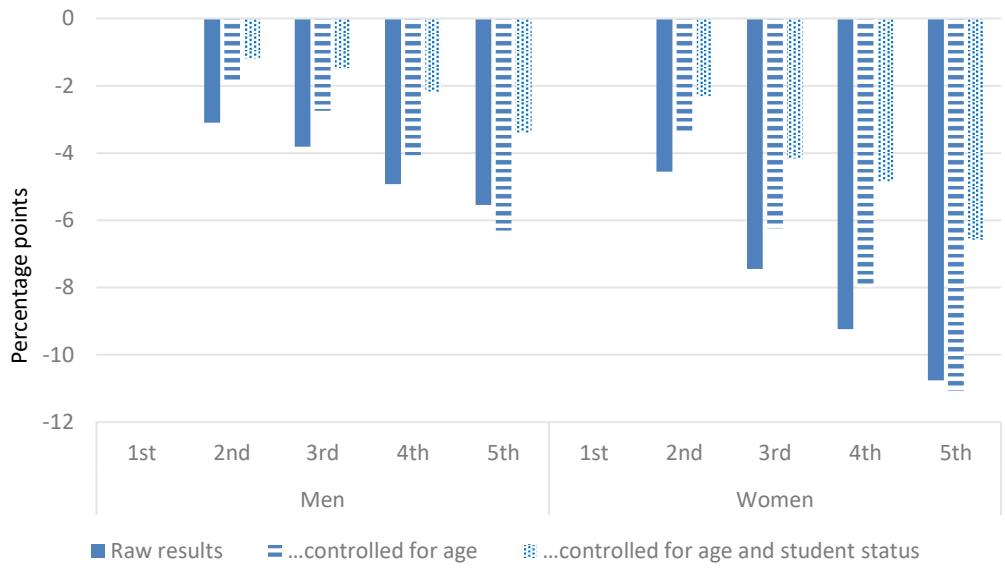


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

When age and student status are taken into account (Figure 2.2), literacy level is negatively correlated (albeit only slightly) with the probability of living with a partner for young women, and shows no correlation for young men. For example, women aged 20 to 29 in the highest quintile of the national distribution of literacy scores are 11 percentage points less likely to be living with a partner than women of the same age in the lowest quintile. When the results are controlled for age and student status, the difference is reduced to about 7 percentage points. For men aged 20 to 29, the difference in the estimated percentage living with a partner between the highest and lowest literacy quintile is negligible when age and student status are taken into account: the share of men in the fifth quintile living with a partner is three percentage points lower than that of men in the first quintile.

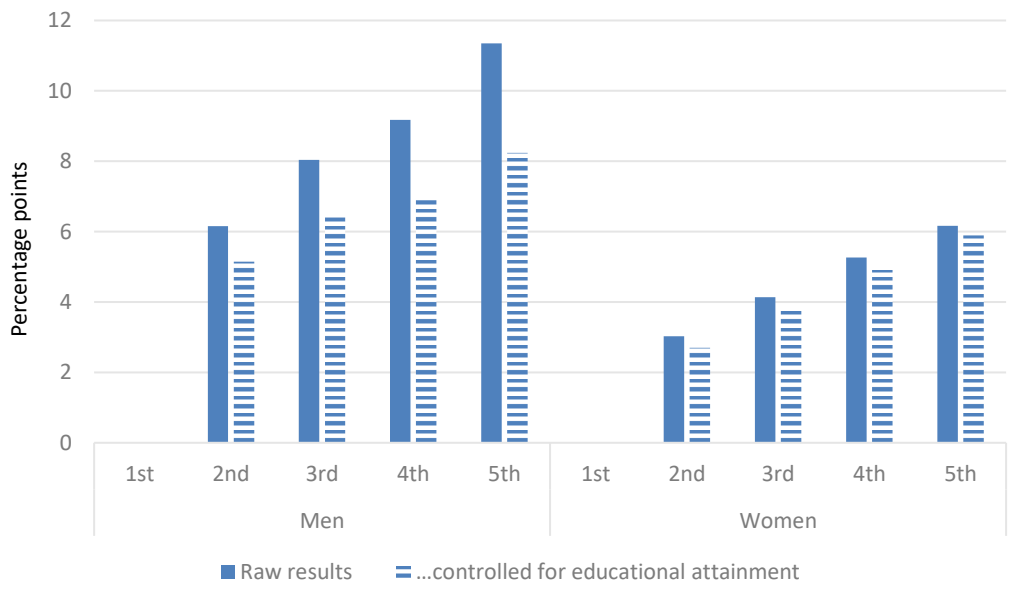
Among older adults (aged 40-65), controlling for educational attainment somewhat reduces the advantage of those with the strongest literacy proficiency in terms of probability of living with a partner in the case of men, but has little effect in the case of women (Figure 2.3).

Figure 2.2. Differences in the percentage of 20-29 year-olds living with a partner, by literacy proficiency level (quintiles): Controlled for age and student status



Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure 2.3. Differences in the percentage of 40-65 year-olds living with a partner, by literacy proficiency level (quintiles): Controlled for educational attainment



Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Literacy proficiency and parenthood

Probability of being a parent is negatively correlated with level of literacy proficiency for both women and men. On average, women aged 16 to 65 are more likely to be parents than men in the same age group. However, the difference in the percentage of women and men with children falls as the level of literacy proficiency rises.

As with marital status, the picture becomes more complex when the age variable is added to the analysis (Table 2.2). For both men and women, the probability of being a parent increases sharply with age up to the age of 39. There is also a negative link, which becomes weaker as age increases, between literacy proficiency level and parenthood among the younger cohorts. Among the older cohorts (adults aged 40 to 65), the link between level of literacy proficiency and probability of being a parent is relatively weak. Thus the likelihood of being a mother is slightly lower for women aged 40 to 65 in the highest quintile of literacy proficiency than for those in any other quintile. For men aged 40 to 65, conversely, the likelihood of being a father is slightly lower for those belonging to the lowest quintile than for those belonging to all other quintiles.

Table 2.2. Percentage of women and men who are parents, by proficiency quintile and age

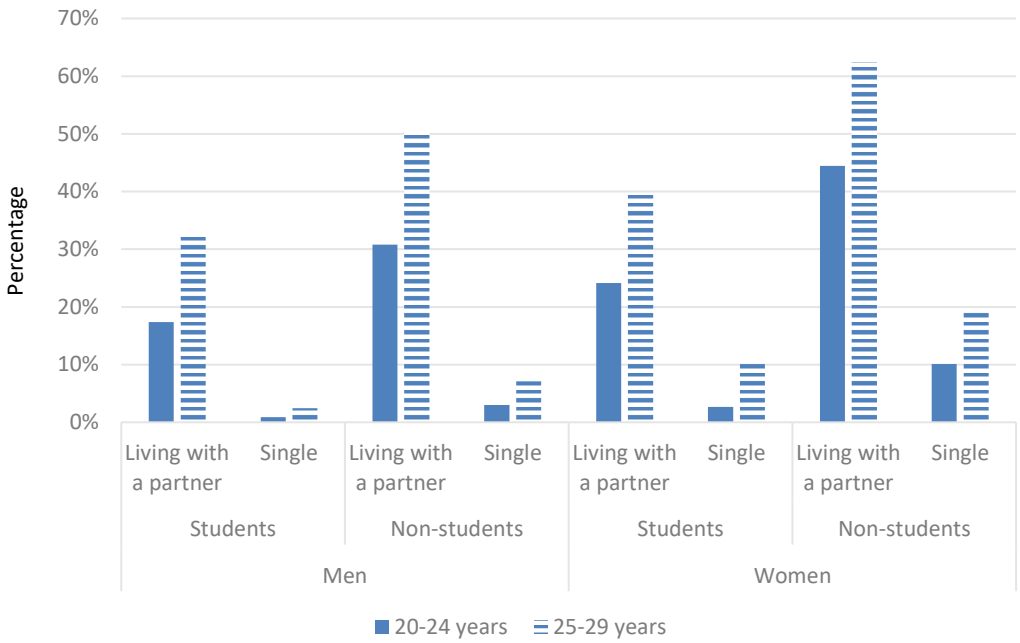
Age	Women						Men					
	1st	2nd	3rd	4th	5th	Together	1st	2nd	3rd	4th	5th	Together
16-19	5.8	2.5	1.7	0.9	0.5	2.1	1.4	1.1	0.5	0.8	0.2	0.8
20-24	29.8	19.1	14.0	10.8	5.7	14.0	11.5	7.3	5.7	4.1	2.4	5.7
25-29	61.2	52.6	43.9	36.5	27.6	41.4	36.4	29.7	26.9	22.6	15.5	24.5
30-34	77.6	73.7	69.8	66.3	59.3	68.1	56.9	54.2	52.6	49.7	45.3	50.8
35-39	86.6	85.6	84.1	82.2	77.8	82.9	71.1	73.6	72.7	72.2	70.9	72.1
40-44	86.9	88.1	87.3	86.2	84.0	86.5	75.1	78.8	79.8	80.9	79.6	79.0
45-49	88.4	89.1	88.5	87.2	84.3	87.6	78.9	82.6	83.2	83.4	83.6	82.2
50-54	89.9	90.3	90.1	89.1	88.5	89.7	80.9	84.3	85.3	86.3	87.7	84.4
55-59	90.0	90.7	90.3	88.9	87.2	89.8	83.5	87.2	88.0	88.4	88.9	86.7
60-65	91.1	91.1	90.4	90.4	87.9	90.8	87.7	89.5	88.9	88.7	88.5	88.7
Total	79.0	73.1	67.9	62.8	56.1	68.0	65.5	62.9	59.5	56.3	51.8	59.1

Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Young adults with the strongest literacy skills, whether male or female, appear to delay the start of parenthood for longer than young adults with the least proficiency. This is partly due to the fact that they tend to marry or cohabit with a partner at an older age[8] and pursue their education for longer. As can be seen in Figure 2.4, the proportion of single young people (aged 20 to 29) with children is very small (regardless of whether they are students or not), and students are less likely to be parents than non-students (regardless of whether they live with a partner or not).

[8] Obviously, living with a partner is not a necessary condition for having children. However, marriage or cohabitation is an important first step on the road to parenthood for many people. A recent French study clearly shows a certain stability in the initial stages of the life cycle of young adults, who, as they grow older, pass from the end of studies to cohabitation and then to parenthood (Insee, 2015[4]).

Figure 2.4. Percentage of 20-29 year-olds who are parents, by sex, student status, marital status and age

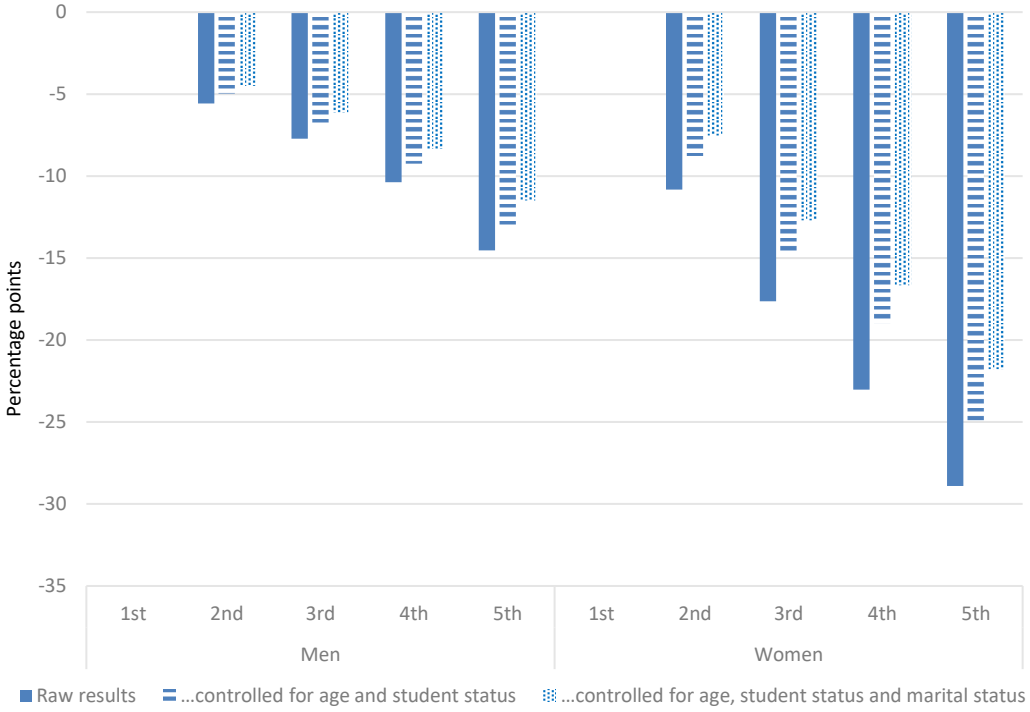


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

The strength of the link between literacy proficiency and parenthood for young adults aged 20 to 29 is found to be slightly reduced when: (1) student status and (2) marital status are controlled for (Figure 2.5). Regardless of whether he or she is a student or living with a partner, the probability of a young adult being a parent decreases as the level of literacy proficiency increases. For example, the raw difference in the percentage of parents among young adults in the lowest proficiency quintile and those in the highest quintile is 29 percentage points for women and 15 percentage points for young men. If the results are adjusted to take account of student status and marital status, the percentage difference decreases slightly to 22 and 11 percentage points respectively.

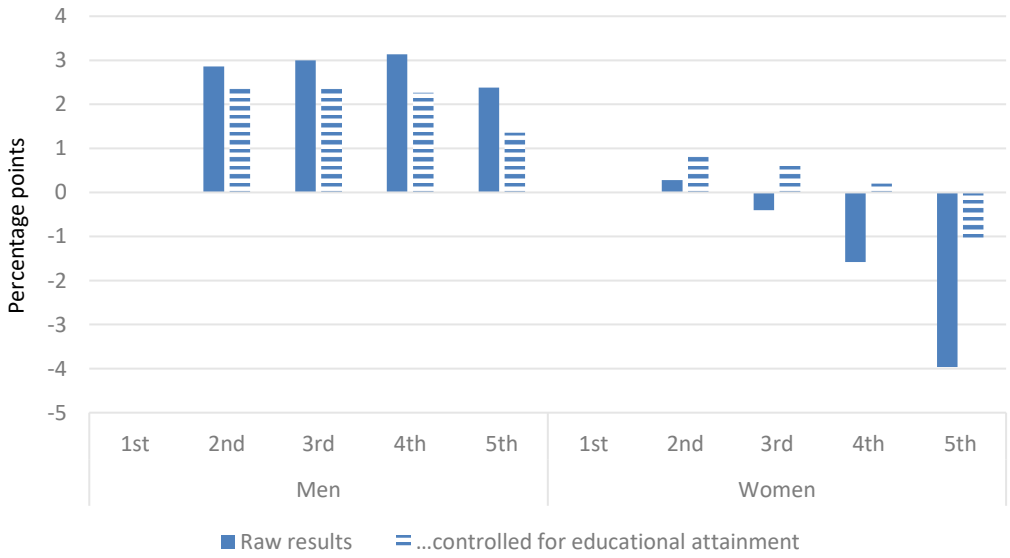
Among the older cohorts, the association between literacy level and parenthood is very weak. The difference in the percentage of parents among women aged 40 to 65 in the first quintile of the national distribution of literacy scores and those in the second to fifth quintiles is between 0 and 4 percentage points. For men in the same age group, the differences are between 2 and 3 percentage points. Controlling for educational attainment has only a slight effect for men and narrows the differences between the percentage of mothers in the first quintile and those in the other four quintiles to negligible levels (Figure 2.6).

Figure 2.5. Differences in the percentage of parents among men and women aged 16 to 29, by literacy proficiency level, controlling for student status and marital status



Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure 2.6. Differences in the percentage of parents among men and women aged 40 to 65, by literacy proficiency level, controlling for educational attainment



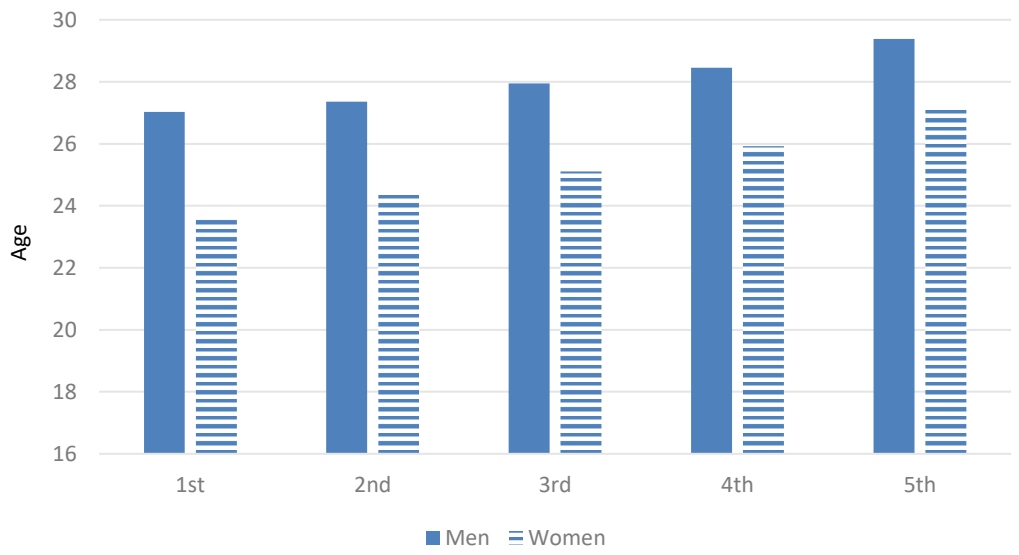
Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Aspects of parenthood

Age at birth of first child

In order to examine the relationship between parents' literacy proficiency and their age at the birth of their first child,[9] the analysis is confined to adults aged 40 to 65 (i.e. to an age group in which only a minority of women are preparing to have their first child). Within this group, the average age at the birth of their first child of women whose literacy score is in the bottom 20% in their country is around 24 years, compared to 27 for those whose score is in the top 20% (Figure 2.7). A similar trend is found for men, whose average age at the birth of their first child is higher than that of women for all literacy proficiency quintiles. Interestingly, the difference in the average age at the birth of their first child between women and men is smaller in the highest quintile than in the lowest quintile.

Figure 2.7. Average age at birth of first child, by level of literacy proficiency and sex: Adults aged 40 to 65



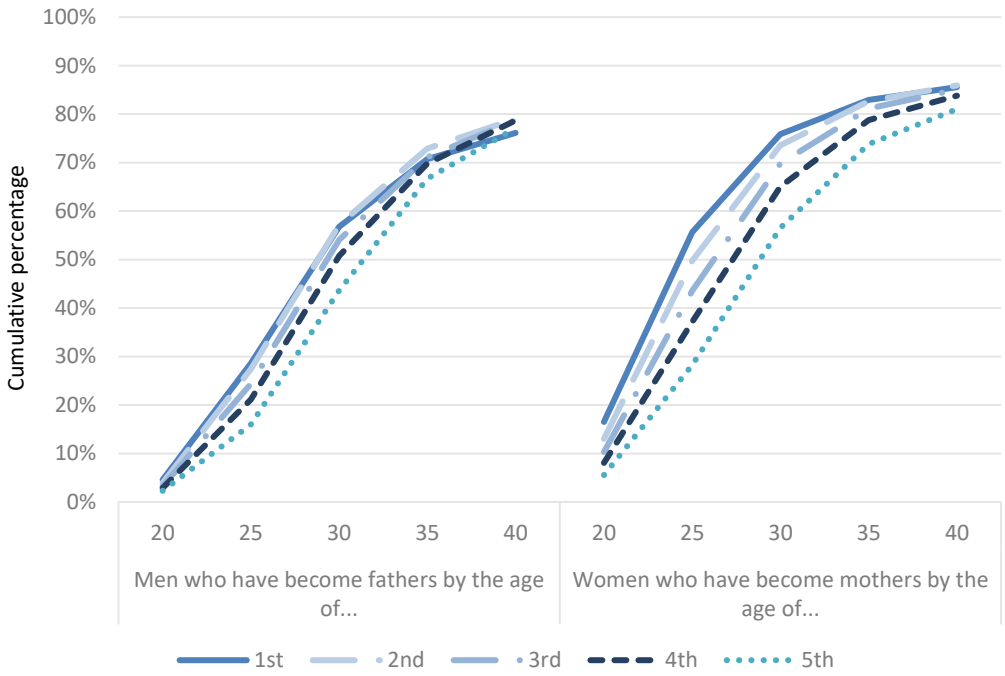
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure 2.8 presents the same results in a slightly different way. It shows the cumulative proportions of women and men in the 40-65 cohort who have become parents between the ages of 20 and 40 according to the different literacy quintiles. Although literacy is not

[9] It should be noted that we have no way of distinguishing biological children from other children (i.e. stepchildren or adopted children) in the PIAAC data. The question about the existence of children (J_Q03a) was worded as follows: 'Do you have children? Please include stepchildren and children not living in your household.' As a result, fathers' average age at the birth of their first child may be underestimated slightly more than if only biological children had been taken into account, given the tendency of men to form a new cohabiting relationship with a partner younger than their previous spouse or partner.

very strongly related to the probability of becoming a parent by the age of 40,[10] the most literate women and men tend to delay the arrival of their first child compared to their less proficient counterparts. For example, whereas 56% of women in the fifth literacy quintile of the 40-65 age group have become mothers by the age of 30, this is the case for 76% of women in the first quintile.

Figure 2.8. Cumulative percentage of parents at a given age, by sex and literacy quintile: Adults aged 40 to 65



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

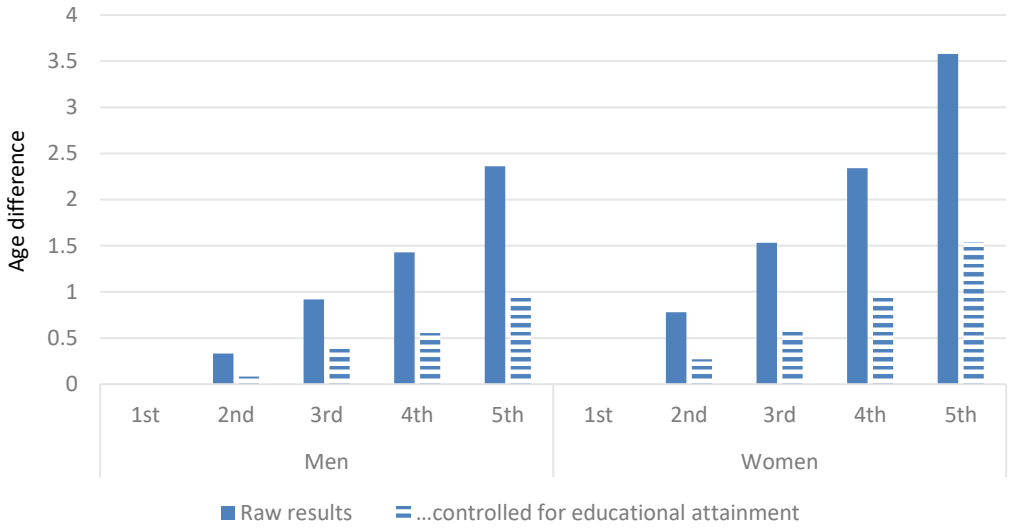
The tendency for adults with higher literacy skills to have their children later than the lowest-performing adults is explained by the fact that: (1) parenthood tends to be delayed until the end of initial studies (see Figure A.2) and (2) adults' average age at the end of their initial education is higher in the case of those with the strongest literacy skills (Figure A.3).

When educational attainment (and hence the number of years of schooling) is controlled for, the strength of the link between literacy skills and the age at which adults become parents for the first time diminishes considerably (Figure 2.9), although it does not disappear. For example, among 40-65 year-olds, the difference in age on the arrival of their first child between women in the fifth literacy quintile and those in the first quintile changes from 3.5 years to 1.5 years when educational attainment is controlled for. However, for both women and men, the average age at which they become parents still

[10] The difference in this probability between adults in the highest quintile of the national distribution of literacy scores and those in the lowest quintile is around 5 percentage points for women and close to zero for men.

increases with the level of literacy proficiency, even when the results are controlled for educational attainment.

Figure 2.9. Difference in average age at birth of first child, by literacy quintile and sex, controlling for educational attainment: Adults aged 40 to 65



Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Teenage parents

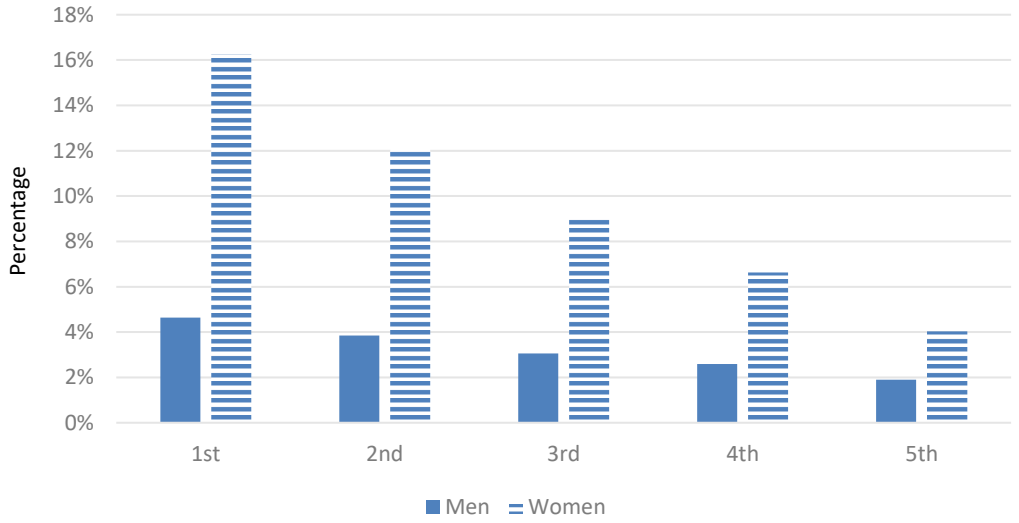
Teenage parenthood (or more specifically teenage motherhood) is a subject of political concern in many countries, such as the United Kingdom (Department of Health, 2013[7]) or the United States (Department of Health and Human Services and Office of Adolescent Health, 2014[8]). Given the interest in this issue, it is worth looking more closely at the relationship between literacy proficiency and teenage parenthood. Overall, the proportion of teenagers who are fathers or mothers among the adult population of countries participating in PIAAC is very low. About 2% of young women and 1% of young men aged 16 to 19 at the time of the survey had children (Table 2.2). Among female teenagers, being a parent is correlated with a low literacy level: 6% of women aged 16 to 19 in the lowest quintile of the national literacy score distribution are mothers, compared to almost none of the most proficient women of the same age.

Consideration of the percentage of men and women who became parents for the first time during adolescence reveals a trend that is fairly comparable. Across all the countries covered by PIAAC, about 16% of women aged 20 to 65 who are in the lowest quintile of literacy scores became mothers in their teens, compared to 4% in the highest quintile.[11]

[11] The decrease in the proportion of teenage mothers among young adults compared to previous generations is probably due in part to the extensive use of female contraception, the spread of which has a proven effect on women's age at the birth of their first child and their participation in the labour market (Bailey, 2006[29]). Unequal access to contraception depending on social background may therefore be one of the reasons for the higher concentration of teenage mothers observed among women with the lowest literacy skills.

Although the proportion of men who became fathers in their teens is much lower, the probability of being a teen parent is also negatively correlated (though less strongly so) with men's literacy proficiency (Figure 2.10).

Figure 2.10. Percentage of adults aged 20 to 65 who became parents in their teens, by literacy quintile and by sex

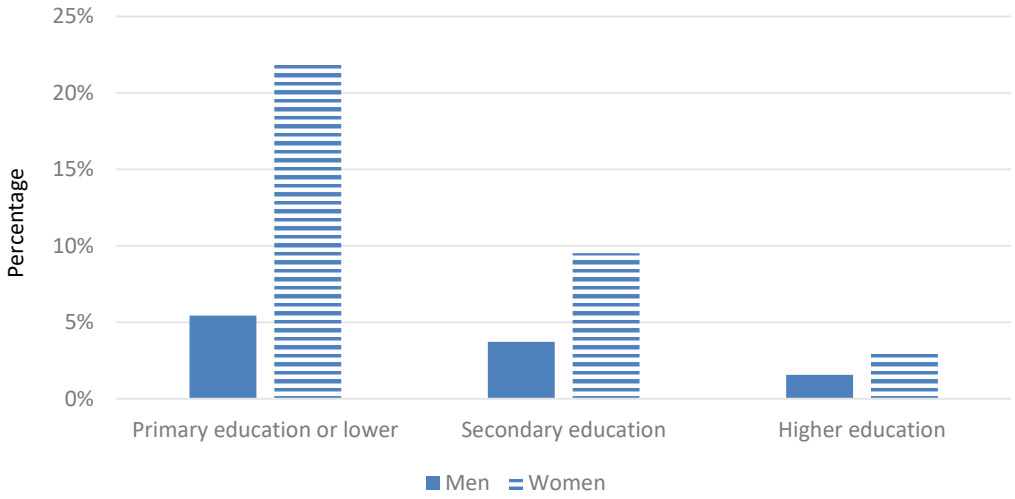


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

A strong negative link between educational attainment and the probability of having a child before the age of 18 is also observed, particularly for women (Figure 2.11). This finding is not surprising. First, most teenage mothers will have had to interrupt their studies on the birth of their first child, if they have not already done so before the birth (or even before conception in some cases).[12] Under these conditions, the highest level of education they will have been able to attain before the birth of their first child is the completion of secondary education. Second, becoming a teenage parent creates many barriers to the resumption of education (at least in the case of mothers while their children are very young) and hence to the development of literacy proficiency (to the level that would have been attained if studies had been pursued without interruption). Failure to complete secondary school makes it almost impossible to progress to higher education and even, purely for financial and practical reasons, to resume studying, especially at upper secondary level. Various studies have shown what a negative net effect teenage motherhood has on women's participation in education (Luong, 2008[9]; Fletcher and Wolfe, 2009[10]).

[12] Whether pregnancy or the birth of a child is the cause for the interruption of studies or, conversely, whether there are pre-existing socio-economic conditions that increase the probability both of early parenthood and of dropping out of school is an important research question, but one that cannot be answered with PIAAC data.

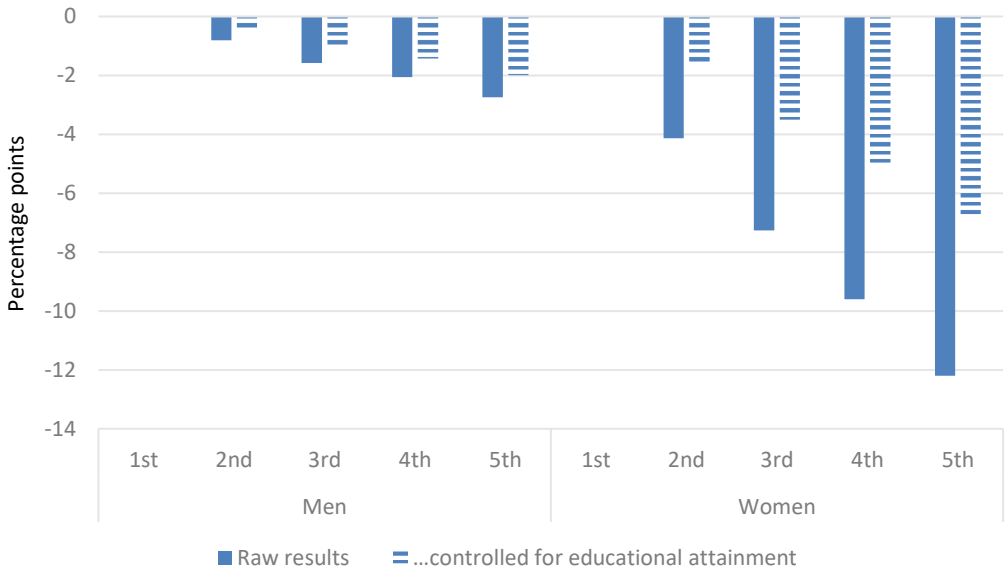
Figure 2.11. Percentage of 25-65 year-olds who became parents in their teens, by sex and by educational attainment



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Unsurprisingly, controlling outcomes by educational attainment level significantly reduces the strength of the link between literacy proficiency and the probability of having a child during adolescence for women. When the level of education is taken into account, the difference in the proportion of women who became mothers in their teens between those in the fifth quintile of the national literacy score distributions and those in the first quintile decreases from 12 to 7 percentage points (Figure 2.12). However, the result is still significant in terms of its magnitude since adults in the first quintile are three times more likely to become a teenage parent than those in the fifth quintile.

Figure 2.12. Difference in percentage of adults aged 20 to 65 who became parents in their teens, by sex and by literacy quintile, controlled for educational attainment

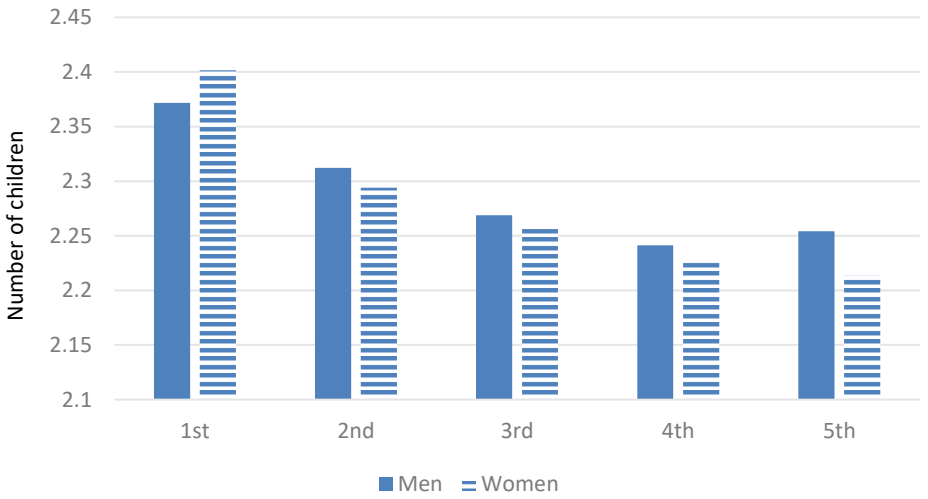


Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Number of children

Among adults who have children, both men and women in the lowest quintile of literacy scores have more children on average than those in the higher quintiles. However, the observed differences are fairly small (Figure 2.13 and Figure 2.14). For example, the difference in the average number of children between women aged 40 to 65 in the two extreme quintiles of the distribution is 0.19.

Figure 2.13. Average number of children, by literacy quintile and sex: Adults aged 40 to 65

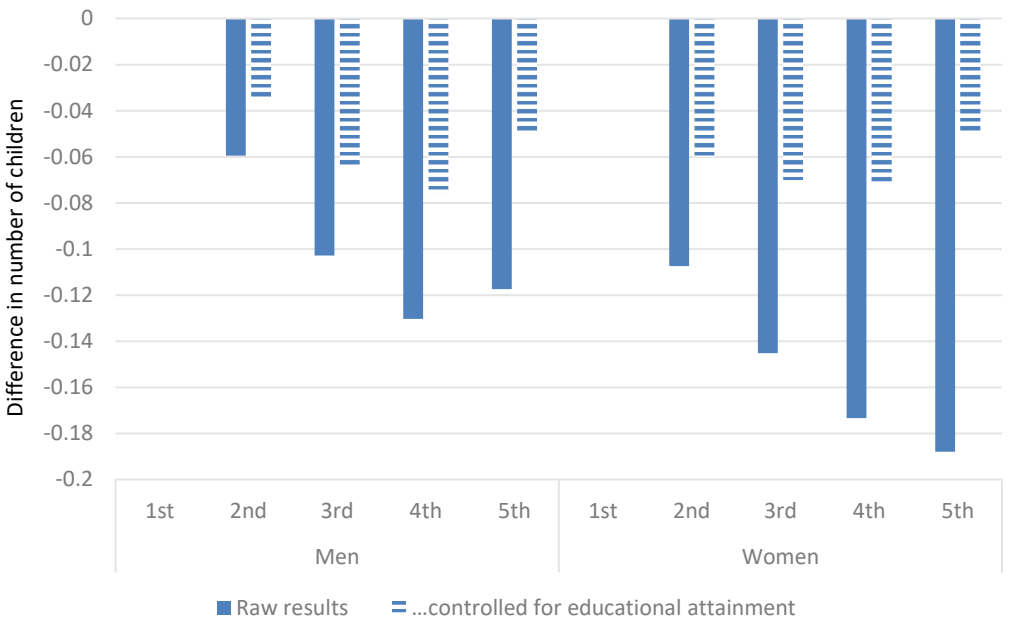


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

As with average age at birth of first child, the correlation between literacy proficiency and number of children is largely explained by the fact that the most proficient adults are also educated to a higher level, and therefore started living with their partner and forming a family at an older age than their less proficient peers.[13] When respondents' educational attainment is controlled for, the strength of the link between literacy proficiency and number of children is negligible (Figure 2.14).

[13] Postponing motherhood to a later date generally has a negative effect on completed fertility (Schmidt et al., 2012[27]).

Figure 2.14. Difference in average number of children, by sex, controlling for educational attainment: Adults aged 40 to 65

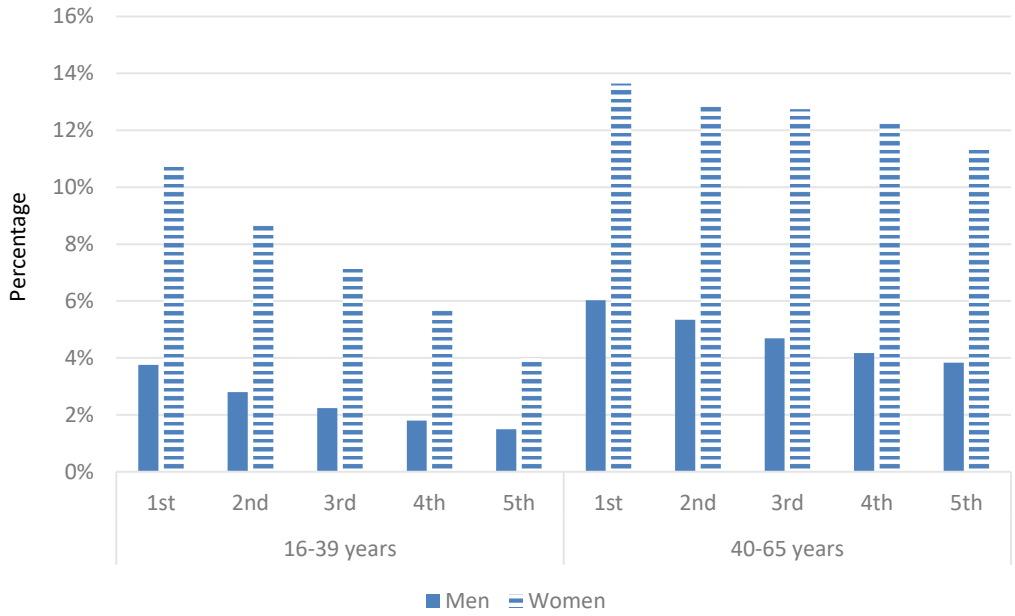


Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Single-parent families

Single-parent households, i.e. those with one parent responsible for one or more children, now constitute a large minority among households in most OECD countries. In 2011, an estimated 26.2% of households consisted of a couple and their child(ren) and 7.5% of a single parent and his or her child(ren) (OECD, 2011[11]). There is, however, considerable national variation in the proportion of single-parent families, ranging, for example, from over 11% in Latvia and New Zealand to less than 3% in Japan. In the vast majority of cases, as reflected in the PIAAC data, the single parent is a woman (Insee, 2015[4]). In addition, a strong negative relationship is observable between literacy proficiency and the probability of being a single parent for men and women, particularly those aged 16 to 39 (Figure 2.15). The greater strength of this relationship for young adults than for older adults reflects the fact that men and women with low literacy skills tend to become parents earlier than adults with higher levels of literacy.

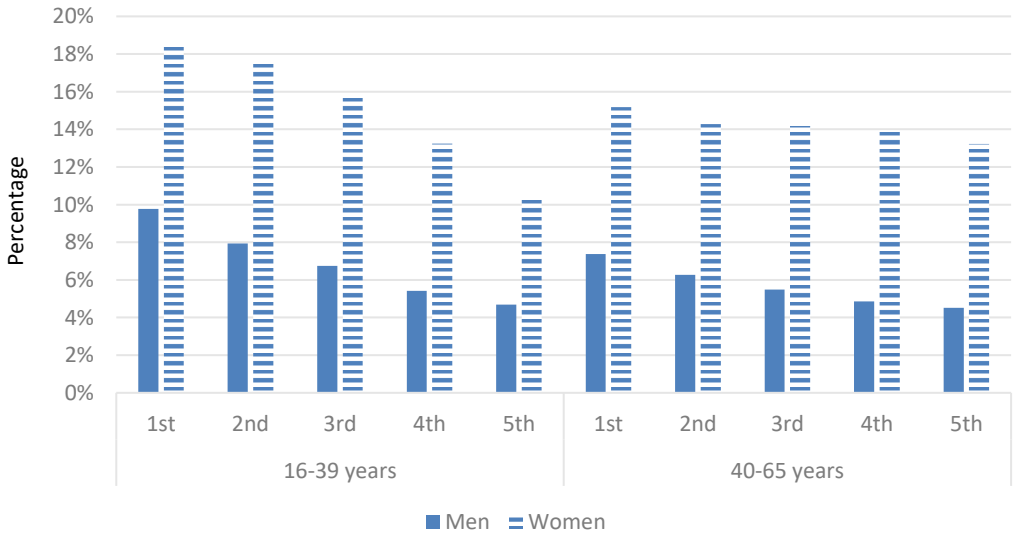
Figure 2.15. Percentage of single parents, by literacy quintile, sex and age: Adults aged 16 to 65



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

The higher rate of single-parent families among the least proficient men and women is partly explained by the fact that the probability of becoming a parent is negatively correlated with the level of literacy for all adults aged 16 to 39 (See Table 2.2 and following). However, even if attention is confined solely to adults who are parents, the probability of raising children alone is still strongly correlated with the level of literacy for the 16-39 age group.

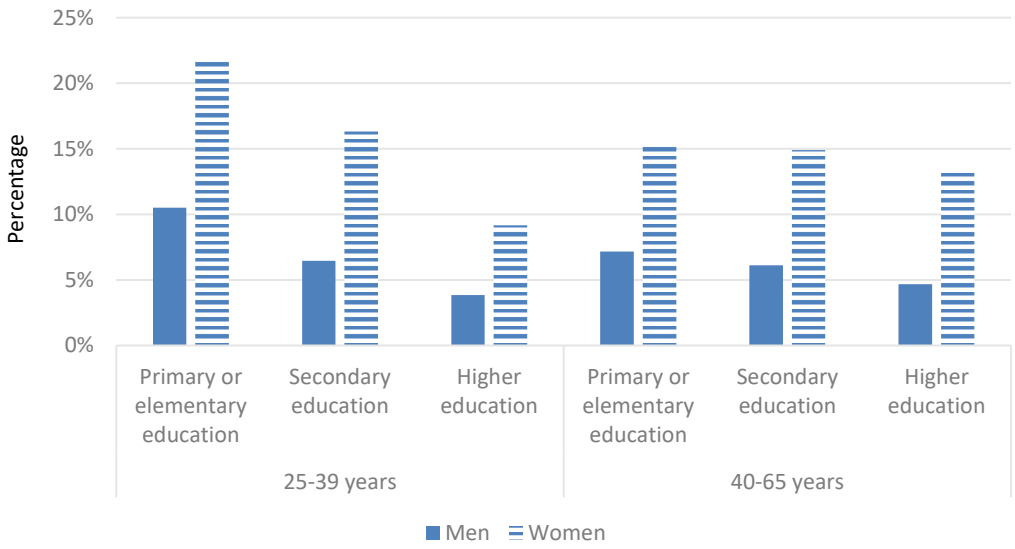
Figure 2.16. Percentage of single parents, by literacy quintile and sex: Parents aged 16 to 65



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

There is a very clear negative relationship between the level of educational attainment and the probability of raising children as a single parent (Figure 2.17). Again, this effect is far more pronounced for the youngest adults than for the rest. Moreover, it corroborates the fact that the least educated adults are more likely to divorce, are less likely to remarry (Aughinbaugh, Robles and Sun, 2013[12]) and take longer to start living with a new partner after a separation or after the death of their partner (Insee, 2015[4]) than the most educated adults.

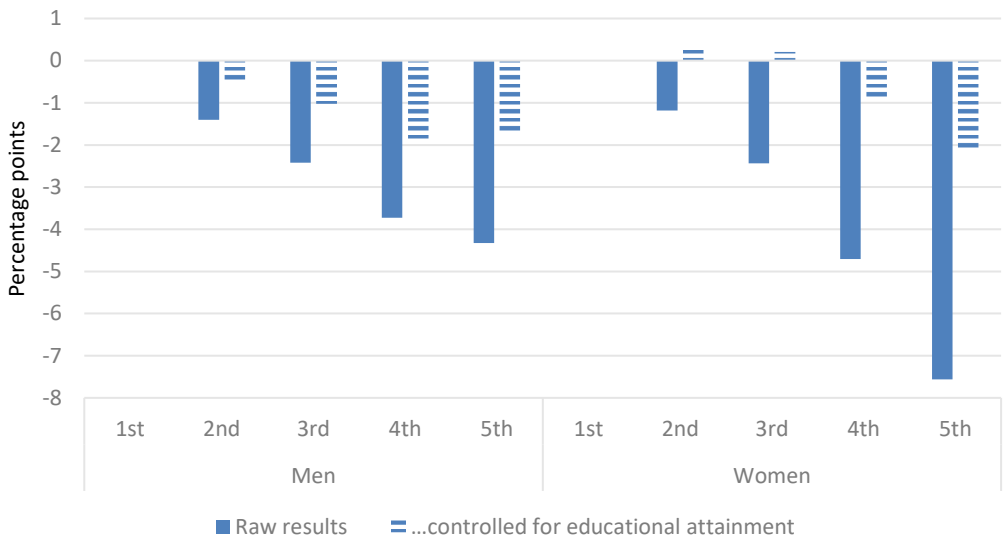
Figure 2.17. Single parents as a percentage of all parents, by educational attainment: Adults aged 25 to 65



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Once educational attainment level is taken into account, the differences in the probability of raising children as a single parent according to literacy proficiency level disappear almost entirely among both men and women aged 25 to 39 (Figure 2.18). By contrast, controlling for educational attainment has no effect among the parents of older cohorts (40-49 years). However, for these age groups, the differences in the probability of raising children as a single parent according to literacy proficiency level were only slight to start with.

Figure 2.18. Difference in percentage of single parents among parents aged 25 to 39, by literacy quintile: Controlled for educational attainment



Note: Reference group = first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Discussion

The level of literacy proficiency is correlated with all dimensions of family formation and composition discussed in this chapter, the strength of these correlations being directly related to the age of respondents. Among the youngest adults, the men and women with the strongest literacy skills are less likely to live with a partner, to have children and, if they are already parents, to raise them alone than their less proficient counterparts. Among older adults, however, the correlation between literacy level and living with a partner or being a single parent is, at most, much lower than among young adults. Literacy proficiency seems to have little relationship with the probability of having children at certain specific points in the life cycle of individuals; conversely, though, it is associated with the age at which adults become parents for the first time and with the number of children they will have. In general, adults with the highest literacy skills tend to delay parenthood and to have fewer children than their less proficient counterparts. In most cases, the links between proficiency level and the aspects of family formation and configuration studied here are clearer for women than for men.

The association between literacy level, age and dimensions of family formation and composition is partly explained by the correlation between participation in education and both literacy proficiency and age. When student status or educational attainment is controlled for, the differences between adults in the five quintiles of the national distribution of literacy scores with regard to the family characteristics examined are in most cases considerably reduced, but still remain significant.

There are two reasons for this. First, proficiency level is positively related to educational attainment and to participation in education. Adults educated to the highest levels tend to have stronger literacy skills than adults with lower levels of education, and students tend to have a higher level of proficiency than non-student adults. People who engage for

longer in education, and at higher levels, tend to perform better in literacy than those who do not,[14] and participation in education is one of the most important mechanisms by which individuals' level of literacy proficiency develops.

Second, studying or attending training requires a significant investment in time and generates opportunity costs with regard to both living with a partner and having children. The most educated adults have spent more years studying than the least educated and, as a result, are generally older when they leave the education system and enter the labour market (on a full-time basis). Although studying does not preclude having a job, working students are usually taken on in a temporary, seasonal or part-time capacity rather than full-time (Zilloniz, 2017[13]). Because of this, students often lack the financial resources to live with a partner and to support a family (especially if the partner does not work and if they have children). In addition, studying and caring for young children are both time-consuming activities which are therefore difficult to combine, especially for women, on whom the responsibility for childcare almost invariably falls (Champagne, Pailhé and Solaz, 2015[14]; OECD, 2017[15]). Thus, studying full-time and setting up an independent household with a partner and/or looking after children are activities which, while not completely mutually exclusive, tend to represent alternatives to one another. As a result, living with a partner and parenthood are usually postponed until the completion of studies.[15]

However, the level of literacy proficiency still shows a positive and relatively strong link with the propensity to delay parenthood, regardless of the effects of student status or educational attainment (or, in other words, the total number of years of study). This is apparent in particular from the older ages at which the most proficient women become mothers and the higher rates of teenage motherhood among the least proficient women, regardless of the effects of level of education. One possible hypothesis for these results would be that, regardless of their student status or educational attainment, women with the *highest overall cognitive abilities* (including strong literacy skills[16]) are more likely than their less capable counterparts: (1) to want to continue their education if they are students and (2) to have higher incomes (and the prospect of higher incomes) once they enter the labour market. The costs associated with becoming a mother at a relatively young age, and hence having to forego opportunities for qualifications and income, are therefore greater for women with strong cognitive skills than for women with few.[17] The higher teenage pregnancy rates observed among women with low skill levels can be explained by the low relative costs for this group of having children at such a young age. By the same token, the higher age at the birth of their first child of women with strong skills reflects the high costs, relative to the benefits, of having children at an earlier stage. These explanations assume, of course, that an individual's position in the national

[14] The ability to reach higher levels of educational attainment depends on individuals' motivation, on their performance but also on having already obtained the required diplomas or certificates at lower levels.

[15] The links between educational attainment and age at birth of first child have already been described in detail (Mills et al., 2011[5]).

[16] It is certainly difficult to imagine how the level of literacy (i.e. reading skills) could be causally related to parenting choices (regardless of the direction of causality).

[17] The mechanisms described by Mills (2011[5]) that cause highly qualified women to delay motherhood apply equally to women with a high level of cognitive skills.

distribution of literacy scores remains reasonably stable throughout life, and that the proficiency level observed at the time of the survey is a reasonable reflection of the level at the time when the decision was made to have children. They also assume that young adults had a good idea at the time of their decision of the costs and benefits generated by the birth of a child or of living together.

What is far less clear is why, regardless of their level of education or of their student status, the men with the strongest literacy skills are more likely to delay becoming fathers than less proficient men. Historically, men have not faced the same pressure as women to leave their studies or work – temporarily at least – on the arrival of a child. Part of the explanation may be that men's approach to parenting depends on the behaviour and timing decisions of their children's mothers. It can be expected that any tendency for highly skilled women to delay motherhood has some effect on their partners who, given the propensity for homogamy (OECD, 2011[11]),[18] will tend to have a higher level of cognitive skills than the partners of women with low levels of literacy.

It is also possible that the delaying of parenthood is due to other factors which have not been taken into account in our analyses, such as having a job that provides good opportunities to develop or maintain literacy skills, or cognitive skills more generally.

The foregoing analyses of family configuration and literacy proficiency do not allow us to provide definite answers on the role of the family in reproducing inequalities in literacy, mainly because of the limited nature of the information available. It would have been useful, for instance, to have data on the literacy proficiency and educational attainment of the partners of PIAAC respondents who have children.[19] This would have allowed us to see how homogeneous these characteristics are in couples with children, and hence to know the proportion of children raised in families with strong or weak literacy skills. In the absence of information on both parents, it is very difficult to characterise groups of children at risk of developing low literacy skills. One group of interest can be identified, however: that of children living in single-parent families in which the parent responsible for them has low literacy skills. About 3.5% of children aged 15 or under, whose parents are in the age group of the PIAAC target population (16-65 years), live in a single-parent family in which the parent's proficiency falls into the lowest 20% in the national distribution of literacy scores.

[18] See page 26.

[19] The only information currently available about the respondent's partner is his/her work status.

Chapter 3. Family structure and effectiveness of skills in the labour market

Introduction

The first part of this report focused on the links between individual skills and the stages in family formation, and considered whether literacy proficiency plays a role in decisions concerning living with a partner and parenthood, and conversely, whether family configuration imposes limitations on adults' level of proficiency. It was found that the level of literacy proficiency does have an effect – albeit a weak one – on adults' tendency to delay parenthood, and that this reinforces the links between skills, educational attainment and integration into the labour market. Following on from this finding, one can ask whether the level of literacy subsequently contributes to the significance of the role played by family configurations in the construction and reproduction of inequalities in the labour market.

Working lives are increasingly characterised by periods of inactivity or transition. The onset of adulthood, unemployment, changes of career direction, training, motherhood and parental leave are all factors that introduce discontinuities into adults' life in the labour market. The constraints related to family configurations are a powerful force in the shaping of these discontinuities. It is therefore essential to understand the 'costs' that these configurations may generate for both the economic well-being of individuals and, more generally, the functioning of modern economies.

An extensive literature already exists on the effects of parenthood on adults' careers. Focusing mainly on the consequences of the presence of children in the household on women's participation and integration in the labour market, this work analyses parenthood as one of the main driving forces behind the construction of social inequalities to the detriment of women in the labour market.

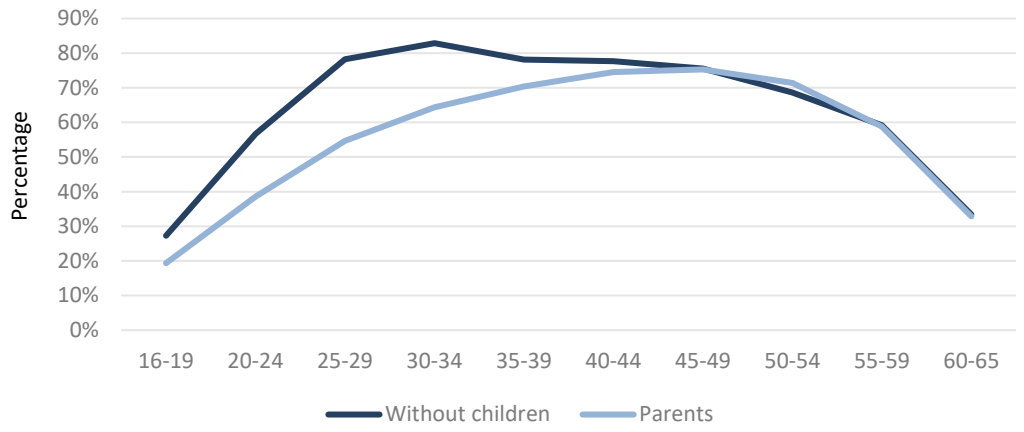
The PIAAC survey data allow this issue to be analysed in new ways by collecting information about respondents' career, family life and literacy performance. We can therefore try to answer the following question: Do the different family configurations (living with a partner, parenthood, number of children) play a similar role on labour market outcomes, regardless of adults' level of proficiency? In other words, does the degree of proficiency in information-processing, which is one of the dimensions of human capital valued in the labour market, offer an opportunity to limit the effects of family configuration on essential aspects of working life such as access to employment, income from work or employment opportunities?

Access to the labour market

The female employment rate, i.e. the proportion of adult women aged 16 to 65 in paid employment, is consistently lower than the male employment rate in all countries participating in the survey. The rate is 60% for women, compared to 75% for men (Figure A.4). Women under 45 who have children are generally less likely to work than

those who have no children. Beyond this age, the employment rate is comparable between these two groups (Figure 3.1). The age groups for which the differences are most pronounced correspond to the periods during which women most commonly give birth to their children, i.e. between 25 and 35 years of age. Over the age of 40, the proportion of working mothers is similar to that of childless women.

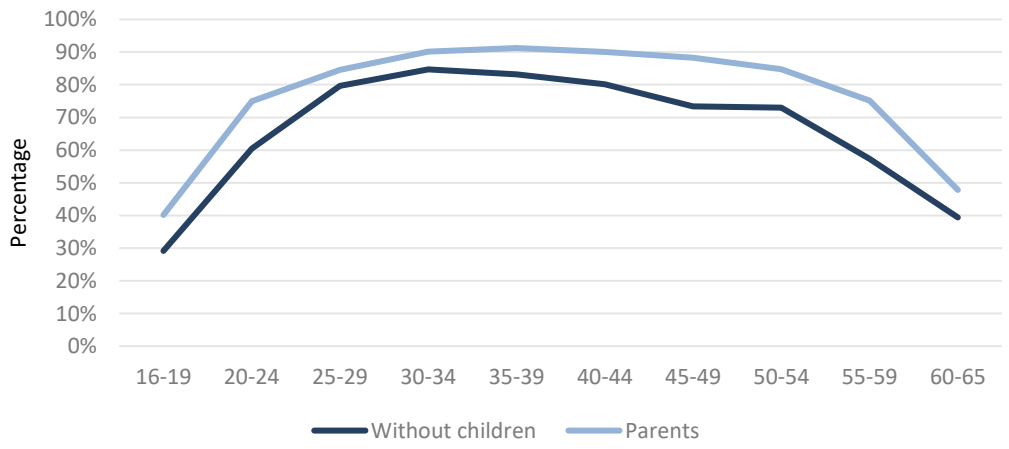
Figure 3.1. Female employment rate, by age and parental status



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

The situation is radically different for the male population. Fathers are far more likely to be working than men without children (Figure 3.2). Over the age of 25, regardless of the age group considered, the rate of those in work is between 5% and 15% higher among men with children than among those without children. In contrast to motherhood, fatherhood thus has a significant positive association with the probability of being in work.

Figure 3.2. Male employment rate, by age and parental status



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

As might be expected, the number of years that women work is inversely proportional to their number of children. For example, the median duration of employment for women aged 50 to 54 is 24 years and 7 months when they have no children, 24 years and 4 months when they have one child and 23 years and 11 months when they have two children (Figure 3.3). However, the difference in number of years of paid work according to number of children, which can be understood as the length of time off work due to being a mother, is not constant within different age groups, but tends to increase as age increases. Thus, mothers of two children aged 40-44 have a median career length 8 months shorter than that of childless women, compared to a difference of 2 years and 2 months for those aged 55-59.

Two hypotheses could explain this increase. In the first place, it is possible that having children does not just interrupt work in the months preceding or following the birth of each child. At certain stages of family life, such as a change of job or a change of school, a couple may decide that one parent should pause work to focus on childcare, so that periods of inactivity accumulate throughout life. Second, the gap may be explained by a change in attitudes or changes in government policy aimed at promoting female employment. In this hypothesis, this difference represents a generational effect: the oldest mothers gave birth to their children at a time when less was done to help or encourage mothers stay in and return to work than has been the case more recently.

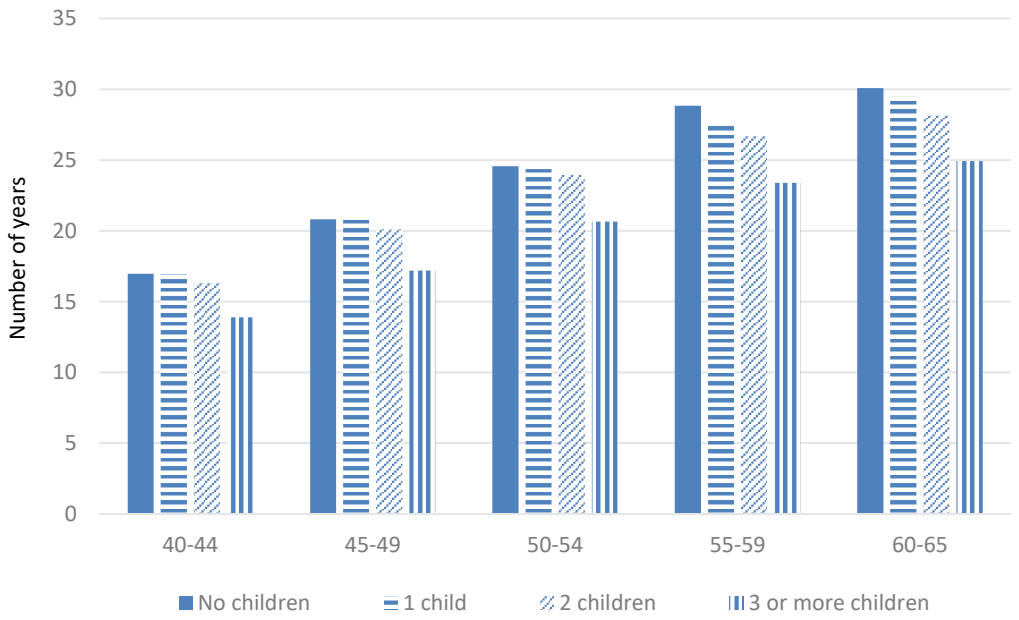
As we are interested in the influences that different family configurations may have on working lives, the analyses will now focus more specifically on adults aged 40 and over. This is because the main question concerns the long-term effects of parenting on work opportunities rather than the short-term effects (such as leave or breaks due to childbirth itself). Moreover, the fact that the employment rate among mothers is close to that of childless women from the age of 40 provides an additional justification for restricting analyses to the 40-65 age group and looking at certain qualitative aspects of jobs according to the sex and family configuration of the respondent.

The family responsibilities that arise with the birth of children usually lead to at least one parent, most often the mother, staying away from the labour market or interrupting employment for a varying length of time.

Non-working adults may have several reasons for not looking for work. The reason most commonly cited by women is family obligations: 33.1% of women aged 16 to 65 who are not in work and who are neither students nor retired mention this reason. Having children significantly increases the frequency of this response: 44.2% of mothers who are in this situation say they are not looking for a job for family reasons.

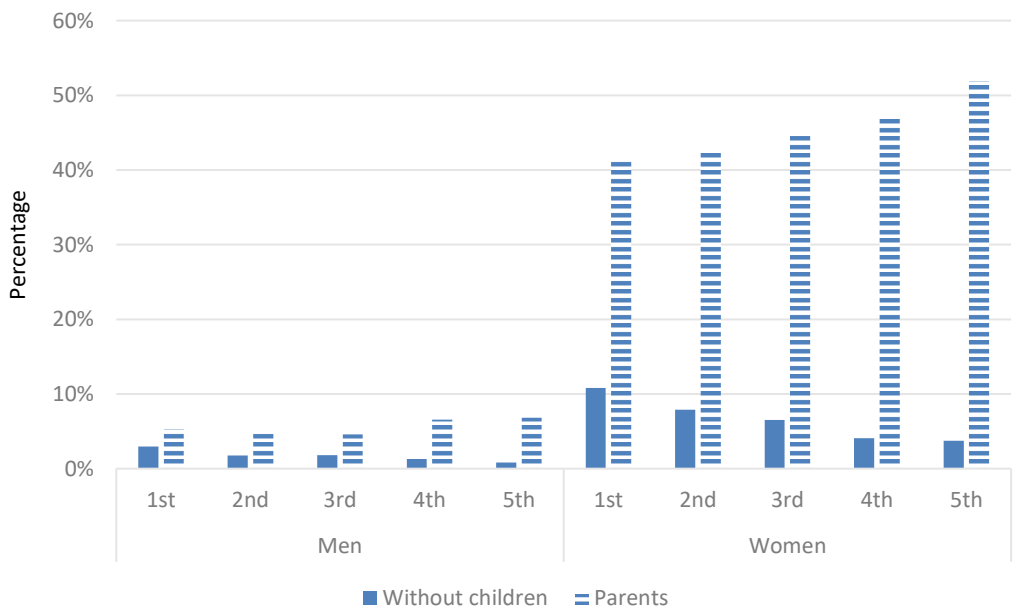
The level of literacy proficiency has a very clear positive influence on the proportion of non-working women with children who are not working for family reasons, and a much less marked negative influence for childless women (Figure 3.4). In response to the question, 'In the last 4 weeks, for which of the following reasons did you not look for work?', over half (51.9%) of non-working women in the fifth literacy quintile answer 'I was looking after the family or home' compared to just over 40% (41.4%) of non-working women in the first quartile – i.e.10.5% more. By comparison, 3.7% of the most proficient non-working childless women give this answer – 7.1 percentage points less than the figure for their counterparts with the lowest literacy scores (10.8%).

Figure 3.3. Average total number of years of paid work of women aged 40 to 65, by number of children and age group



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure 3.4. Percentage of non-working adults not looking for employment for family reasons, by sex, literacy proficiency level and parental status



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

For men, by contrast, family obligations are very rarely a reason for not looking for work. This reason is cited by just 3.7% of non-working men who are neither in education nor

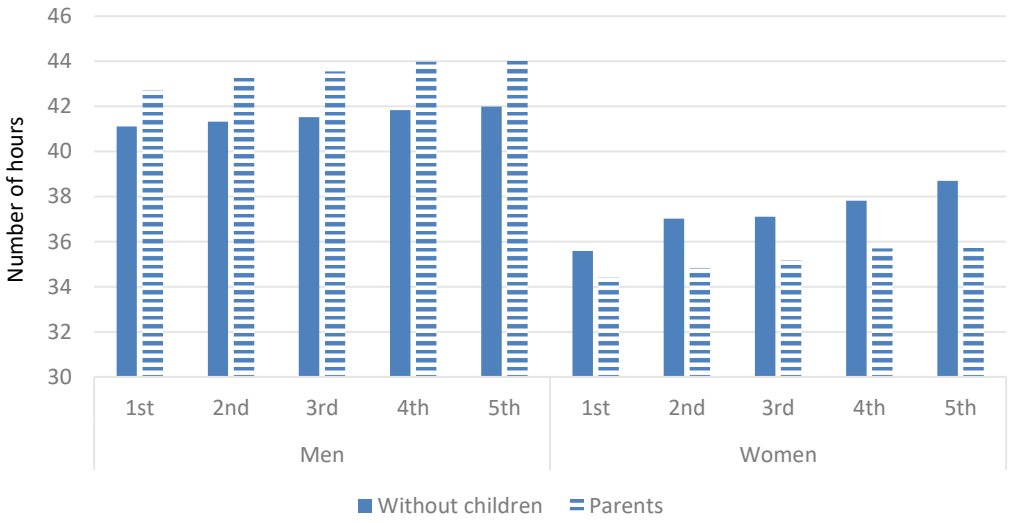
retired. Controlling for fatherhood and level of literacy proficiency has little effect on this order of magnitude. Only groups of men with children who fall into the fourth and fifth literacy quintiles show rates slightly above 6%: the proportions here are 6.6% and 6.8% respectively.

Balance between family life and working life

Number of hours

In the absence of, or in addition to, family policies that promote care arrangements outside the family circle and education policies that encourage the education of very young children,[20] the attempt to strike a balance between the demands of working life and family life can be supported by increased flexibility of working hours. The PIAAC survey makes it possible to estimate the number of hours per week worked by respondents and to analyse the effect of parenthood on this figure. Adults with children have significantly different total working hours from childless adults (Figure 3.5). On average, working mothers aged 40 or older work two hours less than childless women of the same age. Strikingly, the difference in activity is more marked between the two extremes of the literacy proficiency distribution: it is nearly three hours for women in the fifth quintile compared to about one hour for women in the first quintile.

Figure 3.5. Average number of hours of paid work per week for adults aged 40 to 65, by sex, literacy proficiency level and parental status



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

For the male labour force, the presence of a child has the opposite effect. The average working week of fathers aged 40 years or more is 2 hours longer than that of men without children. Moreover, in absolute terms, the increase in working hours associated with being a father is roughly the same regardless of proficiency level.

[20] Studies in France and Spain have shown that early childhood education has tended to increase women's participation in the labour market (Gathmann and Sass, 2018[26]).

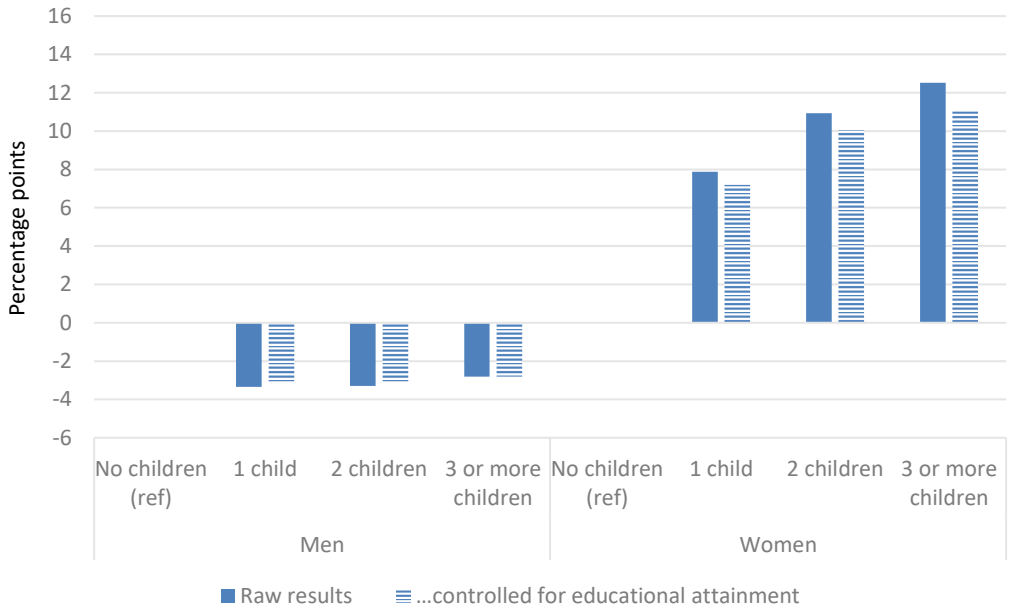
It could be hypothesised that a compensatory effect arises within couples (Bianchi et al., 2014[16]): in a very functional approach to the distribution of family roles, the decrease in professional activity of the parent responsible for childcare – often the woman – is compensated for by increased activity on the part of the other parent, so as to keep the family unit's overall income level unchanged. However, the absence of data on the number of hours per week worked by the respondent's partner makes it impossible to validate or invalidate this hypothesis.

Type of contract

These differences between men and women can be explained first of all in practical terms by the more frequent use of part-time employment contracts by women, who are in any case particularly likely to work part-time: 1 in 5 working women without children work part-time, compared to 1 in 3 working women who have two or more children. In the male population, by contrast, being a father decreases the likelihood of being employed part-time, from 1 in 10 for men aged 40 or over without children to 1 in 14 for men in this age group with one or more children.

When respondents' educational attainment is controlled for, it can be seen that the scale of the effects associated with the number of children remains broadly unchanged (Figure 3.6). At the same level of education, the percentage of working mothers employed part-time is higher than that of childless working women by 7 points if they have one child, 10 points if they have two children and 11 points if they have three or more children.

Figure 3.6. Difference in the percentage of part-time employees among working adults aged 40 to 65, by sex and number of children, controlled for educational attainment



Note: Reference group = active members of the workforce without children.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Whether this increase in part-time work among mothers reflects a form of discrimination against them in the labour market or a strategy for reconciling family and working life is a sensitive issue. It is not possible to distinguish from the available data the cases where such arrangements are externally imposed from those where they are desired. In other words, we cannot identify either the percentage of women who have had to work part-time because of being a mother but who would rather work full-time, or the percentage of women working full-time who would rather work part-time.

This question is made harder to address by the major disparities that exist between national systems: in many cases, these can make switching to part-time work attractive (from the individual point of view or from the point of view of the couple), either by granting high family allowances, by offering salary top-ups to compensate for switching to part-time work for a limited period or, above all, by improving the availability of child care. The problem that can arise is that these family allowances are always transitory in nature. There is therefore a question as to whether this short-term protection of the situation of mothers creates a longer-term penalty by limiting their career opportunities.

It seems clear that women who have worked part-time during their careers do not suffer from discrimination during recruitment procedures, unlike men in the same situation (Pedulla, 2016[17]). However, other factors need to be taken into account, such as participation in the labour market, salary and the differential effect of these non-standard trajectories on career opportunities depending on working women's educational attainment and proficiency level.

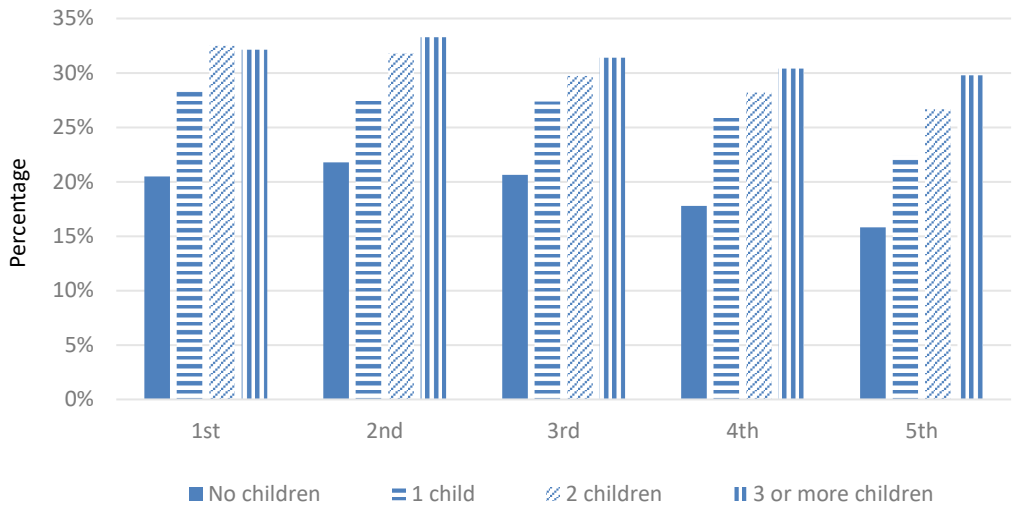
A 'maternity penalty'?

Parenting, proficiency and part-time work

In general, the most proficient women make slightly less use of part-time work than others. About 20% of childless women in the first two quintiles of national literacy scores work part-time, compared to just over 16% of women in the highest two quintiles. Controlling for motherhood confirms this trend. Among the most proficient mothers aged 40 or over, 22% of those with one child are on a part-time work contract, 27% of those with two children and 30% of those with three or more children, compared to 28%, 32% and 32% respectively for those in the first proficiency quintile (Figure 3.7).

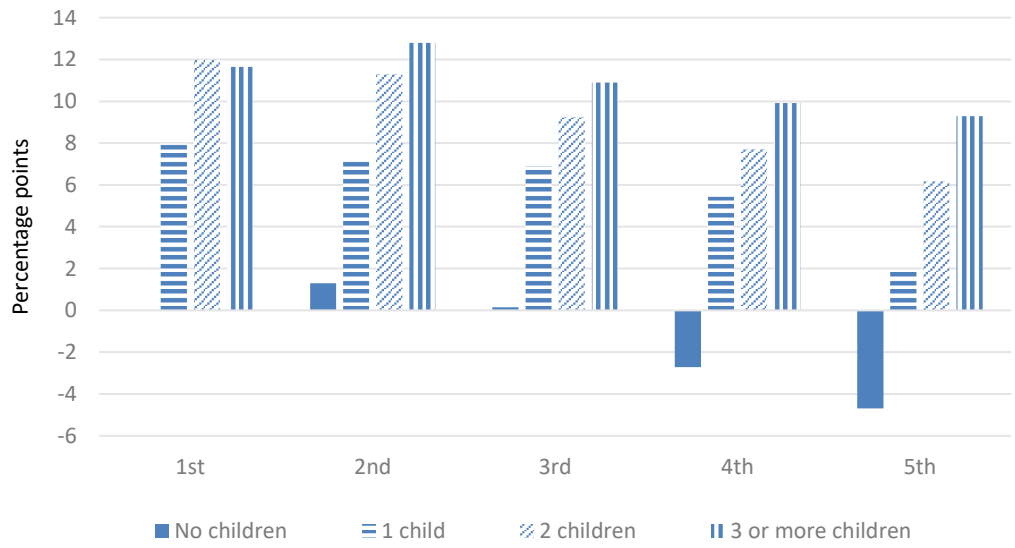
Interestingly, controlling for educational attainment does not change the influence of proficiency level on the correlations observed between the number of children and the part-time employment rate among women over the age of 40 (Figure 3.8). In general, the most proficient women are less likely to work part-time than others with equivalent qualifications and the same number of children. However, the increase in the rate of part-time employment depending on the number of children becomes more pronounced as the proficiency level rises.

Figure 3.7. Percentage of part-time female employees aged 40 to 65, by literacy proficiency level and number of children



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure 3.8. Percentage of part-time employees among working women aged 40 to 65, by literacy proficiency level and number of children, controlled for educational attainment



Note: Reference group = childless working women in first quintile in national distribution of literacy scores.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Several hypotheses may explain this decrease in the strength of the relationship between the number of children and women's part-time employment rate according to proficiency level. First, the difference in resources depending on the level of qualification required for different jobs may be significant. More proficient women are more likely to have access to higher-skilled, higher-paying jobs than their less proficient counterparts. As a result,

they have greater financial resources that allow them to make more use of childcare services.[21]

Second, the way work is organised affects opportunities for flexibility depending on the type of job. Thus many low-skilled jobs, which tend to be held by the least proficient workers, require the workers' continuous physical presence in the workplace, with fixed working hours that are difficult to negotiate. In such cases, part-time work will be the only option for carrying on working for mothers with few if any skills.[22] Conversely, the development of employment relationships which do not require physical attendance (distance employment, teleworking, etc.) offers more flexibility to highly skilled workers for reconciling their full-time working lives with the demands of their family life (OECD, 2016[18]).

Third, normative constraints differ greatly according to the type of job held. It can be assumed that the least skilled jobs tend to be more precarious: the use of part-time arrangements is more common with such jobs, so that switching to part-time work in order to care for young children is not seen as a failure to live up to employers' expectations. In contrast, in very highly skilled jobs, there is a need to still be seen to be working full-time (Pedulla, 2016[17]). A change in the number of hours worked may feed a negative perception of the worker's skills, productivity and, ultimately, personal commitment to his or her work. The normative constraints regarding staying in full-time work are therefore potentially stronger for women in the top two literacy quintiles than for other women.

Maternity, paternity and hourly wages

The question of hourly wages is undoubtedly the most extensively studied question but also the hardest to tackle, since it involves many factors not adequately covered by the PIAAC survey data, such as the characteristics of the local labour market or the individual career path. The following graphs will therefore mainly deal with this question from a descriptive point of view, asking whether having children affects the level of hourly wages received. As there is still a large gender pay gap, the choice has also been made to take the median national wages for each gender as the reference unit. Finally, we will concentrate on the medium-term effects of parenthood on access to work by focusing exclusively on adults aged 40 to 65 years.

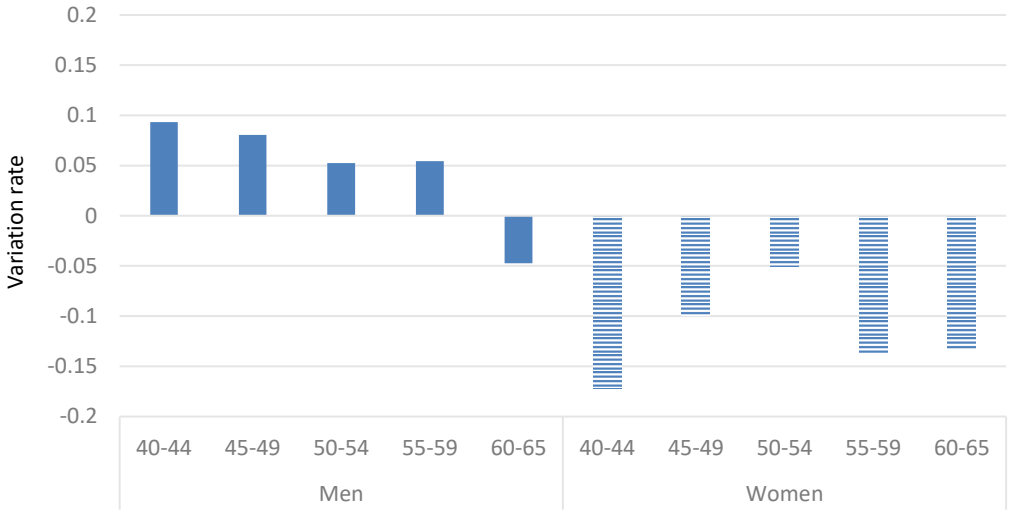
First, the median hourly wages of men with at least two children are in general higher than those of men without children or with one child, regardless of the age group considered. For example, between the ages of 45 and 49, the median wage difference between fathers with two or more children and men without children or with one child is 8.1% in favour of the former. The situation is reversed for working women aged 40 to 65,

[21] Along similar lines, although this cannot be confirmed from the PIAAC data, the amount of resources available to couples may also be significant. More proficient women, who are often more highly educated, are more likely to be in relationships with very highly educated men who tend to be in well-paid jobs (Gonalons-Pons and Schwartz, 2017[31]). A cumulative effect therefore arises by which these couples have much higher incomes than those in which the woman is less proficient.

[22] Such cases may lead to very precarious situations, in particular because the risk of being a single or separated parent (and hence of having a lower income) is higher for women in the lowest literacy quintiles.

for whom the presence of children has a consistently negative effect on median wages in each age group.

Figure 3.9. Difference in median hourly wages between adults with two or more children and adults with one child or no children, by age and sex: Adults aged 40 to 65

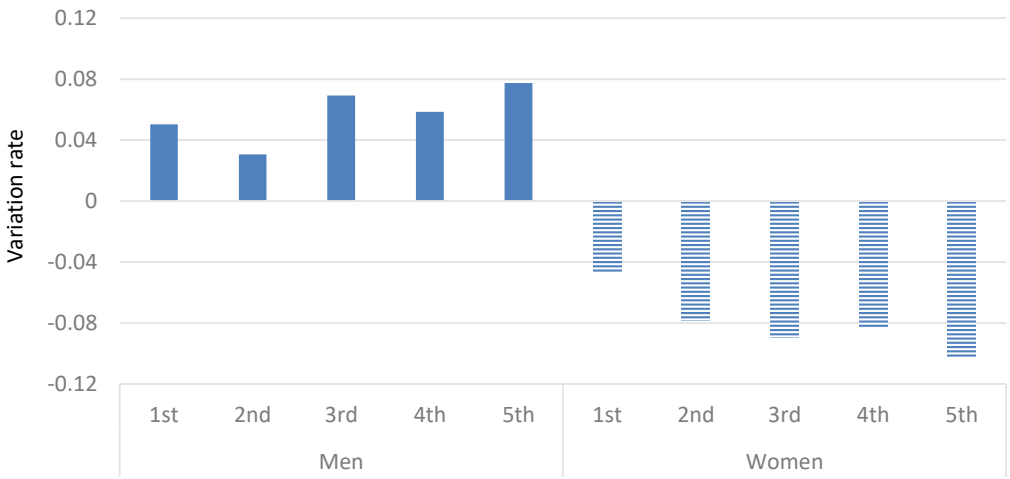


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Controlling for literacy proficiency reveals the same imbalance between the male population and the female population: the presence of children has a clearly positive link with the median wages of men over 40 and a negative one with the median wages of women of the same age, regardless of literacy quintile. However, the magnitude of the variations according to literacy proficiency is less marked for men than for women. In the former case, the income differences range between 3.1% and 7.7%, while they vary between -4.6% and -10.1% in the latter case (Figure 3.10).

In relative terms, motherhood causes a greater financial loss to the most proficient women than for those with the fewest skills. Thus, mothers aged 40 to 65 with at least two children and with literacy scores in the fourth and fifth quintiles of the national distribution of literacy scores have median earnings 8.2 % and 10.1% lower than their counterparts without children or with one child, respectively. For women in the first quintile, the 'penalty' observed is lower: they have a median salary 4.6% lower than that of women without children or with one child. This finding partly confirms the hypothesis of a more rigid work norm in the most skilled jobs. By tending to give rise to periods of inactivity and of maternity or childcare leave and transitions (even if only temporary) to part-time work, motherhood seems in particular to slow the wage progression of the most proficient mothers.

Figure 3.10. Variation in median hourly wages between adults with two or more children and adults with one child or no children, by literacy proficiency level and sex: Adults aged 40 to 65

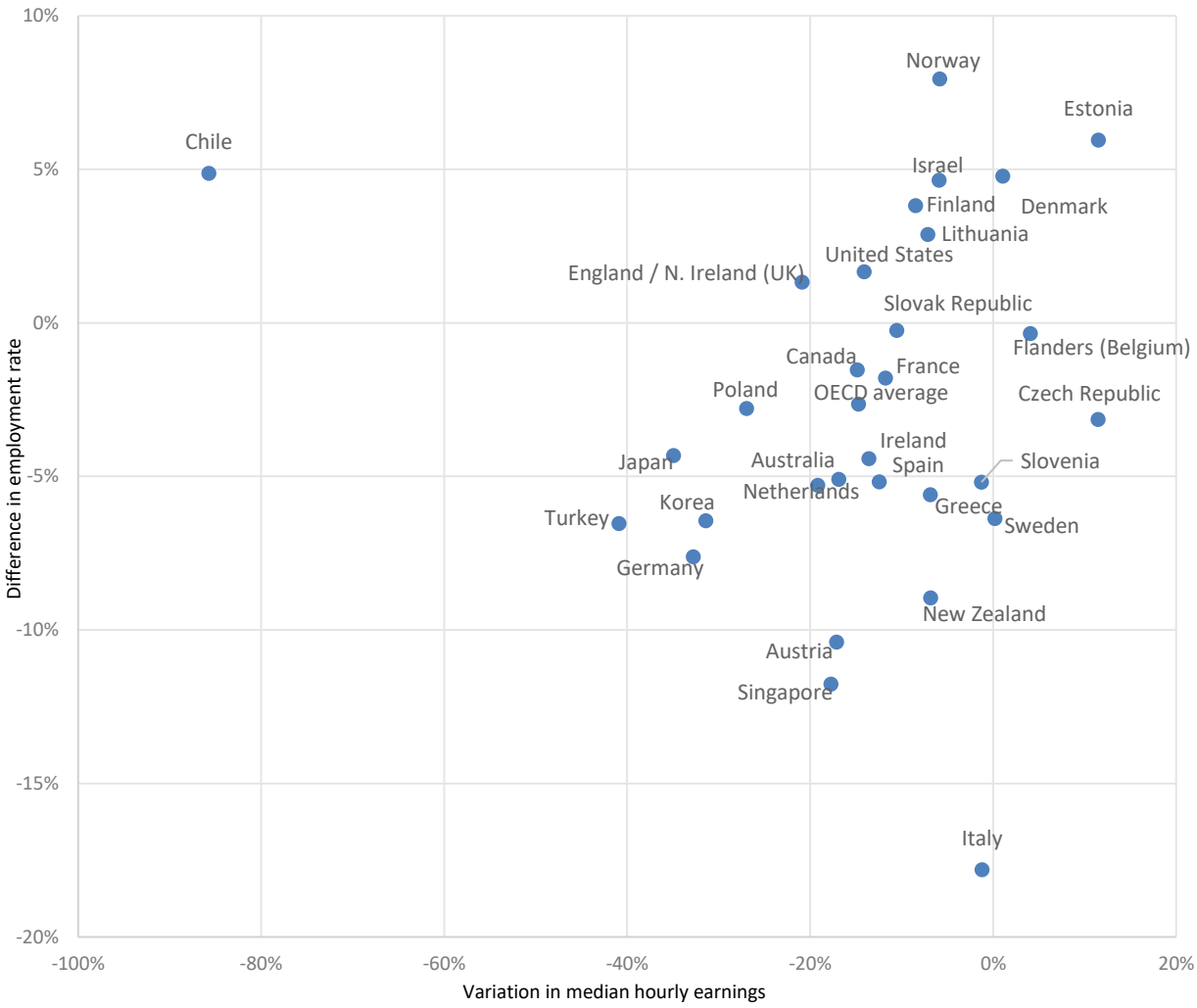


Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

It is interesting to note that the 'maternity penalty' in terms of earnings is very variable in the countries that participated in the PIAAC survey (Figure 3.11). It is at levels well above the average of the participating countries in Turkey (-41%) and Chile (-86%), but it is also very high in a number of countries with very high levels of literacy, such as Japan (-35%), Germany (-33%) and Korea (-31%). On the other hand, several countries, especially in eastern and northern Europe, show no net differences in median hourly earnings between childless women and those with children. In some cases, the differences may even favour the latter, as in the Czech Republic and Estonia, where women with children have median wages that are 12% higher than those of childless women, doubtless because of the family benefit schemes that exist in these countries.

There is no obvious relationship between the variation in earnings and the labour market participation of women aged 40 to 65 with children. The only point noted is that, on average, differences in employment rates according to motherhood status are usually between -8 and +8 percentage points. Only three countries, in which mothers are far less likely to work than women without children, deviate somewhat from this trend: Austria (-10.4), Singapore (-11.8) and above all Italy (-17.8), where the employment rate for women, regardless of their situation, is very low compared to the OECD average (OECD, 2011[11]).

Figure 3.11. Difference in employment rate and variation in median hourly earnings between working women with and without children aged 40 to 65, by country



Note: The OECD average is the average of the OECD countries that participated in the survey.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

One of the striking learning points from this comparative analysis is that national situations can be very different even when government policies are, on the face of it, very similar. The example of the comparison between Germany and Finland is quite telling on this point. In these two countries, mothers receive a comparable number of full-time equivalent weeks of paid leave (40.6 weeks compared to 42.6 weeks), and public childcare and preschool facilities for children aged 0 to 2 years have very similar capacities (32.3% of children of this age were enrolled in Germany in 2014, compared to 27.9% in Finland).[23] However, the consequences of motherhood on the labour market seem more negative for women in the first case than in the second, in terms of both labour market participation (-7.6 percentage points against +3.8 percentage points) and

[23] OECD Family Database, indicators PF 2.1 and PF 3.2.

median hourly income (-32.8% against -8.5%). This result could highlight the influence of the social and cultural factors that still shape gender identities to a large degree and play a key role in the formulation and effectiveness of government policies designed to promote not just gender equality, but more specifically the protection of mothers in the labour market (Budig, Misra and Boeckmann, 2012[19]).

Family configurations and work opportunities

Going beyond its effects on labour market participation, the influence of family configuration on adults' well-being in terms of their work situation can be considered with reference to the constraints that family can exert on parents' work opportunities. Although the PIAAC questionnaire does not allow us to examine career trajectories as such, it does provide us with information on adults' participation in training, work-related or otherwise, which remains one of the levers for advancement and mobility in the labour market.

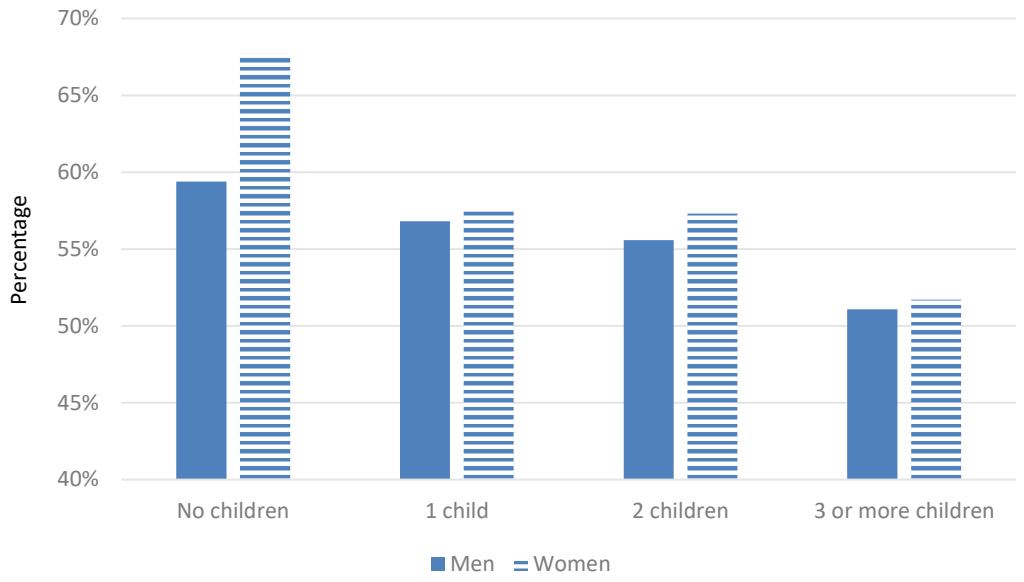
Adults' participation in training

The participation rate of adults aged 16 to 65 who have completed their initial education decreases with the presence of children in the household (Figure 3.12). The relationship between the number of children and the likelihood of having participated in training over the last twelve months is stronger for women than for men. Woman who have no children are more likely than their male counterparts to participate in training (68% against 59%), and they become slightly less likely to do so than men if they have at least one child. In total, having three or more children reduces the probability of women participating in training compared to childless women by 16 percentage points, compared with a decrease of 8 percentage points for men in the same situation.

The link between participation in training and number of children can be partly explained by time management issues: the more children parents have, the less time they have available outside their working hours for personal activities.[24] It could also be explained by an age effect: among adults aged 16 to 65, the more children adults have, the older their average age compared to the rest of the population. However, it is possible that the desire for training decreases continuously with age. In any case, the fact remains that the differing effect of the presence of children between men and women suggests that family composition is more of a decisive factor in participation in training for mothers than for fathers.

[24] The difficulty comes not just from the amount of time that parents have to find in order to participate in such training, but also practical organisational details which can disrupt the family routine, making them harder to manage for parents of large families than for other adults: training locations which are too far away, inflexible training time slots, etc.

Figure 3.12. Percentage of employed working adults who participated in formal or informal training in the 12 months preceding the survey, by sex and number of children



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

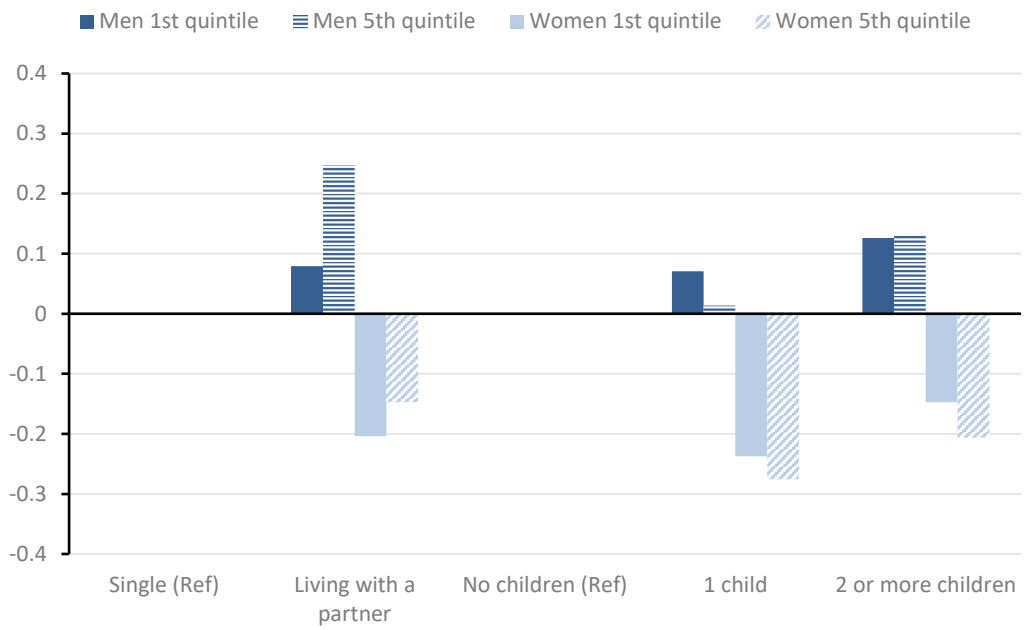
To gain a more precise idea of the effect of family configurations on the probability of participating in training and the influence of literacy proficiency on this effect, one possible method is to use inferential analysis to examine the predictors of participation in a training activity independently of each other.

A series of logistic regressions was therefore performed on the binary variable – 1 if the respondent participated in training in the 12 months preceding the survey and 0 if not. The explanatory variables describing family configuration used in the different statistical models are as follows:

- Number of children: 0 (reference value) if the respondent has no children, 1 if he/she has 1 and 2 if he/she has 2 or more.
- Marital status: 0 (reference value) if the respondent does not live with a partner, and 1 if he/she lives with a partner or spouse.

In addition, several control variables were introduced: the age and squared age of the respondent (continuous variables), the level of education (0 for primary or lower, 1 for secondary and 2 for higher) and labour market status (0 for employed, 1 for unemployed and 2 for inactive). A regression was performed for each of the five quintiles of the national distribution of literacy scores for women and men. Only the estimates (i.e. maximum likelihood estimators) for links relating to the family configuration of men and women in the two extreme quintiles of the distribution are presented in the following graph. The details of the other estimators are presented in the Annex (Table A.1).

Figure 3.13. Logistic regression of probability of participating in training (maximum likelihood estimators)



Note: Adults aged 16 to 65 years. Ref indicates that the variable has been used as a reference modality. All the maximum likelihood coefficients are significantly different from 0 at the 95% threshold with a probability p>0.001.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

This analysis shows that, regardless of educational attainment, age and activity status, the influence of family configuration varies greatly by gender, but also by level of literacy proficiency. For example, among women whose literacy scores place them in the fifth quintile nationally, those with one or more children are 24% less likely to participate in professional training than those who have no children,[25] all else being equal, whereas mothers of one child in the first quintile are 21% less likely to participate in training. Similarly, having two or more children has a greater negative effect on the likelihood of receiving training for the most proficient women than for their less proficient counterparts, compared to women without children.

The results for the male population show a very different picture of the influence of family composition and proficiency level. Overall, the indicators of aspects of family configuration show positive effects on the probability of men participating in training activities, but in ways that vary according to their level of literacy proficiency. Thus for men in the first quintile of the national literacy score distribution, it is the presence of children in the household that, all else being equal, has a positive influence on their

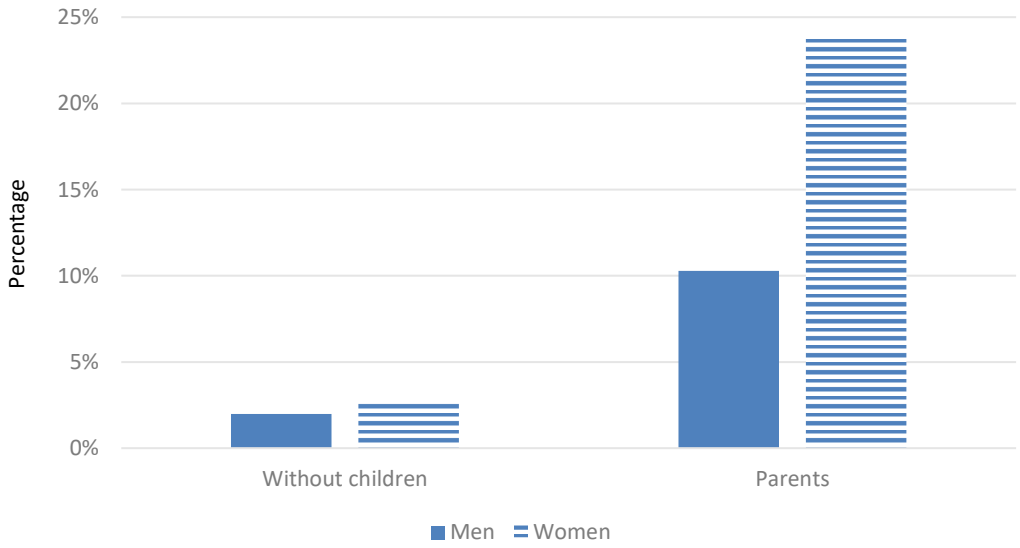
[25] The mathematical properties of the maximum likelihood estimation of a binary variable in a logistic regression can be used to deduce the relative risk (or odds ratio) associated with the value of a variable (relative to the variable's reference value, often 0) by calculating the estimated coefficient exponential for the value.

propensity to engage in training, whereas for men in the fifth quintile, the most decisive predictor relating to family is living with a partner.

Barriers to training

The PIAAC background questionnaire provides information on the reasons why employed adults have not participated in training activities in the 12 months prior to the survey. The question was phrased as follows: 'Which of the following reasons prevented you from participating in education and training?'. Respondents were asked to select from a list of eight predefined reasons the one which they felt to be the most important. One of the possible responses referred directly to family duties, giving the following as a possible reason: 'I did not have time because of child care or family responsibilities'. It should be noted that this wording does not distinguish childcare from care for other family members (in particular elderly parents, or close or extended family members suffering from illness or disability, such as spouses, grandchildren or siblings).

Figure 3.14. Percentage of employed active adults who were unable to participate in training for family reasons, by sex and parental status



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

When adults do not have children, family responsibilities are very rarely cited as the main reason for being unable to participate in training, with less than 3% of childless adults referring to it. On the other hand, being a parent leads to a very clear increase in the occurrence of this response, but with a particularly pronounced sex effect. Of the adults who would have liked to attend training but were unable to, one in four mothers cite family responsibilities as the reason, compared to just one in ten fathers. This result illustrates one of the possible mechanisms by which family configurations can constrain women's employment opportunities by limiting their chances – more than is the case for men – of improving their career prospects or changing jobs by participating in suitable training.

Discussion

The different dimensions of family configuration studied in this chapter are strongly correlated with adults' participation in the labour market. However, the direction – more than the strength – of the correlation depends to a large extent on the respondent's sex. Thus among women under 40, mothers are less likely than women without children to be in paid employment. After the age of 40, the employment rate is comparable between the two categories, but women with children are more frequently employed on a part-time basis than those without, and especially when they have a large number of children. In addition, working mothers with at least two children have median hourly wages that are nearly 8% lower than those of their childless counterparts. This may be due to the fact that part-time jobs tend to be less skilled than full-time jobs (and thus less well paid), but also due to career interruptions attributable to motherhood. These have the effect of depreciating the human capital of mothers, who make less intensive use of their skills during their periods of leave (Kawaguchi and Toriyabe, 2018[20]), and may send a negative signal to employers regarding their commitment and productivity. Finally, living with a partner and having children tend to reduce the propensity to participate in training and hence to limit opportunities for advancement in the labour market. For men, the effects of family configurations on their labour market participation and career prospects are almost exactly the opposite.

The question under consideration was whether controlling for proficiency level reduced the effects of family configurations on adults' careers. It might have been expected that gender inequalities would be eliminated to some extent as respondents' literacy scores increased. In fact, the role of proficiency level is ambivalent. While it is true, for example, that among adults with children, those in the fifth literacy quintile work more hours per week on average, are less likely to be employed part-time and have higher incomes than those in the first quintile, the differences between parents and childless adults are generally greater for the most proficient adults than for the least proficient, with a very strong gender effect. In other words, relatively speaking, mothers in the fifth literacy quintile face higher 'maternity penalties' (Budig, Misra and Boeckmann, 2012[19]) than those in the first quintile. For men, by contrast, the positive work-related effects of living with a partner and having children increase as they progress up the proficiency ladder, in both relative and absolute terms.

The results which appear to suggest that women in the first proficiency quintile are less affected in the labour market by having a family than those in the other quintiles in reality reflect their greater economic vulnerability. They are the most likely to occupy low-skilled jobs with two particular characteristics: they belong to the most exposed sectors of the economy and they do not involve the acquisition and/or demonstration of a high level of skill. As a result, these women, who have fewer assets in the labour market and lower earnings, are more likely to opt for extended parental leave (Ulker and Guven, 2011[21]). Moreover, according to the results of Chapter 1, this vulnerability is compounded by the fact that women in the first quintile: (1) are more likely to be single parents than women in the other quintiles, and therefore to have to support the household entirely from their own earnings, and (2) have their first child at a younger average age than women in other quintiles, meaning that they are likely to encounter some of the work-related difficulties experienced by mothers as soon as they enter the labour market. The multidimensional nature of the economic vulnerability of the least skilled and/or least educated women gives them a greater incentive to avoid changing jobs, irrespective of their family

configuration, and to rely instead on help from family members to cope with changes in their family unit (the birth of a child, separation, etc.) (Young and Willmott, 1957[22]).

By contrast, the impact of family life on women's careers at the upper end of the literacy proficiency score distribution is far more pronounced. The presence of children and maternity (or parental) leave affect both the working hours and the pay per hour of mothers in the fourth and fifth quintiles. The types of job that these women have seem to be based around an ideal that is difficult to reconcile with a busy family life, and other studies have pointed out that highly skilled women have a sense of the incompatibility of work and family life that is especially acute, and certainly keener than that of men in the same position (Busch-Heizmann and Holst, 2017[23]). The penalties faced by the most proficient women, which in many ways are more severe than for women in the other proficiency groups, represent a major opportunity cost for modern economies.

Is it correct to speak of inequalities? The fact that family configuration has differing effects for men and women on many aspects of adult life is consistent with long-standing and widely shared observations[26] on the place of the family in defining gender and, by extension, in reproducing inequalities between the sexes. The results of this survey clearly show that family configurations have both quantitative (participation rate) and qualitative (time worked, earnings) effects on adults' working lives; these effects tend to be negative for women and positive for men, and are more pronounced for adults in the higher quintiles in the distribution of literacy scores. However, we would need to have an idea of the persistence of these effects in the long term to be able really to speak of inequalities; and above all, we would need to know the conditions under which the differences in the integration of mothers compared to other categories of workers reflect an externally imposed gap rather than a consciously chosen strategy to reconcile economic necessities with family responsibilities. The fact that the PIAAC survey is only in its first edition means that it is not possible to give a definitive answer to this question. In any case, the results on the influence of the family on the likelihood of engaging in training suggest that being a mother and living with a partner do at least have consequences for the opportunities and legitimate career aspirations of working women.

Moreover, the differences in the observed effects by sex depend as much on purely family reasons (i.e. the pressure for the custody and care of children to be predominantly the mother's responsibility, or the unequal division of labour within households) as on non-family reasons (i.e. couples adapting their behaviour in response to pre-existing objective inequalities in the labour market). Fathers' apparent exemption from these difficulties experienced by women may reflect the fact that, for example, in view of the more negative consequences for them of parental leave, they are less likely to exercise their right to such leave, or tend to take it for much shorter periods. Studies have shown that deviating from the standard of the ideal worker attracts much heavier penalties for men than for women (Coltrane et al., 2013[24]), and reduces their employment prospects even more drastically.

The question, therefore, is not so much why family life generates gender inequalities in the labour market, especially for the most highly skilled women, as why government policies created to protect the jobs of pregnant women and mothers unintentionally

[26] From Durkheim's classical theory of conjugal, or rather domestic, regulation (1897[28]) to the functionalist work of Parsons (1964[33]), taken further in studies on the burden faced by women in managing kinship relations, such as Rosenthal's seminal work on *kinkeeping* (1985[34]).

become a source of stigmatisation in certain cases (Albrecht, Thoursie and Vroman, 2015[25]).

Comparisons of results by country suggest that cultural aspects play a significant role in structuring the links between family configuration, literacy proficiency and equal opportunities in the labour market. Numerous experiments have been set up with regard to the rules on allocation and duration of parental leave in particular, in order to improve our understanding of the effects on career continuity of extending paid leave or of an obligation for both parents to take parental leave in alternation. In the next edition of PIAAC it will be possible to compare changes in these links over time. This will offer an opportunity to participate in these debates, and to measure changes in how motherhood is viewed in the most highly skilled employment sectors, which are the least successful in reconciling work and family life.

Chapter 4. Conclusions

Chapter 1 demonstrated that literacy proficiency level has a limited yet significant link with certain aspects of family formation, when the effects of educational attainment and age are taken into account. This has to be done because of the twofold correlation that exists between age and educational attainment on the one hand and educational attainment and literacy proficiency on the other. Despite this, the level of literacy is still very clearly associated with some of the key moments in the family life cycle – including, for example, the average age when a couple's first child is born.

Chapter 2 focused more on the role of the family in the varying effectiveness of literacy proficiency level in the labour market; this role differs very explicitly according to sex. The most highly skilled men appear to have clear absolute and relative advantages in the labour market over their less skilled counterparts and women in general. Mothers, meanwhile, suffer negative effects that seem to persist over time; these are more pronounced for mothers in the fifth quintile of the national distribution of literacy scores than for others.

However, the results presented in this report all suffer from the same flaw: lack of information on the respondent's spouse or partner. This limits what we can say not just about the extent of the links observed but also the significance of these links, since, on family issues, it is conceivable that many crucial decisions that affect both childcare and career breaks are taken jointly by the parents. To understand the reasons for the decisions made by couples to reconcile work and family life, a knowledge of the socio-professional characteristics of all members of the household would therefore be required.

However, two sets of recommendations can be considered on the basis of the results presented in this report:

- The results strongly suggest that, starting in early adulthood, training should be organised in a manner compatible with work and family responsibilities. Moreover, given the cumulative nature of the difficulties faced by women with low literacy proficiency, funding mechanisms for training for these mothers (and especially single mothers) should be considered. Finally, incentive schemes to support mothers who wish to receive training could be created, for example in the form of a 'training account' specifically for mothers or parents who have taken parental leave, or by providing easy access to childcare (reserved places in crèches, criteria for allocating a childcare allowance, etc.) to inactive parents who participate in training.
- Apart from childcare facilities and preschool provision, the conditions for the allocation and organisation of parental leave are the main drivers of gender inequality in the labour market. Building on experiments carried out in Austria and Germany (Gathmann and Sass, 2018[26]), it would be desirable to take a close

look at the flexibility of the length of parental leave (OECD, 2017[15]) and at the compulsory taking of such leave by fathers.[27]

The next edition of PIAAC will be of particular interest for the issues discussed in this report. In particular, longitudinal pseudo-panel analysis between the first and second editions will be used to differentiate the effects of age from generational effects on work-life balance strategies and to measure progress on labour market access for mothers with the highest levels of literacy proficiency.

In the interval before the collection of data for the next edition, since single-parent families are the only ones about which we have complete information, a study focusing on this form of family configuration would be useful.

[27] Studies have shown the importance of the joint (simultaneous or alternating) participation of both parents in parental leave for the cognitive development of children (Danzer and Lavy, 2018[30]).

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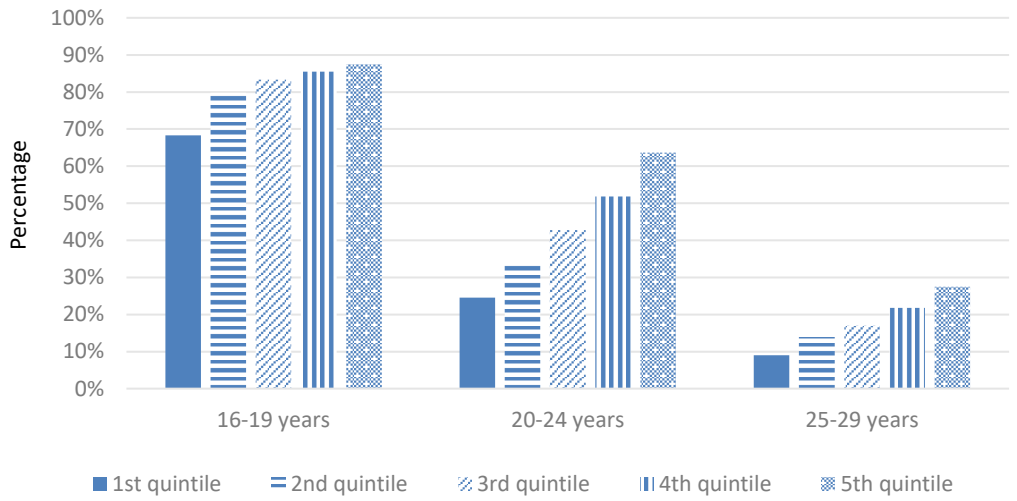
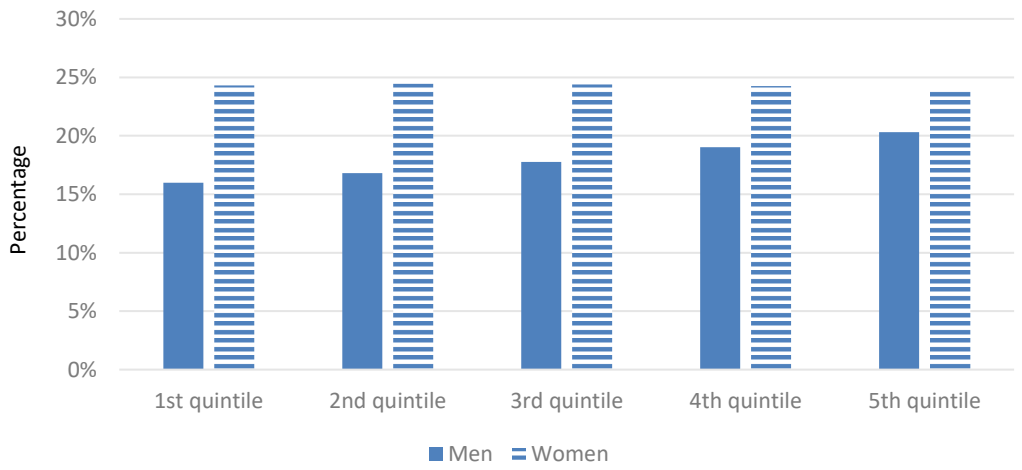
Annex A. Tables and figures

Figure A.1. Proportion of students per literacy quintile: Adults aged 16 to 29



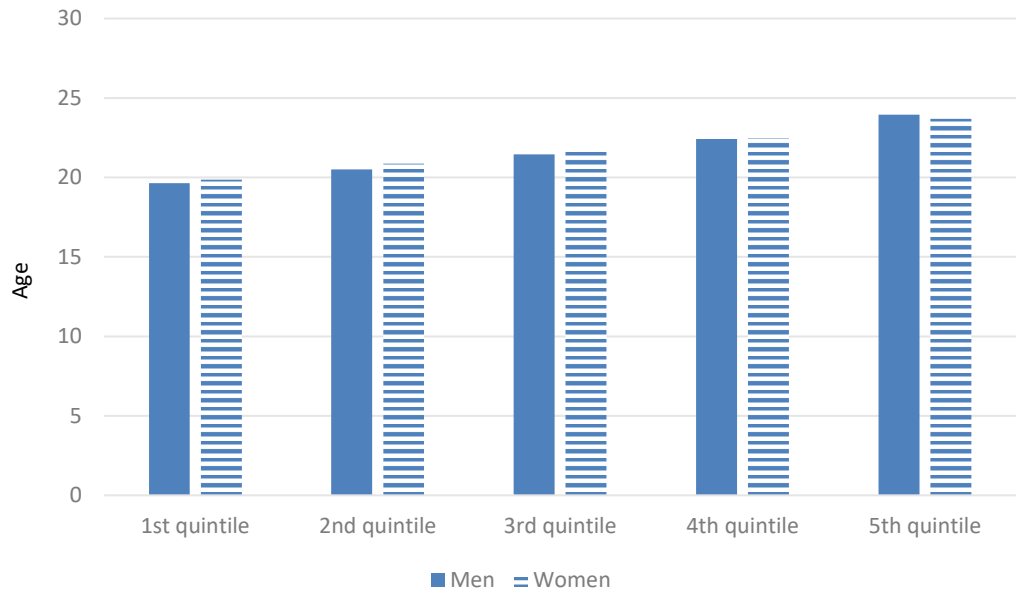
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure A.2. Percentage of parents whose first child was born before the end of their initial education, by sex and literacy quintile: Adults aged 30 to 65



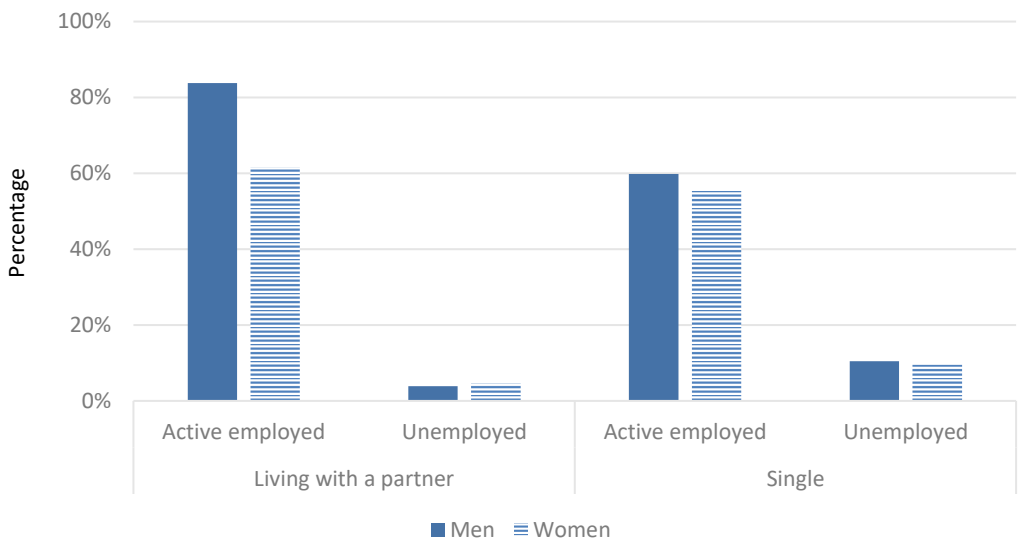
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure A.3. Average age at end of initial studies, by sex and literacy quintile: Adults aged 30 to 65



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Figure A.4. Percentage of active employed and unemployed adults aged 16 to 65, by family status and sex



Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

Table A.1. Maximum likelihood estimators for logistic regression of participation in formal or non-formal work-related training, in the last 12 months

	Women					Men				
Variables	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Constant	-0.51	-0.17	0.07	0.40	0.74	0.41	0.57	0.46	0.49	0.43
Age	0.01	0.00	-0.01	-0.02	-0.02	-0.04	-0.04	-0.03	-0.02	-0.02
Squared age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Living with a partner	-0.20	-0.18	-0.16	-0.18	-0.15	0.08	0.18	0.11	0.21	0.25
Primary level	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Secondary level	0.72	0.77	0.70	0.59	0.48	0.60	0.58	0.58	0.57	0.54
Higher level	1.30	1.43	1.39	1.24	1.18	1.24	1.25	1.18	1.16	1.05
Without children	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
1 child	-0.24	-0.23	-0.24	-0.26	-0.28	0.07	-0.06	-0.02	0.02	0.01
2 or more children	-0.15	-0.14	-0.11	-0.14	-0.21	0.13	0.05	0.09	0.12	0.13
Active employed	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Unemployed	-0.84	-0.80	-0.91	-0.53	-1.05	-0.43	-0.86	-0.79	-0.46	-0.28
Inactive	-1.93	-1.72	-1.55	-1.38	-1.20	-1.57	-1.30	-1.13	-0.89	-0.63

Note: Adults aged 16 to 65 years. Ref. indicates that the variable has been used as a reference modality. All the maximum likelihood coefficients are significantly different from 0 at the 95% threshold with a probability p>0.001.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), www.oecd.org/skills/piaac/publicdataandanalysis.