How Does the Probability of Benefiting From a Disability Pension Vary With Early Career Earned Income?

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Abstract – In this article, we analyse the links between earned income in the early years of an individual's career, and the risk that they will become beneficiaries of a disability pension at different points in later life, using the inter-pension schemes sample (EIC, 2009-2017). For men, we identify a clear gradient: the risk of benefiting from a disability pension is 1.5 times greater than the median for the lowest income deciles, and 2.5 times lower for the top decile. This gradient, which is less pronounced for women, remains present even when controlling for socio-professional status and health parameters in the early career, although it is attenuated. Inequality with regard to disability is particularly high at the ages when disability remains relatively rare (between the ages of 40 and 50), and has become more pronounced among more recent generations of men. The probability that an individual will receive a disability pension at an early age thus appears to be a relevant indicator of health inequality.

JEL: J14, I14, H55
Keywords: disability, health inequality, pension, social protection, income

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The connection between health inequality and income inequality has become a subject of lively debate in the economic and epidemiological literature. Although the correlation between low income and poor health has been amply documented, the nature and direction of the causality at work is still debated (Deaton, 2002; Pickett & Wilkinson, 2015; Barnay & Jusot, 2018). Indeed, poor health may impede an individual's professional integration and earning power, something which is particularly clear in cases involving disability (Banks *et al.*, 2024; Minkler *et al.*, 2006; Enroth & Fors, 2021, Chatzitheochari *et al.*, 2022). Conversely, low income may represent an obstacle to healthcare access and, more broadly, to behaviours conducive to good health.

Recent research has highlighted the complexity of the causal mechanisms at play. Some of these inequalities have their roots in childhood (Case *et al.*, 2002; Apouey & Geoffard, 2015, 2016), or can be traced back as far as birth (Panico *et al.*, 2015; Panico & Tô, 2023): childhood or youth disability may prevent individuals from continuing their studies or finding work. Furthermore, individuals in the lowest income bracket are more likely to develop chronic diseases at an earlier age, and people with chronic diseases are more likely to see their income decline (Danesh *et al.*, 2024). Research has also shown that accidents have more severe consequences on the subsequent careers of women than of men (Duguet & Le Clainche, 2014). These various forms of health inequality are reflected in the life expectancy income gradients, abundantly documented in the wake of Chetty *et al*.'s (2016) work focusing on the United States. This gradient has been identified in France (Blanpain, 2018; Mélard *et al.*, 2024), but it appears to be less severe.

Disability pensions offers a particularly interesting angle from which to analyse health inequality. Entitlement to the disability pension scheme, which is dependent upon being declared unfit for work for reasons not involving a work-related cause, is an objective indicator of an individual's state of health. This measurement is all the more relevant when we consider that the life expectancy of people living with disabilities is significantly reduced (Aubert, 2024), highlighting the negative health consequences of disability. Our article is based on data from the inter-pension schemes sample (EIC), compiled for the years 2009-2017 in order to examine the connections between individual earned income between the ages of 30 and 35 and the likelihood of becoming eligible for disability allowances at a later age. We devote special attention to exploring four subjects.

Firstly, we analyse the predictive power of earned income between the ages of 30 and 35 on the probability of subsequently receiving a disability pension, detailing how this probability varies with income. Secondly, we consider the extent to which this connection between income and the probability of disability, which we hereafter refer to as a "gradient," is a reflexion of other individual characteristics correlated with income, such as level of education, socio-professional category and sector of activity. Thirdly, we examine the variation of this gradient over the working life course, in order to identify the points at chich disability inequality becomes more pronounced. Fourthly, and finally, we analyse the evolution of this gradient over the course of recent generations, casting new light on the temporal dynamics of health inequality as reflected in the inability to work.

Our results demonstrate the existence of a clear gradient, which is particularly stark for men: for men in the lowest income deciles, the chances of experiencing disability pensions are up to 1.5 times higher than the median probability. This gradient is still present, albeit in an attenuated form, once we take socio-professional parameters into account. The striking fact is the relatively young age (40 to 45) at which inequalities appear and that they tend to decrease with age. For men, health inequality has increased from one generation to the next, particularly at the bottom end of the income scale.

This article is structured as follows. In Sections 1 and 2 we provide details of the institutional context and the data we used. Section 3 describes our empirical methods, and Section 4 our results, followed by a conclusion.

1. Institutional Context

We first describe the population of disability pension beneficiaries. Numerous studies have demonstrated the importance of this scheme towards the end of workers' careers (Barnay, 2008), and the increasing prevalence of disability as the retirement age was delayed (Aubert *et al.*, 2016; Rabaté & Rochut, 2020). Several publications from France's National Old Age Insurance Fund (the *Caisse nationale d'assurance vieillesse* - CNAV; see Di Porto, 2011; Couhin & Floderer, 2023) have described the profile of those taking early retirement because they are no longer able to work. The early retirement scheme

allows private sector employees who have been declared unfit for work to access their full pension when they reach retirement age, regardless of whether they have worked for the required number of years. Retirement for inability to work must therefore not be confused with disability pensions, even if a majority (55%) of those retiring early for inability to work do also receive disability pensions until they reach the statutory retirement age, at which point the early retirement scheme means that they are entitled to their full pension. This scheme is only open to private sector employees, and the scope of our study is broader. Civil servants no longer able to work on account of disability are entitled to their full pension before they reach retirement age.

Aside from these studies focusing on the general pension scheme, little research has been devoted in France ito the connections between disability pensions and workers' careers. This lack of research may be partly attributed to difficulties in accessing the individual data required to conduct such analyses, such as EIC data or data from the inter-pension retiree sample (EIR). However, this gap in the literature seems especially troublesome when we consider the quantitative importance of disability pensions within our social protection system: these pensions were paid to almost 827,000 people in 2021, at an annual cost of over 8.2 billion Euros (Marc *et al.*, 2022). In a given generation, more than 7% of workers will experience disability pensions (Marino & Cheloudko, 2024), and this proportion seems likely to increase in the wake of recent reforms of the pension system (Aubert *et al.*, 2016).

1.1. Disability, a Risk Covered by Several Social Security Schemes, Both Health and Pensions

Disability pensions are social security benefits paid to beneficiaries whose capacity for work is substantially and permanently impeded, as a result of a non-work-related accident or illness. A diverse array of conditions can lead to disability. They include mental health issues, bone and joint diseases, tumours, strokes, accidents, etc. Recipients of disability pensions often suffer from multiple health conditions (Cour des Comptes, 2019).

Once somebody has been declared disabled, they are entitled to receive a pension which partly offsets the drop in their labour income. In France, disability insurance was first introduced for public sector employees in the form of early retirement pensions, before becoming part of the national health insurance scheme for private sector employees. These pensions are now paid out by France's National Health Insurance Fund (CNAM) for employees affiliated with the general scheme, or by pension schemes for other workers.

According to the annual survey of pension funds (EACR), 843,000 individuals were directly entitled to receive disability pensions as of the end of 2022. 12.5% of them were new beneficiaries in 2022. The vast majority of people with disabilities (85.5%) are covered by the general pension scheme. 9.5% of them receive pensions from a public sector scheme (FPE), either civilian or military, or else from the National Pension Fund for Local Authority Employees (CNRACL). The gender breakdown of people receiving disability benefits is broadly similar to the overall gender balance of each scheme: the proportion of women among beneficiaries of the public sector schemes (excluding military schemes) is higher than the proportion of women among beneficiaries of the private sector schemes (63% women at the FPEC and 69% at the CNRACL, compared with 56% at the CNAM and 58% at the National Fund for the Electricity and Gas Industries (CNIEG)) (Marino & Cheloudko, 2024).

The fact that the risk of disability is covered by a multitude of pension schemes, as well as the CNAM, leads to a great diversity of outcomes for beneficiaries. As noted above, one notable difference is that, in the public sector, civil servants receive their pensions early if they are signed off work for disability, whereas in the private sector, disability benefits are governed by a separate mechanism, and individuals do not receive their disability pension until they reach retirement age.

Under the general scheme and affiliated schemes, decisions regarding disability pensions depend on the eligibility criteria relative to age, along with various medical and administrative conditions. Individuals must be younger than the statutory retirement age, must have lost two-thirds of their ability to work, and must have paid contributions to their pension scheme for a certain amount of time. For example, under the general scheme, a disabled worker must have been registered with the same scheme for at least twelve months and paid contributions from a salary equal to at least 2,030 times the hourly minimum wage over the past twelve months, or else have worked at least 600 hours over the past twelve months.

Within the civil service schemes (excluding the military schemes), decisions regarding disability pension eligibility depend on medical conditions, age and status. In order to quality for early retirement on grounds of disability, an individual must: be a fully contracted civil servant; be below the statutory retirement age for their position; be permanently incapacitated from continuing in this position; not be capable of reassignment to a different position compatible with their health condition. In cases of temporary incapacitation which do not prevent individuals from returning to work eventually, they may quality for the temporary disability pension, for a renewable five-year period. The social security system's medical officers assess individuals' level of disability and inability to work, then calculate the disability rate which determines the value of their disability pensions.

1.2. Characteristics of the Beneficiaries of Disability Pensions in 2022

Once they have been declared eligible for a disability pension by a medical officer, private sector workers enter one of three categories depending on their disability level. The amount of disability pension they receive depends on their category. However, the classification is not definitive and may change if the individual's health situation changes.

– Category 1: people with disabilities capable of working. The pension is equal to 30% of the average annual salary from the best ten years of their career.

– Category 2: people with disabilities who are entirely unable to work. The pension is equal to 50% of the average annual salary from the ten best years of their career.

– Category 3: people with disabilities who are entirely incapable of working and who require assistance from a third party to accomplish basic daily tasks. The value of the pension is equal to 50% of the average annual salary from the ten best years of their career, plus the supplementary third-party allowance (MTP).

The majority (73%) of disabled beneficiaries from the private sector qualify for Category 2 pensions, with 25% falling into Category 1. The latter may therefore continue to work, subject to certain conditions. The remaining 2% receive Category 3 pensions, and are thus eligible for the supplementary third-party allowance (MTP).

These proportions vary from one scheme to the next: there are slightly fewer Category 2 beneficiaries of the non-employee MSA scheme (59%) and the CNIEG (69%) compared with the general scheme (71%). However, these schemes have a higher rate of disabled beneficiaries in Category 1 (39% for the non-employee MSA scheme, 30% for CNIEG, compared with 27% for the CNAM). The proportion of Cat. 3 beneficiaries, meanwhile, varies little between the schemes: between 1% and 2% (Marino & Cheloudko, 2024).

Disabled civil servants, meanwhile, are not split into three categories; their disability ratio is calculated by the social security medical officer.

1.3. The Amount of Pensions Depend Primarily on the Disability Category

Disability pensions have minimum and maximum values for each category, which are revised every year by ministerial decree. They are recalculated on 1st April each year, in line with inflation. As of January 1st, 2024, the minimum monthly pension was €328.07 and the maximum values were €1,159.20 for beneficiaries in Category 1 and €1,932 for Categories 2 and 3.

The annual value of the pension is equal to 50% of the average annual salary from the best ten years of their career, plus the supplementary attendance allowance (MTP) when relevant. The MTP is a supplement paid to certain disability pension recipients in Category 3, to help cover the cost of the assistance they need to perform basic everyday tasks. As of April 1st, 2024, the MTP was worth €1,226.60 per month.

The disability pension is automatically replaced by the retirement pension for inability to work when beneficiaries who are no longer in employment reach the statutory retirement age (SRA). If they are still in employment, disability pension recipients may continue to claim their pension in full until they reach full retirement age. Retirement on grounds of unfitness, with recognised disability status, makes beneficiaries eligible for a full pension when they reach the statutory retirement age, even if they did not work the required number of years.

For retired civil servants, the calculation formula is similar to that used to calculate the amount of their pension: 75% of the salary received during their last six months in employment, multiplied by the pro rata coefficient. This pro rata coefficient is equal to the ratio between the number of years during which they have paid pension contributions and the number of years required to qualify for the full pension. There are no minimum or maximum values for disability

pension paid by the civil service insurance schemes. However, if the disability ratio is equal to or greater than 60%, there is a minimum pension corresponding to 50% of the salary on which the pension calculation is based. Since disability pension is essentially identical to old age pension in the public sector, no adjustment is necessary when recipients reach retirement age.

The average disability pension (including third party assistance supplements) derived from the EACR 2022 data was 840 Euros per month, all schemes taken together. The median amount was €680. For private sector schemes, as might be expected, the higher the disability ratio, the higher the pension. In 2022, for beneficiaries of the general scheme, recipients in Category 1 received an annual monthly pension of 610 Euros, those in Cat. 2 received 910 Euros and those in Cat. 3 received 2,020 Euros. For a given disability category, the average pension amount paid by the general scheme and by the employees' MSA fund is similar. The CNIEG, on the other hand, pays out significantly more, while the non-employee MSA pays considerably less. This is largely due to the fact that wages are higher among CNIEG members than among MSA members – pensions are calculated with reference to recipients' former salaries – but also owes something to the different calculation methods used by the CNIEG and the MSA (Marino & Cheloudko, 2024).

2. Data

2.1. The Inter-Pension Scheme Sample

The data we use are derived from the piling-up of individuals from all waves of the inter-pension scheme sample (EIC) for the years 2009 through 2017. The EIC 2017 spans the generational cohorts 1946 through 1994. Using previous waves of EIC data enables us to include all individuals still alive in 2009, even if they died before 2017.

The most recent version of this database, compiled and published by DREES, contains individuals born on specific days of specific years, who have been registered with at least one of the main French pension schemes over the course of their careers. The date of birth is therefore the main criterion for inclusion in this sample. The dates of birth in question vary from one year to the next, thus altering the proportion of included individuals in each cohort: 4.4% for every other even year from 1946 onwards, and 2.2% for other even years from 1952 onwards. To the extent that dates of birth can be regarded as random, this sample is thus representative of all workers contributing to the major pension schemes.

The pension schemes update this database with information regarding the pension contributions and payment periods for each individual. This allows us to retrace the employment and earning history of each individual, along with the number of completed quarters in employment, and any quarters registered as unemployment, illness or disability.

This information enables us to identify the moment at which individuals begin claiming disability pensions, while retracing the longer-term trajectory of their careers. Periods of illness are defined as periods of more than six weeks off work for health reasons, allowing us to identify signs of ill health before an individual is potentially recognised as being disabled. However, it should be noted that these periods also include maternity leave because, for administrative purposes, it is classified as a period of leave for "health reasons." Interpretion of this variable thus differs across for men and women.

Furthermore, the EIC is matched with two other databases which serve to enhance our analysis: the all-employees panel (PTS) and the permanent demographic sample (EDP). These data allow us to observe additional individual characteristics: the PTS provides a more detailed view of wages, while also providing details regarding socio-professional categories and sectors of activity. The EDP also enables us to measure each individual's level of education. However, the indicator for education or qualifications is imperfect on two counts. The sampling filter used by the EDP is based on date of birth, much like the EIC, but the days used are different and as such the two databases are not perfectly aligned. Moreover, the education data provided by the EDP is based on census surveys. This variable is thus not available for individuals who have never participated in a census. As such, the proportion of individuals for whom we do not have education and qualification data is close to 40%. So as not to change the size of the sample, while retaining the option of using these variables, we chose to keep all of the observations in our sample, adding to our analysis variables a term corresponding to the missing values of the explanatory variables.

2.2. Sample and Variables

Our analysis focuses on the probability that an individual will benefit from a disability pension between the ages of 35 and 60, the onset on

"disability" thus defined being the first full quarter in which they receive the disability pension. We also analyse the correlation between this probability and their income decile before the age of 35.

We choose the age of 35 in order to strike a balance between the need for individuals to have been on the labour market long enough (in order to determine the income decile and to detect periods of sick leave, for example) and, on the other hand, the risk that we would already find too many recipients of the disability pension if the age was set too high. We thus opted for 35, which is also the age used by Aubert (2024) as his benchmark. Moreover, it is relatively rare for individuals to begin receiving the disability pension before the age of 35: this was the case for just 10.3% of those receiving the disability pension in the EIR 2016. We thus exclude these very early recipients from our analytical sample.

The data sources used allow our analysis to include, in addition to gender, age, and generation, the following variables: level of education, details of professional situation and income between the ages of 30 and 35, and indicators of vulnerability with potential career consequences (time spend in illness and unemployment before the age of 35). The income variable is calculated as the average decile of earned income observed for the individual's gender and year of birth. This is a relative value, situating the observation within the income distribution for their age and gender. We have chosen to focus on the average income in the age bracket 30-35 in order to smooth out income variability.

2.3. Descriptive Statistics

Our sample comprises 174,984 men and 153,497 women, including 7,965 men and 6,965 women who were not registered as disabled in 35, but did subsequently receive disability pension later in life.

Figure I shows the breakdown of our sample by birth year. The individuals in the sample were born between 1950 and 1976. The difference in the sample sizes for certain age cohorts is due to the fact that the number of birth days included in the sample varies depending on the year of birth (see Section 2.1 above).

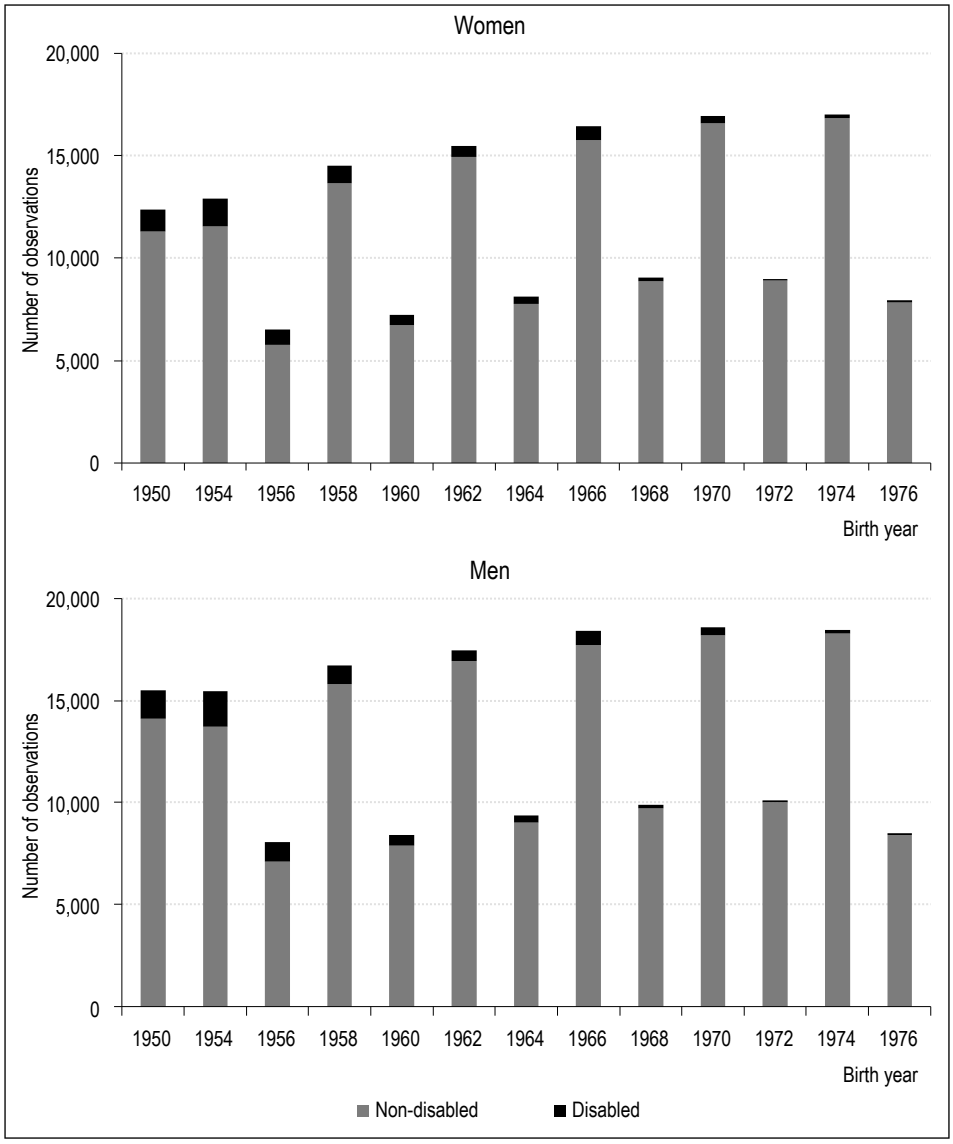
As seen in Figure II, the oldest generations at time of observation (i.e. in 2017) are naturally overrepresented among those who have, for at least one period in their lives, received disability pension. By 2017, almost 9% of the 1950 generation had experienced a period of disability; the proportion for the 1956 generation was close to 12%. The disability rate for the 1956 generation is higher than it is for the 1950 generation, potentially on account of the increase in the retirement age, which was raised from 60 to 62 between the 1950 and 1955 generations. As such, more people are liable to experience a period of disability before retiring (Rabaté & Rochut, 2020). Subsequent generations, who had not reached the age of 60 at the time these data were collected, display lower rates of disability: around 6% for those born in 1958 and 1960, with that proportion falling to 1.5% for those born in 1976. Although there are some differences, disability rates remain relatively similar for men and women. It should be noted that these rates are slightly higher than those observed by DREES (Marino & Cheloudko, 2024). This difference can primarily be attributed to the fact that the prevalence of disability is usually measured at the point of retirement. In our study, however, the sample includes those who die before reaching retirement age, as well as people who have periods of disability but then exit that status. This may happen for one of several reasons: some people may no longer qualify for disability benefits because their health improves, or because their earned income exceeds the maximum threshold. In our data, 22.7% of people who were registered as disabled at the age of 35 subsequently experienced at least one year in which they were in employment without receiving disability benefits. That proportion falls to 15.7% for those first encountering disability at the age of 45, and 5.9% for those encountering disability at 55.

The differences in disability rates between age groups can be largely attributed to the fact that they are observed at different ages. Figure III shows the disability rate for each generation at different ages. We observe an upward trend in the prevalence of disability for successive generations, with increases for every age from 45 to 55, between the 1950-1958 and 1959-1966 generations.

Table 1 shows the average characteristics for the individuals in our sample, sorted by gender and by whether or not they received disability pensions before the age of 60.

Our descriptive statistics reveal clear disparities between individuals experiencing periods of disability pensions and those with no experience of disability pensions before the age of 60. People with disabilities are overrepresented in

Figure I – **Sample distribution by year of birth**



Reading note: The 1950 cohort in the sample comprises 124,000 women, 1,100 of whom received disability pensions for at least one quarter, and 155,000 men, 1,400 of whom received disability pensions for at least one quarter.
Source: EIR-EIC – authors' calculations.

the least qualified socio-professional categories, particularly among working men (who make up 45.6% of men with disabilities, and just 37.1% of men without disabilities), while managers and educated professionals are much less likely to experience disability (the proportion of managerial staff among the total number of men with disabilities is 13.1 percentage points lower than the proportion of managerial staff among men without disabilities; for women, the difference is −8.2 pp).

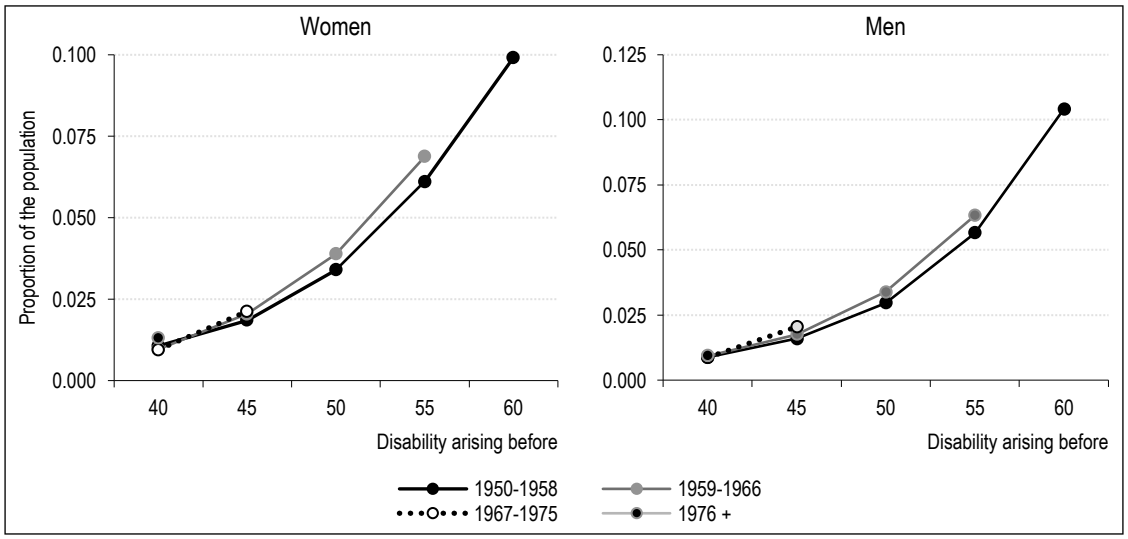
This social stratification effect is also reflected in the levels of education and qualifications observed. Among the disabled population, people with no qualifications (+5.8 percentage points for men and +4.1 pp for women) are over-represented, while graduates of higher education are under-represented (−11 pp for men and −11.7 pp for women). There are also significant variations between sectors of activity: the industrial sector has more disabled workers (particularly among women, where the rate is 5.1 points higher), whereas general government services have fewer (−4.9 points for men, −8.2 points for women).

Professional instability before the age of 35 also appears to be an important factor, with an increased occurrence of unemployment (+5 points for men, +4.1 points for women) and periods of sick leave (+27.4 points for men, +14.1 points for women) among future disability beneficiaries. Once again, it is worth noting

Figure II – **Proportion of people with an episode of disability pension pre-2017, by birth year**

Reading note: Among the cohort born in 1950, 8.6% of women and 8.9% of men had been registered as disabled in the pensions system for at least one quarter before 2017. These proportions rise to 11.5% and 11.8% respectively for the 1956 cohort, and fall to 6.0% and 5.5% for the 1958 cohort.
Source: EIR-EIC – authors' calculations.

Figure III – **Proportion of people with an episode of disability pension before certain ages, by birth year**



Reading note: 3.4% of women in the 1950-1958 generation and 3.9% of the 1959-1966 generation were registered as disabled in the pensions system for at least one quarter before reaching the age of 50. For men, the proportions were 3.0% for the generation 1950-1958 and 3.4% for the generation 1959-1966.
Source: EIR-EIC – authors' calculations.

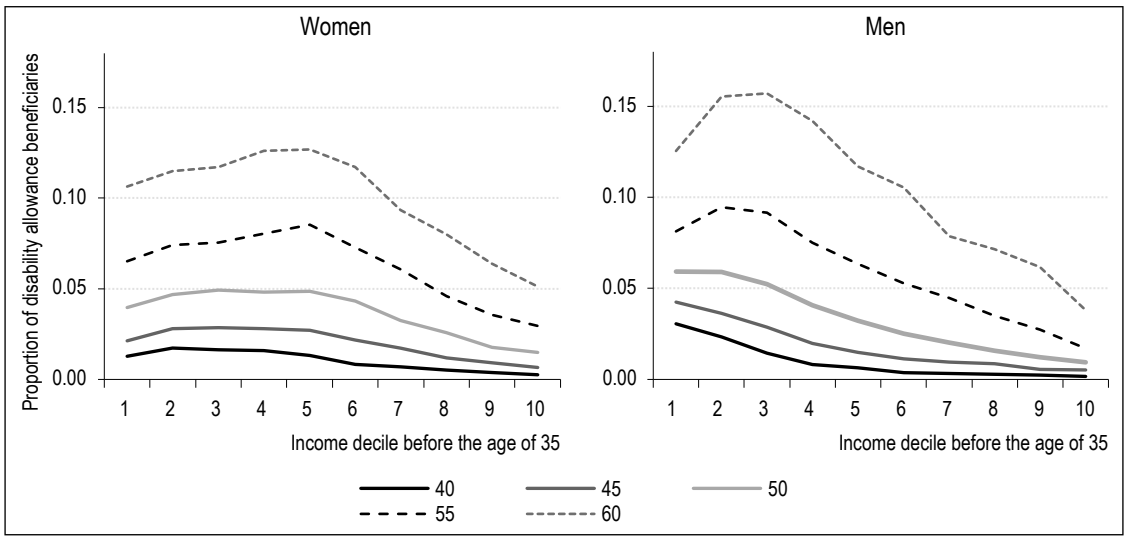
here that there is no administrative distinction between quarters on sick leave and quarters taken for maternity leave, which explains the very high prevalence among women before the age of 35.

The sample also contains a non-negligible proportion of missing values, particularly for the variable measuring education (around 40%), for the reasons described above. However, it should be borne in mind that the proportions of entries without details on education and qualifications show little variation between gender and disabilities, confirming the apparently random nature of these missing variables.

Finally, Figure IV shows the probability of experiencing disability set against three key dimensions: age, earned income and sex. As above, the rise of disability with age is visible, with rates between 0.2% and 2.5% at 40, rising to much higher levels by the age of 60, from 3.8% to more than 16% in some categories.

This increase with age is accompanied by a particularly steep social gradient. The lowest income deciles always have higher rates of

Figure IV – **Proportion of disability pensions beneficiaries at different ages, by income decile before the age of 35**



Key: 1.3% of women who fell in the 5th decile for average earned income between the ages of 30 and 35 experienced a period of disability pension before the age of 40; the figure rose to 4.9% by the age of 50 and 12.7% by 60.
Source: EIR-EIC – authors' calculations.

disability than the upper deciles, and this gap appears to grow wider with age. At the age of 60, for example, the disability ratio is 16% for men in the third decile, compared with just 2.5% for those in the top decile. This disparity appears to reflect the cumulated impact of social inequalities over the course of a career.

The differences between men and women, meanwhile, appear to be more subtle and thus merit further attention. Disparities between the income deciles are more pronounced for men than they are for women, and the differences between women in the first five income deciles are very small. At the age of 60, men in the lowest deciles have a slightly higher risk of disability than women (16% against 12%), while the gap appears to diminish in the higher deciles.

These results demonstrate the existence of an important disability gradient determined by earned income before the age of 35, which appears as soon as the age of 40. Nevertheless, there is a risk that these descriptive results mix up age and generational effects, which need to be separated.

3. Empirical Strategy

The task of interpreting the statistical connection between earned income before the age of 35 and the probability of experiencing disability is rendered more complex by the existence of variables correlated with earned income, such as profession, level of education and health condition, which could act as confounding factors. Above and beyond this initial descriptive analysis, our empirical analysis seeks to determine whether or not the connection observed between income and disability at different ages withstands efforts to control these variables. Without claiming to prove a causal relation, this approach allows us to minimise the direct influence of other observed variables, and to assess the extent to which they flatten the initial gradient.

We model the probability of receiving the disability pension for the first time before a given age. In order to mitigate the risk of reverse causality, we use early-career income and control variables measured before the age of 35 as explanatory variables.

We formalise the model using Y_{ia} , an indicator variable which is equal to 1 if the individual *i* is observed to have experienced at least one disability spell before age *a*. This variable depends on the sign of the latent variable Y_{ia}^{*}:

$$Y_{ia}^{*} = \sum_{k=1}^{10} 1\{D_i = k\}\delta_{ka} + X_i\beta_a + \varepsilon_{ia}$$

where D_i represents the earned income decile observed for the individual before the age of 35, and X_i is a set of control variables which vary depending on the specifications. We also posit the hypothesis that ε_{ia} is drawn according to a logistic distribution: the estimated model is thus a *logit* model.

The δ_{ka} parameters are logarithms of the relative risk (log odds ratio) of being disabled at age *a*, among individuals in different deciles

Table 1 – **Descriptive statistics**

	Women			Men		
	Disabled	Non-disabled	Difference	Disabled	Non-disabled	Difference
Socio-professional category before the age of 35						
Farmers	0.029	0.027	0.002	0.013	0.011	0.002
Tradespeople, shopkeepers	0.123	0.107	0.016	0.044	0.042	0.002
Executives, higher-level professions	0.050	0.181	−0.131	0.043	0.124	−0.082
White-collar workers	0.122	0.129	−0.007	0.477	0.477	0.000
Blue-collar workers	0.456	0.371	0.085	0.183	0.117	0.067
Middle-management professions	0.087	0.162	−0.076	0.109	0.200	−0.091
Missing	0.134	0.023	0.111	0.131	0.029	0.102
Sector of activity before the age of 35						
Service sector	0.026	0.035	−0.008	0.051	0.076	−0.025
Scientific and technical activities	0.118	0.122	−0.003	0.128	0.118	0.010
General government	0.114	0.163	−0.049	0.314	0.396	−0.082
Other	0.056	0.082	−0.026	0.075	0.079	−0.003
Commerce	0.242	0.248	−0.006	0.220	0.197	0.024
Construction	0.133	0.098	0.034	0.008	0.012	−0.004
Manufacturing	0.236	0.212	0.025	0.152	0.100	0.051
Missing	0.075	0.041	0.035	0.052	0.023	0.029
Education						
No qualifications	0.150	0.091	0.058	0.117	0.076	0.041
Below high school diploma level	0.321	0.252	0.070	0.308	0.215	0.093
High school diploma *(baccalauréat)*	0.061	0.090	−0.029	0.087	0.112	−0.025
Higher education	0.054	0.163	−0.110	0.088	0.204	−0.117
Missing	0.415	0.404	0.011	0.400	0.393	0.007
Events after the age of 35						
Unemployment	0.548	0.498	0.050	0.574	0.533	0.041
Illness / maternity leave	0.446	0.172	0.274	0.733	0.592	0.141
Number of observations	7,965	167,019		6,965	146,532	

for income before the age of 35. While the sign and significance of these coefficients provides information about the different levels of risk experienced by different population groups, they remain difficult to interpret. We thus work with relative risk ratios for these population groups:

$$RR(k,k',a)=\frac{\sum_i \hat{P}(Y_{ia}=1\,|\,D_i=k,X_i)}{\sum_i \hat{P}(Y_{ia}=1\,|\,D_i=k',X_i)}$$

equal to the ratio between the mean predicted probabilities of disability if the individuals all belonged to group k, and the mean if they all belonged to group k'. The two mean values are calculated for the population as a whole, taking the population make-up into consideration. In practice, and with certain exceptions (see Figure VII-A), we compare these risk figures with the risk calculated for the median group ($k' = 5$).

Finally, we use four discrete specifications:

(i) The first specification includes only the variables for the pre-35 wage income decile, with no other control variables. This specification allows us to recover the unadjusted disability gradient;

(ii) In the second specification, we factor in the presence of episodes of sick leave or maternity leave or unemployment before the age of 35. These control variables enable us to observe heterogeneity which could be attributed to pre-existing situations;

(iii) The third specification controls for individuals' education level, in addition to the variables mentioned above;

(iv) This specification includes the industry and socio-professional category (single figure code) of subjects before the age of 35.

4. Results

Figure V shows the principal results of our estimate, breaking down the relative risks of experiencing disability before the age of 60 for both sexes. We use 60 as the benchmark age because it corresponds to the age at which, for a large proportion of the sample, disability pension is automatically converted to old-age pension. The relative risk figures shown here are based on the regressions presented in detail in Table 2 for men and Table 3 for women.

4.1. A Clear Disability Gradient

4.1.1. Unadjusted Gradients for First Instance of Disability Status: Effects Comparable to Those Observed for Mortality

First of all, our analysis confirms the trend revealed in Figure IV, namely the existence of a disability risk gradient which decreases as income increases, something which is particularly salient for men. Men in the bottom three income distribution deciles (between the ages of 30 and 35) are 1.2 times more likely to experience disability than men closer to the median income. At the other end of the scale, men in the top two deciles are 2.5 times less likely to claim disability pension before the age of 60.

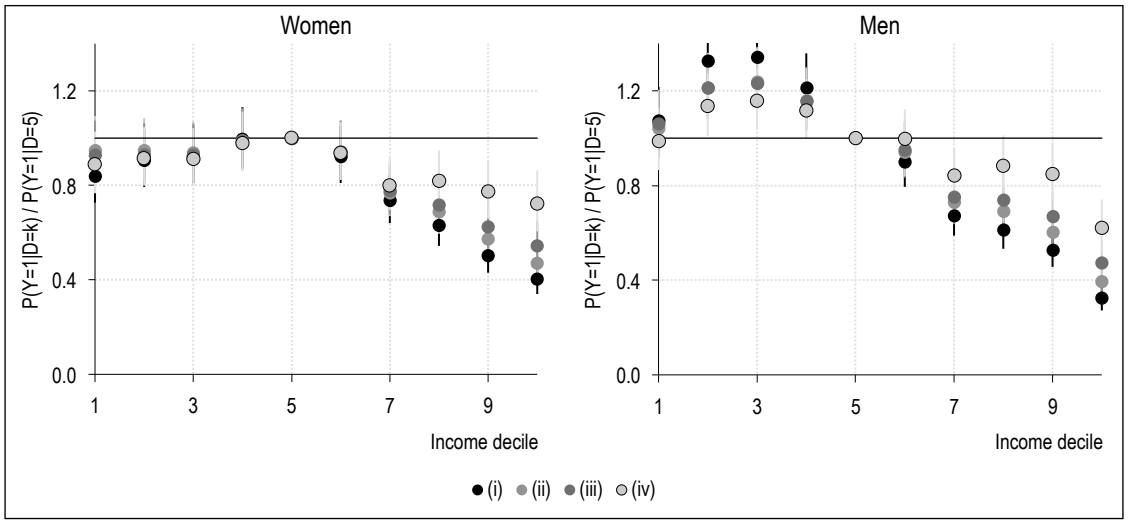
For women, the gradient appears to be less pronounced, largely on account of a much weaker effect at the lower end of the income scale: below the 6th decile, the disability risk remains relatively stable. At the top end of the scale, however, relative risk (in relation to the 5th decile) is comparable to that observed for men.

This configuration echoes the results of previous studies concerning the connection between individual income and life expectancy (Blanpain, 2018; Mélard *et al.*, 2024). The weaker correlation observed among women, particularly at the lower end of the income scale, is generally attributed to the fact that there is a higher proportion of women with no earned income of their own, but this does not necessarily equate to a lower standard of living, as couples tend to pool their resources. Since both mortality and disability are in some respects consequences of ill health, this result comes as no surprise.

4.1.2. Health Setbacks and Periods of Unemployment Before the Age of 35 Can Be Connected to Disability

Our analysis also incorporates indicators for periods of unemployment or extended periods of sick leave (at least two months) or maternity leave before the age of 35, providing indirect insight into the early health of individuals. This approach seeks to overcome the reverse causality problem identified in measurements of health inequality (Goldman, 2001). It should be noted that the periods of sick leave included in our calculations correspond to breaks of at least 60 days, implying potentially significant health problems. Nevertheless, this information is much less accurate for women because periods of maternity leave are included in this variable.

Figure V – **Relative risk of claiming a disability pension before the age of 60, by income decile before the age of 35**



Note: These graphs present the estimates generated by the logistic models detailed in Section 3. The dots represent the coefficients of the dummy variables for each income decile (ages 30-35). The vertical bars represent the confidence intervals.
Reading note: The relative risk of claiming a disability pension before the age of 60 for a woman in the top decile is 0.4 times that of a woman in the fifth decile, without control variables (Specification i); it is 0.7 times that of a woman in the fifth decile once the control variables are factored in (Specification iv).
Field: Age cohorts aged 60 or over by 2017 (1950, 1954 and 1956).
Source: EIR-EIC – authors' calculations.

Table 2 – **Probability of disability status before the age of 60, men**

	(i)	(ii)	(iii)	(iv)
Intercept	−2.020*** (0.049)	−2.364*** (0.053)	−3.015*** (0.093)	−3.601*** (0.120)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	0.080 (0.073)	0.047 (0.074)	0.070 (0.074)	−0.016 (0.079)
2	0.326*** (0.067)	0.225*** (0.068)	0.226** (0.069)	0.150* (0.071)
3	0.340*** (0.066)	0.251*** (0.067)	0.245*** (0.068)	0.176* (0.069)
4	0.220*** (0.067)	0.173* (0.068)	0.168* (0.068)	0.131 (0.069)
6	−0.120 (0.071)	−0.069 (0.072)	−0.060 (0.072)	−0.006 (0.073)
7	−0.438*** (0.076)	−0.359*** (0.077)	−0.326*** (0.077)	−0.202** (0.078)
8	−0.541*** (0.078)	−0.418*** (0.079)	−0.344*** (0.080)	−0.147 (0.082)
9	−0.699*** (0.082)	−0.568*** (0.083)	−0.454*** (0.083)	−0.193* (0.086)
10	−1.211*** (0.096)	−1.021*** (0.097)	−0.831*** (0.099)	−0.548*** (0.103)
Education (*Ref.*: Higher education)				
No qualifications			0.900*** (0.092)	0.532*** (0.098)
Below high school diploma level			0.696*** (0.083)	0.383*** (0.089)
High school diploma *(baccalauréat)*			0.470*** (0.104)	0.285** (0.107)
Missing			0.619*** (0.081)	0.285*** (0.086)
Socio-professional category (*Ref.:* Middle-management professions)				
Farmers				0.540*** (0.125)
Tradespeople, shopkeepers				0.441*** (0.072)
Executives				−0.252** (0.092)
White-collar workers				0.320*** (0.079)
Blue-collar workers				0.407*** (0.064)
Missing				1.358*** (0.076)
Sector (*Ref.:* General government)				
Service sector				0.421*** (0.115)
Scientific and technical activities				0.404*** (0.079)
Commerce				0.513*** (0.066)
Construction				0.732*** (0.075)
Manufacturing				0.548*** (0.068)
Other				0.376*** (0.088)
Missing				0.536*** (0.083)
Events after the age of 35				
Unemployment		0.213*** (0.037)	0.234*** (0.037)	0.251*** (0.038)
Illness / maternity leave		0.952*** (0.036)	0.917*** (0.036)	0.863*** (0.037)
Loglikelihood	−12,695.37	−12,337.97	−12,280.07	−11,963.52
AIC	25,410.74	24,699.95	24,592.15	23,985.05
BIC	25,496.46	24,802.81	24,729.30	24,233.64

Including these variables (Model ii) has different effects for the two sexes, and for different levels of income. At the top of the income distribution scale, the impact is modest: for women, the relative risk (Figure V) in the top decile increases gradually from 0.40 to 0.47, with a similar attenuation visible in the gradient for men, from 0.33 to 0.40. At the bottom of the income scale, the effect is more pronounced for men: the relative risk for the 2nd decile compared with the 5th decile falls from 1.32 to 1.21. As such, using these markers of vulnerability as control variables only partially attenuates the disability gradient observed in our initial calculations.

Table 3 – **Probability of disability status before the age of 60, women**

	(i)	(ii)	(iii)	(iv)
Intercept	−1.928*** (0.053)	−2.428*** (0.063)	−2.958*** (0.094)	−3.276*** (0.108)
Earned income between the ages of 30 and 35 (*Ref.:* 5)				
1	−0.198* (0.083)	−0.062 (0.084)	−0.083 (0.084)	−0.138 (0.086)
2	−0.112 (0.077)	−0.059 (0.078)	−0.083 (0.078)	−0.103 (0.080)
3	−0.090 (0.077)	−0.073 (0.077)	−0.084 (0.077)	−0.106 (0.079)
4	−0.006 (0.075)	−0.012 (0.075)	−0.016 (0.076)	−0.025 (0.076)
6	−0.091 (0.076)	−0.068 (0.076)	−0.067 (0.076)	−0.075 (0.077)
7	−0.344*** (0.080)	−0.294*** (0.080)	−0.283*** (0.080)	−0.257** (0.081)
8	−0.515*** (0.083)	−0.417*** (0.084)	−0.374*** (0.084)	−0.229** (0.085)
9	−0.755*** (0.088)	−0.618*** (0.089)	−0.527*** (0.090)	−0.294** (0.093)
10	−0.990*** (0.095)	−0.828*** (0.096)	−0.676*** (0.097)	−0.370*** (0.102)
Education (*Ref.*: Higher education)				
No qualifications			0.822*** (0.096)	0.402*** (0.102)
Below high school diploma level			0.643*** (0.081)	0.312*** (0.087)
High school diploma *(baccalauréat)*			0.391*** (0.100)	0.200 (0.103)
Missing			0.501*** (0.079)	0.205* (0.083)
Socio-professional category (*Ref.:* Middle-management professions)				
Farmers				0.691*** (0.162)
Tradespeople, shopkeepers				0.328*** (0.099)
Executives				−0.361*** (0.108)
White-collar workers				0.316*** (0.067)
Blue-collar workers				0.683*** (0.083)
Missing				1.166*** (0.081)
Sector (*Ref.:* General government)				
Service sector				−0.024 (0.092)
Scientific and technical activities				0.269*** (0.069)
Commerce				0.306*** (0.057)
Construction				−0.193 (0.224)
Manufacturing				0.309*** (0.064)
Other				0.317*** (0.076)
Missing				0.249** (0.085)
Events after the age of 35				
Unemployment		0.204*** (0.040)	0.221*** (0.040)	0.246*** (0.041)
Illness / maternity leave		0.561*** (0.042)	0.538*** (0.042)	0.512*** (0.043)
Loglikelihood	−10,147.94	−10,029.51	−9,981.81	−9,748.89
AIC	20,315.87	20,083.02	19,995.63	19,555.78
BIC	20,399.54	20,183.42	20,129.50	19,798.41

4.1.3. To Qualify for Disability Pensions, Individuals Must Have a Medical Condition Which Is Not Work-Related. However, Eligibility Is Also Linked to Socio-Professional Category and Sector of Activity

Since disability pension is paid to beneficiaries who are not able to work due to health conditions which are not work-related, we looked more closely at the extent to which the observed gradient could be attributed to individual characteristics such as socio-professional category, level of education and sector of activity. This approach was informed by the sizeable literature exploring the connections between social

differences and high-risk behaviours (Khlat *et al.*, 2020), the impact of working conditions on health issues (Kivimäki *et al.*, 2012), and disability diagnoses (Albertsen *et al.*, 2007).

The likelihood that a person will experience disability is closely linked to their social standing, as measured by the socio-professional category variable (CS): men in managerial positions are at less risk than those in intermediate professions (executives have a risk factor which is 0.8 times that of intermediate professions), while clerical employees (1.4 times the risk of intermediate professions), blue-collar workers (1.5 times) and farmers (1.7 times) are at greater risk, even when income, level of education and sector of activity are equalised. A lack of information regarding socio-professional category (marked "Missing") in the statistical sources (in this case the all-employee database (BTS) paired with the EDP) is associated with a disability risk 3.6 times greater than the median. A lack of information in the CS case of the BTS may be indicative of unstable employment linked to disability (health problems leading to disability may also contribute to a more chequered employment history).

Finally, the industrial and construction sectors carry risk levels which are, respectively, 1.7 and 2 times higher than that associated with general government employees. Here again, individuals for whom sector information is "Missing" carry a greater risk (multiplied by 1.7).

These correlations do not allow us to form general conclusions as to the causal links between employment conditions and disability, and the potential for disability to be caused by professional factors. Socio-professional category, in particular, is a social stratification variable which groups together individuals with shared characteristics in the social sphere, above and beyond their income and qualifications, and may thus imply shared attitudes, for example with regard to health behaviours. Sector of activity may be more closely related to working conditions, but it may also be associated with other, unobserved factors which might increase or decrease the risk of disability, relating to living conditions and behaviours outside of work.

4.1.4. Qualifications, Socio-Professional Category, and Sector of Activity Attenuate but Do Not Erase the Income Effect

The inclusion of these control variables does attenuate the link between income and disability risk, particularly at the upper end of the income scale. For men, the relative risk differential between the 10th (top) and 5th income deciles falls from 2.5 to 2.1 when we factor in level of education/qualification (Model iii), then falls further to 1.6 when we factor in sector of activity and socio-professional category (Model iv). For women, the gap falls from 2.1 to 1.4. More generally, the gradient appears to flatten out between the 5th and 10th deciles, reflecting the lesser importance of income at the top end of the scale, once we add control variables for employment history before the age of 35.

At the bottom end of the income scale, however, factoring in these control variables only has a limited impact, for both women (where the gradient remains flat) and men. Comparing the different specifications reveals that variables pertaining to employment have the most significant impact, with level of education/qualification having a merely marginal impact in terms of flattening the inequality gradient. This result shows that, although it offers protection for those unable to work for reasons which are not work-related, disability pension receipt remains strongly correlated with professions and sectors of activity, even when we control for level of education.

Our analysis reveals the presence of different mechanisms at different income levels: for men, the variables "socio-professional category" and "sector of activity" have a greater influence on the gradient in the upper reaches of the income distribution scale, while indicators of vulnerability are more influential at the lower end of the scale.

Overall, incorporating control variables into the regressions attenuates differences in disability risk in relation to individual income, but does not alter our initial finding that those individuals with the lowest incomes in the early years of their career have a greater disability risk later on. This is particularly true for men. Conversely, the risk is lower for those who earn the highest salaries early in their careers, both women and men.

4.2. Variation Over Time of the Correlation Between Earned Income and Disability Risk

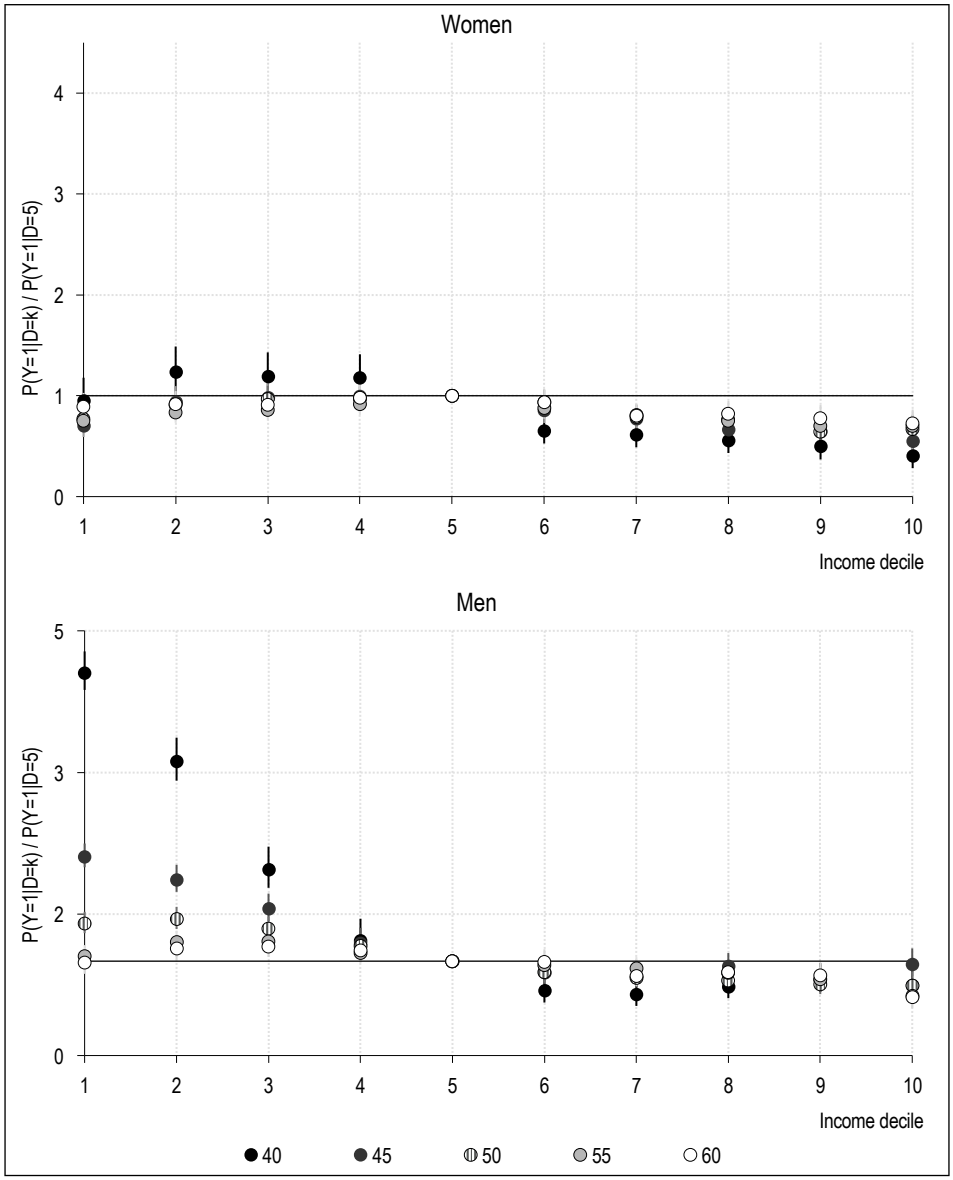
The results detailed above demonstrate the existence of a negative correlation between disability risk and earned income before the age of 35, even when explanatory variables are factored in. This result was obtained by analysing the probability of claiming disability pensions, encompassing all of the individuals contained in our sample, irrespective of their year of birth. We now propose to look at the

heterogeneity of this effect with regard to two further dimensions: the age at which a person first receives the disability pension, and their year of birth. All of these analyses are based on the model incorporating all of the control variables (Model iv).

4.2.1. Variation With Age

Figure VI shows how the gradient varies with age. For men in the first income decile, the relative disability risk compared with the 5th decile drops off significantly with age, from a ratio of 4.06 at the age of 40 to 2.1 at 45, then 1.4 at 50, 1.05 at 55 and, finally, just below 1 at the age of 60. At the upper end of the income scale, however, the gradient remains comparatively stable across different ages, with relative risk ranging from 1 to 1.6. For women at the lower end of the income scale, the relative risk shows much less variation with age. Nevertheless, this relative risk is less and less important for those in the upper deciles, as they advance in age.

Figure VI – **Relative risk of claiming a disability pension before different ages, by income decile before the age of 35**



Note: These graphs present the estimates generated by the logistic model (iv) detailed in Section 3. The dots represent the coefficients of the dummy variables for each income decile (ages 30-35) The vertical bars represent the confidence intervals.
Reading note: For a man in the lowest income decile before the age of 35, the relative risk of claiming a disability benefit before the age of 40 is 4 times greater than it is for a man in the fifth decile (black dot). The risk of disability before the age of 50 is just 1.4 times greater (striped dot), while their respective risks of disability by the age of 60 are not different (white dot).
Scope: Birth years 1950-1976. Coefficients for a given age are estimated with reference to the age cohorts who had reached or exceeded that age by 2017.
Source: EIR-EIC – authors' calculations.

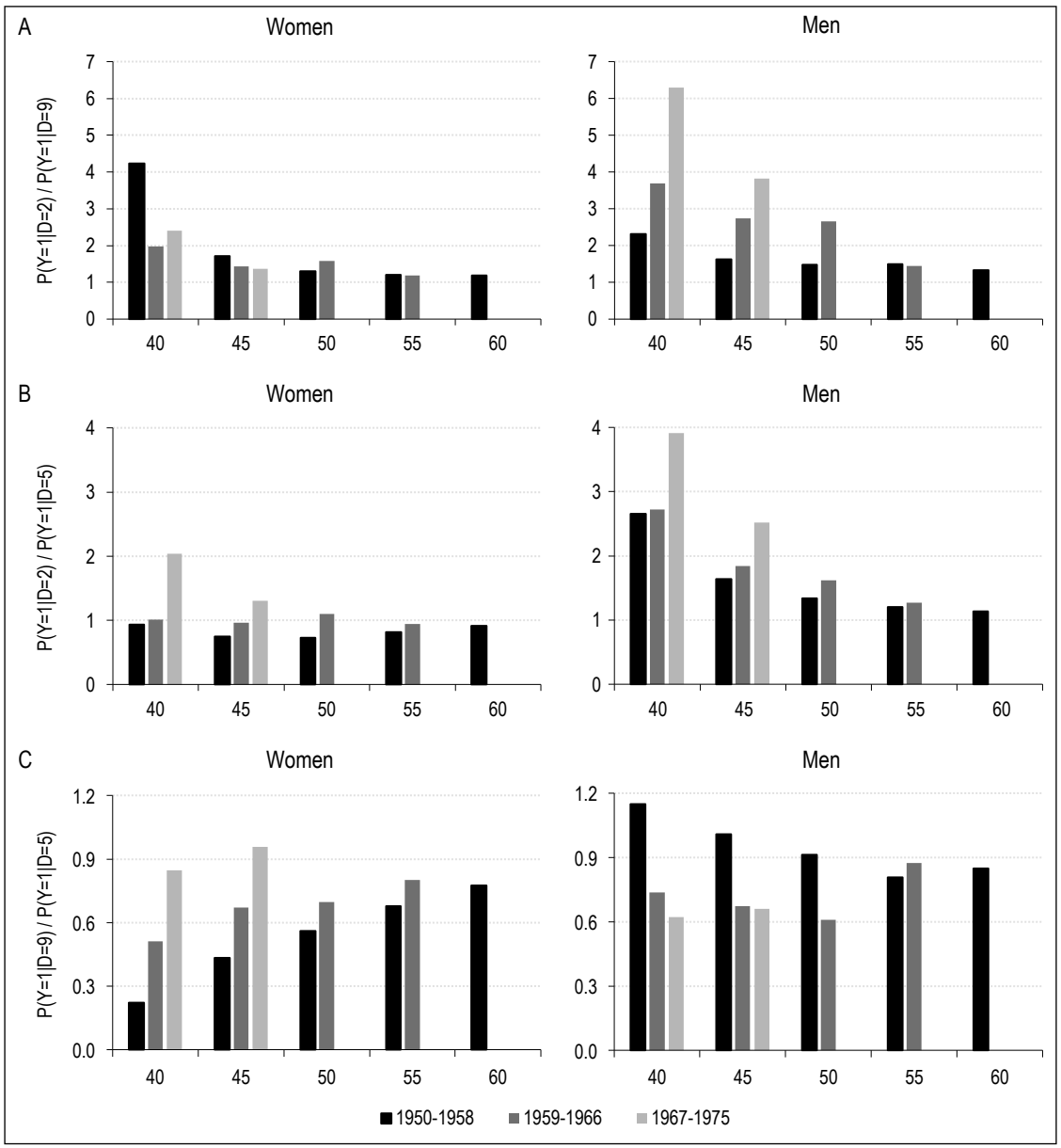
4.2.2. Generational Developments

Finally, we analysed variations in the probability of receiving disability pension before a given age for different generational cohorts. To do this, we needed to estimate coefficients for the different cohorts at different ages. Figure VII shows the risk ratio between deciles 2 and 9 (section A of the graph), which may be parsed as the product of the risk ratio between deciles 2 and 5 (section B) and deciles 5 and 9 (section C).

This analysis reveals discrete trends for the two genders. For women, a decline in the risk ratio with age can be observed across all generations. This trend is not uniform between generations, however: the gradient at age 40 decreases between the 1950-1958 and 1959-1966 generations, but then increases for the 1967-1975 generation.

For men, the gradient increases sharply across the generations. The relative risk of the 2nd decile

Figure VII – **Relative risk of claiming a disability pension before different ages, by income decile before the age of 35 and by generation**



Note: These graphs present the estimates generated by the logistic model (iv) detailed in Section 3. The vertical bars represent the estimated relative risk, with each colour representing a different generation. Graph A compares the risks for those in the second and ninth deciles, Graph B compares the second and fifth deciles, and Graph C compares the ninth and fifth deciles.
Reading note: For a man in the second lowest income decile before the age of 35, the relative risk of claiming a disability pension before the age of 40 is 2.3 times greater than it is for a man in the ninth decile, if they both belong to the 1950-1958 generation. This gap widens to 3.7 x for the 1959-1966 generation, and to 6.3 for the 1967-1975 generation.
Source: EIR-EIC – authors' calculations.

compared with the 9th decile thus increases from approximately 2 in the 1950-1958 generation to more than 6 for the 1967-1975 generation. This increase persists between the ages of 45 and 50, for the cohorts for whom we were able to observe these age milestones. The absence of inequality at age 55 suggests that disability occurs before this age, without increasing across the career as a whole.

The difference between the lower (Graph B, D2 vs D5) and upper (Graph C, D9 vs D5) ends of the income distribution scale shows that the increase in inequality observed at young ages (40-45) is principally driven by the lower end of the scale for men. This result highlights the growing importance of early-career inequality in relation to the phenomenon of disability, especially for men in the lowest income brackets.

* *
*

In this study we analyse the probability that an individual will experience disability status on the basis of early-career income, using data from the Inter-Pension Scheme sample. We thus demonstrate the existence of a clear gradient, which is particularly stark for men: for men in the lowest income deciles, the disability risk is up to 1.5 times greater than the median probability. The gradient remains, albeit in attenuated form, when we factor in socio-professional characteristics, level of education/qualification and indicators of vulnerability before the age of 35, such as quarters in which individuals received unemployment benefits or were on sick leave. The risk of experiencing disability is particularly high for men with lower incomes, while the risk is lower for those with the highest earned incomes; this is true for both women and men.

Nevertheless, taking these control variables into consideration does not permit us to conclude that there is a causal connection between individual income and the probability of experiencing disability. The possibility of reverse causality cannot be ruled out. Unobserved health characteristics might simultaneously affect both earned income in the early years of an individual's career and their subsequent risk of disability.

For men, the statistical connection between income and the probability of experiencing disability early in their careers grows stronger with each new generation. This upward trend can be observed up to the age of 50, and is primarily driven by the increasing prevalence of disability in the lower echelons of the income distribution scale. This echoes previous studies on loss of autonomy, which have revealed inequalities that are particularly evident at younger ages (people losing their autonomy between the ages of 60 and 75). The likelihood of experiencing disability, dependency or premature death thus appears to be a particularly revealing measure of social inequalities in terms of health outcomes and living conditions, perhaps even more so than the disparities in the average age at which these events occur. Above the age of 50, comparison between the generations does not reveal any alteration in the relationship between income and the prevalence of disability.

Combined with the fact that disabled people have a lower life expectancy (Aubert, 2024), and that recent gains in life expectancy have primarily been made at advanced ages, and thus do not benefit those who die prematurely (Dahl *et al.*, 2024), it seems likely that this accentuation of the disability gradient at younger ages will contribute, in coming years, to a deterioration of the gradient for life expectancy at birth.

The fact that income levels drive inequality in terms of the risk of experiencing disability raises questions as to the policies which might be put in place to mitigate this risk. The existence of this gradient in the mid-career years, at relatively young ages (40-45) should encourage us to step up preventive efforts aimed at low-paid employees or in precarious roles in the early years of their careers. □

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APPENDIX

TABLES SHOWING THE RESULTS OF OUR REGRESSION ANALYSES

Table A1 – **Probability of disability status before the age of 40, men**

	(i)	(ii)	(iii)	(iv)
Intercept	−5.078*** (0.094)	−6.280*** (0.109)	−6.349*** (0.145)	−6.511*** (0.180)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	1.621*** (0.107)	1.821*** (0.110)	1.828*** (0.111)	1.482*** (0.116)
2	1.347*** (0.107)	1.378*** (0.110)	1.382*** (0.111)	1.196*** (0.114)
3	0.863*** (0.113)	0.833*** (0.115)	0.837*** (0.115)	0.709*** (0.117)
4	0.297* (0.125)	0.238 (0.126)	0.238 (0.126)	0.203 (0.127)
6	−0.513*** (0.154)	−0.402** (0.155)	−0.398* (0.155)	−0.382* (0.155)
7	−0.692*** (0.163)	−0.496** (0.164)	−0.487** (0.164)	−0.438** (0.164)
8	−0.804*** (0.169)	−0.427* (0.170)	−0.407* (0.171)	−0.317 (0.173)
9	−0.927*** (0.177)	−0.416* (0.178)	−0.382* (0.180)	−0.223 (0.184)
10	−1.319*** (0.206)	−0.603** (0.209)	−0.550* (0.214)	−0.300 (0.230)
Education (*Ref.*: Higher education)				
No qualifications			0.256* (0.121)	0.143 (0.126)
Below high school diploma level			0.094 (0.114)	−0.011 (0.118)
High school diploma *(baccalauréat)*			0.142 (0.137)	0.040 (0.139)
Missing			−0.019 (0.110)	−0.201 (0.116)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.029 (0.209)
Tradespeople, shopkeepers				0.252 (0.131)
Executives				−0.488* (0.193)
White-collar workers				0.486*** (0.121)
Blue-collar workers				0.002 (0.114)
Missing				1.735*** (0.129)
Sector (*Ref.*: General government)				
Service sector				−0.126 (0.155)
Scientific and technical activities				−0.122 (0.101)
Commerce				0.018 (0.088)
Construction				−0.153 (0.115)
Manufacturing				0.101 (0.101)
Other				0.262 (0.136)
Missing				0.712*** (0.116)
Events after the age of 35				
Unemployment		−0.138* (0.062)	−0.137* (0.062)	0.018 (0.064)
Illness / maternity leave		2.498*** (0.062)	2.486*** (0.063)	2.461*** (0.064)
Loglikelihood	−8,267.27	−7,227.24	−7,220.13	−6,891.18
AIC	16,554.54	14,478.49	14,472.26	13,840.36
BIC	16,655.26	14,599.36	14,633.42	14,132.46

Table A2 – **Probability of disability status before the age of 45, men**

	(i)	(ii)	(iii)	(iv)
Intercept	−4.190*** (0.069)	−5.021*** (0.078)	−5.371*** (0.118)	−5.805*** (0.149)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	1.075*** (0.084)	1.170*** (0.086)	1.175*** (0.086)	0.802*** (0.091)
2	0.905*** (0.083)	0.882*** (0.085)	0.883*** (0.085)	0.668*** (0.088)
3	0.675*** (0.086)	0.603*** (0.087)	0.605*** (0.087)	0.473*** (0.088)
4	0.291** (0.092)	0.234* (0.093)	0.232* (0.093)	0.189* (0.093)
6	−0.267* (0.105)	−0.176 (0.106)	−0.165 (0.106)	−0.132 (0.106)
7	−0.459*** (0.110)	−0.299** (0.111)	−0.274* (0.112)	−0.179 (0.112)
8	−0.577*** (0.114)	−0.293* (0.116)	−0.239* (0.116)	−0.058 (0.118)
9	−0.967*** (0.130)	−0.592*** (0.132)	−0.501*** (0.134)	−0.224 (0.137)
10	−1.061*** (0.135)	−0.538*** (0.138)	−0.406** (0.142)	−0.031 (0.151)
Education (*Ref.*: Higher education)				
No qualifications			0.579*** (0.105)	0.362*** (0.108)
Below high school diploma level			0.354*** (0.099)	0.169 (0.101)
High school diploma *(baccalauréat)*			0.310* (0.121)	0.157 (0.122)
Missing			0.321*** (0.096)	0.049 (0.099)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.415** (0.159)
Tradespeople, shopkeepers				0.501*** (0.105)
Executives				−0.497*** (0.149)
White-collar workers				0.715*** (0.102)
Blue-collar workers				0.317*** (0.093)
Missing				2.128*** (0.104)
Sector (*Ref.*: General government)				
Service sector				−0.013 (0.131)
Scientific and technical activities				0.136 (0.084)
Commerce				0.085 (0.075)
Construction				−0.005 (0.093)
Manufacturing				0.215** (0.081)
Other				0.254* (0.111)
Missing				0.628*** (0.094)
Events after the age of 35				
Unemployment		0.132** (0.048)	0.137** (0.048)	0.262*** (0.049)
Illness / maternity leave		1.782*** (0.044)	1.758*** (0.044)	1.715*** (0.045)
Loglikelihood	−11,598.79	−10,717.60	−10,699.93	−10,166.14
AIC	23,217.59	21,459.20	21,431.87	20,390.28
BIC	23,315.93	21,577.21	21,589.22	20,675.48

Table A3 – **Probability of disability status before the age of 50, men**

	(i)	(ii)	(iii)	(iv)
Intercept	−3.407*** (0.053)	−4.039*** (0.060)	−4.539*** (0.099)	−5.029*** (0.128)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	0.642*** (0.070)	0.687*** (0.071)	0.693*** (0.072)	0.370*** (0.077)
2	0.635*** (0.068)	0.598*** (0.069)	0.597*** (0.069)	0.408*** (0.072)
3	0.510*** (0.068)	0.433*** (0.070)	0.434*** (0.070)	0.323*** (0.071)
4	0.252*** (0.072)	0.201** (0.073)	0.196** (0.073)	0.163* (0.073)
6	−0.256** (0.080)	−0.187* (0.081)	−0.175* (0.081)	−0.133 (0.081)
7	−0.477*** (0.086)	−0.340*** (0.087)	−0.309*** (0.087)	−0.205* (0.087)
8	−0.722*** (0.092)	−0.505*** (0.093)	−0.436*** (0.094)	−0.246* (0.096)
9	−0.990*** (0.101)	−0.709*** (0.102)	−0.595*** (0.103)	−0.301** (0.105)
10	−1.249*** (0.111)	−0.858*** (0.113)	−0.694*** (0.116)	−0.318* (0.123)
Education (*Ref.*: Higher education)				
No qualifications			0.727*** (0.093)	0.460*** (0.096)
Below high school diploma level			0.496*** (0.087)	0.278** (0.090)
High school diploma *(baccalauréat)*			0.329** (0.108)	0.165 (0.110)
Missing			0.505*** (0.084)	0.211* (0.088)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.514*** (0.127)
Tradespeople, shopkeepers				0.461*** (0.086)
Executives				−0.420*** (0.118)
White-collar workers				0.613*** (0.086)
Blue-collar workers				0.398*** (0.075)
Missing				2.052*** (0.085)
Sector (*Ref.*: General government)				
Service sector				0.021 (0.116)
Scientific and technical activities				0.255*** (0.073)
Commerce				0.151* (0.065)
Construction				0.127 (0.078)
Manufacturing				0.318*** (0.068)
Other				0.261** (0.094)
Missing				0.597*** (0.081)
Events after the age of 35				
Unemployment		0.202*** (0.038)	0.209*** (0.039)	0.306*** (0.039)
Illness / maternity leave		1.420*** (0.036)	1.393*** (0.036)	1.339*** (0.037)
Loglikelihood	−14,812.11	−14,018.03	−13,981.49	−13,348.36
AIC	29,644.21	28,060.07	27,994.99	26,754.72
BIC	29,740.24	28,175.30	28,148.63	27,033.20

Table A4 – **Probability of disability status before the age of 55, men**

	(i)	(ii)	(iii)	(iv)
Intercept	−2.690*** (0.050)	−3.165*** (0.056)	−3.782*** (0.098)	−4.313*** (0.125)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	0.266*** (0.072)	0.274*** (0.073)	0.292*** (0.073)	0.057 (0.079)
2	0.432*** (0.067)	0.363*** (0.068)	0.365*** (0.069)	0.213** (0.071)
3	0.394*** (0.066)	0.315*** (0.068)	0.312*** (0.068)	0.217** (0.070)
4	0.182** (0.069)	0.128 (0.070)	0.123 (0.070)	0.093 (0.070)
6	−0.196** (0.075)	−0.124 (0.076)	−0.110 (0.076)	−0.045 (0.076)
7	−0.369*** (0.078)	−0.255** (0.079)	−0.216** (0.079)	−0.084 (0.080)
8	−0.622*** (0.084)	−0.456*** (0.085)	−0.378*** (0.085)	−0.146 (0.087)
9	−0.887*** (0.091)	−0.684*** (0.092)	−0.553*** (0.093)	−0.231* (0.095)
10	−1.364*** (0.107)	−1.085*** (0.109)	−0.890*** (0.111)	−0.508*** (0.117)
Education (*Ref.*: Higher education)				
No qualifications			0.911*** (0.093)	0.550*** (0.098)
Below high school diploma level			0.631*** (0.087)	0.332*** (0.091)
High school diploma (baccalauréat)			0.443*** (0.108)	0.236* (0.110)
Missing			0.582*** (0.085)	0.223* (0.089)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.732*** (0.119)
Tradespeople, shopkeepers				0.487*** (0.080)
Executives				−0.418*** (0.109)
White-collar workers				0.456*** (0.084)
Blue-collar workers				0.473*** (0.070)
Missing				1.867*** (0.080)
Sector (*Ref.*: General government)				
Service sector				0.328** (0.113)
Scientific and technical activities				0.220** (0.078)
Commerce				0.244*** (0.066)
Construction				0.441*** (0.076)
Manufacturing				0.424*** (0.067)
Other				0.307*** (0.091)
Missing				0.522*** (0.081)
Events after the age of 35				
Unemployment		0.195*** (0.037)	0.210*** (0.037)	0.266*** (0.038)
Illness / maternity leave		1.185*** (0.036)	1.152*** (0.036)	1.092*** (0.037)
Loglikelihood	−13,675.62	−13,124.22	−13,066.97	−12,537.81
AIC	27,371.24	26,272.43	26,165.94	25,133.62
BIC	27,461.93	26,381.26	26,311.04	25,396.62

Table A5 – **Probability of disability status before the age of 40, women**

	(i)	(ii)	(iii)	(iv)
Intercept	−4.308*** (0.070)	−5.597*** (0.106)	−5.684*** (0.124)	−6.162*** (0.146)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	−0.026 (0.106)	0.212* (0.107)	0.191. (0.107)	−0.050 (0.112)
2	0.270** (0.094)	0.359*** (0.094)	0.343*** (0.094)	0.222* (0.096)
3	0.215* (0.094)	0.243* (0.094)	0.234* (0.095)	0.182 (0.096)
4	0.185 (0.095)	0.188* (0.095)	0.184 (0.095)	0.169 (0.095)
6	−0.488*** (0.112)	−0.465*** (0.113)	−0.458*** (0.113)	−0.435*** (0.113)
7	−0.680*** (0.119)	−0.586*** (0.120)	−0.572*** (0.120)	−0.497*** (0.120)
8	−0.958*** (0.131)	−0.768*** (0.133)	−0.740*** (0.133)	−0.597*** (0.134)
9	−1.307*** (0.149)	−0.991*** (0.152)	−0.952*** (0.152)	−0.710*** (0.158)
10	−1.651*** (0.171)	−1.307*** (0.174)	−1.264*** (0.174)	−0.916*** (0.189)
Education (*Ref.*: Higher education)				
No qualifications			0.233* (0.106)	−0.060 (0.112)
Below high school diploma level			0.130 (0.087)	−0.089 (0.091)
High school diploma *(baccalauréat)*			−0.088 (0.109)	−0.200 (0.110)
Missing			0.086 (0.082)	−0.143 (0.086)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				−0.198 (0.337)
Tradespeople, shopkeepers				0.022 (0.175)
Executives				−0.345* (0.169)
White-collar workers				0.331*** (0.100)
Blue-collar workers				0.333** (0.126)
Missing				2.185*** (0.118)
Sector (*Ref.*: General government)				
Service sector				−0.073 (0.114)
Scientific and technical activities				0.167 (0.091)
Commerce				0.130 (0.074)
Construction				−0.854* (0.384)
Manufacturing				0.239* (0.098)
Other				0.407*** (0.107)
Missing				0.653*** (0.115)
Events after the age of 35				
Unemployment		0.176** (0.060)	0.183** (0.060)	0.307*** (0.060)
Illness / maternity leave		1.425*** (0.080)	1.427*** (0.080)	1.476*** (0.081)
Loglikelihood	−8,409.04	−8,160.42	−8,155.34	−7,753.15
AIC	16,838.08	16,344.84	16,342.68	15,564.30
BIC	16,937.50	16,464.14	16,501.75	15,852.60

Table A6 – **Probability of disability status before the age of 45, women**

	(i)	(ii)	(iii)	(iv)
Intercept	−3.575*** (0.056)	−4.499*** (0.077)	−4.800*** (0.100)	−5.374*** (0.119)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	−0.260** (0.090)	−0.074 (0.091)	−0.099 (0.091)	−0.366*** (0.095)
2	0.034 (0.079)	0.106 (0.079)	0.086 (0.079)	−0.064 (0.082)
3	0.049 (0.078)	0.070 (0.078)	0.056 (0.078)	−0.017 (0.080)
4	0.028 (0.078)	0.030 (0.078)	0.024 (0.078)	−0.003 (0.079)
6	−0.233** (0.083)	−0.212* (0.084)	−0.203* (0.084)	−0.167* (0.084)
7	−0.468*** (0.089)	−0.387*** (0.089)	−0.365*** (0.090)	−0.273** (0.090)
8	−0.827*** (0.099)	−0.659*** (0.100)	−0.611*** (0.101)	−0.431*** (0.102)
9	−1.088*** (0.109)	−0.835*** (0.111)	−0.757*** (0.111)	−0.455*** (0.115)
10	−1.438*** (0.124)	−1.131*** (0.126)	−1.022*** (0.127)	−0.617*** (0.137)
Education (*Ref.*: Higher education)				
No qualifications			0.462*** (0.093)	0.132 (0.099)
Below high school diploma level			0.343*** (0.078)	0.089 (0.083)
High school diploma *(baccalauréat)*			0.156 (0.097)	0.007 (0.099)
Missing			0.325*** (0.074)	0.064 (0.078)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.275 (0.230)
Tradespeople, shopkeepers				0.197 (0.136)
Executives				−0.288* (0.135)
White-collar workers				0.485*** (0.084)
Blue-collar workers				0.539*** (0.103)
Missing				2.255*** (0.097)
Sector (*Ref.*: General government)				
Service sector				−0.078 (0.095)
Scientific and technical activities				0.301*** (0.071)
Commerce				0.126* (0.061)
Construction				−0.659* (0.285)
Manufacturing				0.171* (0.076)
Other				0.264** (0.089)
Missing				0.589*** (0.093)
Events after the age of 35				
Unemployment		0.272*** (0.047)	0.281*** (0.047)	0.385*** (0.048)
Illness / maternity leave		0.949*** (0.054)	0.945*** (0.055)	0.988*** (0.056)
Loglikelihood	−11,448.54	−11,224.04	−11,207.60	−10,620.46
AIC	22,917.08	22,472.07	22,447.21	21,298.93
BIC	23,013.99	22,588.37	22,602.27	21,579.98

Table A7 – **Probability of disability status before the age of 50, women**

	(i)	(ii)	(iii)	(iv)
Intercept	−2.969*** (0.048)	−3.644*** (0.061)	−3.998*** (0.083)	−4.430*** (0.097)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	−0.221** (0.076)	−0.075 (0.076)	−0.101 (0.076)	−0.276*** (0.080)
2	−0.042 (0.069)	0.016 (0.069)	−0.007 (0.069)	−0.104 (0.071)
3	0.010 (0.067)	0.027 (0.068)	0.011 (0.068)	−0.034 (0.069)
4	−0.010 (0.067)	−0.009 (0.068)	−0.017 (0.068)	−0.037 (0.068)
6	−0.129 (0.069)	−0.105 (0.069)	−0.098 (0.070)	−0.075 (0.070)
7	−0.418*** (0.074)	−0.349*** (0.075)	−0.327*** (0.075)	−0.250*** (0.075)
8	−0.659*** (0.080)	−0.517*** (0.081)	−0.463*** (0.081)	−0.292*** (0.082)
9	−1.052*** (0.091)	−0.846*** (0.092)	−0.754*** (0.093)	−0.468*** (0.096)
10	−1.222*** (0.096)	−0.976*** (0.098)	−0.842*** (0.099)	−0.434*** (0.107)
Education (*Ref.*: Higher education)				
No qualifications			0.606*** (0.080)	0.238** (0.084)
Below high school diploma level			0.407*** (0.069)	0.119 (0.073)
High school diploma *(baccalauréat)*			0.214* (0.085)	0.047 (0.087)
Missing			0.341*** (0.066)	0.059 (0.069)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.325 (0.176)
Tradespeople, shopkeepers				0.203 (0.106)
Executives				−0.442*** (0.111)
White-collar workers				0.365*** (0.067)
Blue-collar workers				0.567*** (0.082)
Missing				1.952*** (0.079)
Sector (*Ref.*: General government)				
Service sector				−0.116 (0.083)
Scientific and technical activities				0.247*** (0.061)
Commerce				0.248*** (0.051)
Construction				−0.410 (0.220)
Manufacturing				0.265*** (0.061)
Other				0.229** (0.075)
Missing				0.353*** (0.081)
Events after the age of 35				
Unemployment		0.297*** (0.038)	0.308*** (0.038)	0.378*** (0.039)
Illness / maternity leave		0.643*** (0.041)	0.636*** (0.042)	0.652*** (0.043)
Loglikelihood	−14,416.24	−14,228.41	−14,194.90	−13,593.34
AIC	28,852.48	28,480.82	28,421.80	27,244.68
BIC	28,946.94	28,594.18	28,572.94	27,518.63

Table A8 – **Probability of disability status before the age of 55, women**

	(i)	(ii)	(iii)	(iv)
Intercept	−2.371*** (0.048)	−2.933*** (0.060)	−3.458*** (0.088)	−3.887*** (0.104)
Earned income between the ages of 30 and 35 (*Ref.*: 5)				
1	−0.290*** (0.078)	−0.153. (0.079)	−0.182* (0.079)	−0.314*** (0.082)
2	−0.152* (0.072)	−0.101 (0.072)	−0.129 (0.072)	−0.203** (0.074)
3	−0.134 (0.071)	−0.114 (0.071)	−0.132 (0.072)	−0.170* (0.073)
4	−0.065 (0.070)	−0.067 (0.070)	−0.080 (0.070)	−0.098 (0.071)
6	−0.171* (0.071)	−0.153* (0.071)	−0.150* (0.071)	−0.145* (0.072)
7	−0.367*** (0.074)	−0.315*** (0.075)	−0.299*** (0.075)	−0.236** (0.075)
8	−0.663*** (0.080)	−0.551*** (0.081)	−0.500*** (0.081)	−0.321*** (0.082)
9	−0.932*** (0.087)	−0.772*** (0.088)	−0.675*** (0.089)	−0.395*** (0.091)
10	−1.121*** (0.093)	−0.927*** (0.094)	−0.759*** (0.096)	−0.399*** (0.102)
Education (*Ref.*: Higher education)				
No qualifications			0.828*** (0.087)	0.394*** (0.093)
Below high school diploma level			0.624*** (0.076)	0.294*** (0.081)
High school diploma *(baccalauréat)*			0.400*** (0.093)	0.215* (0.096)
Missing			0.503*** (0.074)	0.184* (0.078)
Socio-professional category (*Ref.*: Middle-management professions)				
Farmers				0.589*** (0.166)
Tradespeople, shopkeepers				0.374*** (0.100)
Executives				−0.405*** (0.113)
White-collar workers				0.358*** (0.068)
Blue-collar workers				0.740*** (0.081)
Missing				1.687*** (0.078)
Sector (*Ref.*: General government)				
Service sector				−0.043 (0.088)
Scientific and technical activities				0.325*** (0.064)
Commerce				0.292*** (0.054)
Construction				−0.146 (0.211)
Manufacturing				0.286*** (0.061)
Other				0.339*** (0.074)
Missing				0.299*** (0.080)
Events after the age of 35				
Unemployment		0.213*** (0.038)	0.226*** (0.038)	0.268*** (0.039)
Illness / maternity leave		0.608*** (0.041)	0.586*** (0.041)	0.581*** (0.043)
Loglikelihood	−12,300.37	−12,151.67	−12,096.58	−11,630.28
AIC	24,620.75	24,327.35	24,225.17	23,318.56
BIC	24,709.63	24,434.01	24,367.38	23,576.32