





OPEN ACCESS

# Does reduced employment protection increase the employment disadvantage of workers with low education and poorer health?

Merel Schuring <sup>1</sup>, Suzan J W Robroek,<sup>1</sup> Ludovico Carrino,<sup>2</sup> Anouk C O'Prinsen,<sup>1</sup> Karen M Oude Hengel,<sup>1,3</sup> Mauricio Avendano <sup>4,5</sup>, Alex Burdorf<sup>1</sup>

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/jech-2020-213772>).

<sup>1</sup>Department of Public Health, Erasmus Medical Center, Rotterdam, Netherlands

<sup>2</sup>Global Health & Social Medicine, King's College London, London, UK

<sup>3</sup>Netherlands Organization for Applied Scientific Research TNO, Leiden, Netherlands

<sup>4</sup>Department of Global Health and Social Medicine, King's College London School of Social Science and Public Policy, London, UK

<sup>5</sup>Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Harvard University, Cambridge, Massachusetts, USA

## Correspondence to

M Schuring, Department of Public Health, Erasmus University Medical Center, P.O. Box 2040, 3000 CA Rotterdam, The Netherlands; [m.schuring@erasmusmc.nl](mailto:m.schuring@erasmusmc.nl)

Received 14 January 2020

Revised 1 April 2020

Accepted 2 June 2020



© Author(s) (or their employer(s)) 2020. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Schuring M, Robroek SJW, Carrino L, et al. *J Epidemiol Community Health* 2020;**74**:851–857.

## ABSTRACT

**Background** Declines in employment protection may have disproportionate effects on employment opportunities of workers with low education and poorer health. This study investigates the impact of changes in employment protection levels on employment rates according to education and health in 23 European countries.

**Methods** Data were taken from the 4-year rotating panel European Union Statistics on Income and Living Conditions study. Employed participants aged 29–59 years (n = 334 999) were followed for 1 year over an 11-year period, from 2003 up to 2014. A logistic regression model with country and period fixed effects was used to estimate the association between changes in the Organisation for Economic Co-operation and Development (OECD) employment protection index and labour market outcomes, incorporating interaction terms with education and health.

**Results** 15 of the 23 countries saw their level of employment protection decline between 2003 and 2014. Reduced employment protection of temporary workers increased odds of early retirement (OR 6.29, 95% CI 3.17 to 12.48) and unemployment (OR 1.37, 95% CI 1.07 to 1.76). Reduced employment protection of permanent workers increased odds of early retirement more among workers in poor health (OR 4.46, 95% CI 2.26 to 8.78) than among workers in good health (OR 2.58, 95% CI 1.30 to 5.10). The impact of reduced employment protection of temporary workers on unemployment was stronger among lower-educated workers (OR 1.47, 95% CI 1.13 to 1.90) than among higher-educated workers (OR 1.21, 95% CI 0.95 to 1.54).

**Conclusion** Reduced employment protection increased the odds of early exit from paid employment, especially among workers with lower education and poorer health. Employment protection laws may help reduce the employment disadvantage of workers with low education and poorer health.

## INTRODUCTION

Employment protection legislation (EPL) was designed to protect jobs and increase job stability, as well as to prevent the negative consequences of job loss for workers and their families.<sup>1</sup> Since the 1990s, many European countries have implemented reforms to their EPL systems, aimed at 'flexibilisation' or 'deregulation' of the labour market.<sup>1</sup> As a result, the proportion of temporary workers has increased, while the employment protection of permanent workers has remained largely unchanged.<sup>2,3</sup>

A common argument in favour of reduced EPL is that making it easier to fire workers would increase employment and boost future economic growth, because firms may be more likely to hire employees if they have more flexibility in dismissing them.<sup>1</sup> However, this has resulted in segmentation of the labour market, whereby outsiders tend to move from one temporary contract to another while insiders enjoy high protection and stability.<sup>4</sup>

One assumption behind EPL flexibilisation is that it reduces labour market inefficiencies, increasing overall employment and improving the overall well-being of workers.<sup>1</sup> Consistently, some studies suggest that paid employment is associated with better health,<sup>5</sup> while exit from paid employment is associated with deterioration of health.<sup>6–11</sup> On the one hand, EPL flexibilisation that reduces employment protection may also increase the risk that vulnerable workers, particularly those in poor health or with less education, exit paid employment,<sup>12–16</sup> perpetuating the employment gap of workers by education and health status.<sup>17</sup>

In some European countries, such as the United Kingdom, poor health is considered by law a potential cause for dismissal.<sup>18</sup> By contrast, in countries such as the Netherlands, legislation tightly regulates the dismissal of workers for health reasons.<sup>19</sup> Earlier studies suggest that there has been an increased risk of exit from paid employment among workers with health limitations and chronic illnesses in response to reduced employment protection.<sup>20,21</sup> Two European studies found that higher employment protection is associated with a smaller employment gap between healthy and unhealthy persons.<sup>17,22</sup> A limitation of these studies is that they rely on cross-country variation in employment protection levels, making it difficult to control for the impact of other characteristics that vary across countries. So far, no studies have examined the impact of changes in employment protection levels within countries on labour market outcomes according to health and educational level.

Lower-educated workers more often have employment contracts with flexible working hours and short-term temporary contracts compared with higher-educated workers.<sup>23</sup> An earlier study showed that lower-educated workers were more likely to exit paid employment through unemployment, disability and economic inactivity but were less likely to exit paid employment into early retirement, compared with higher-educated workers.<sup>21</sup> Reduction

of employment protection may increase exit from paid employment through different pathways among lower- and higher-educated workers. However, no studies have examined this question exploiting changes in employment protection across countries.

The aim of this study was to assess the impact of changes in employment protection on exit from paid employment through different pathways among workers in European countries. We hypothesised that reforms which reduced employment protection in pursuit of higher labour market flexibility disproportionately increased the risk of exit from paid employment among workers with lower education and poorer health.<sup>17 24 25</sup>

## METHODS

### Design and study population

Longitudinal data from 2003 to 2014 were obtained from the 4-year rotating panel 'European Union Statistics on Income and Living Conditions' (EU-SILC), in which 25% of the sample is newly recruited and 25% is dropped each year. Data from 23 EU-countries that participated between 2003 and 2014 were available. Details on modalities of data collection, comparability of data between countries and over time, response levels and any other question concerning the quality of data are provided by the official EU-SILC documentation and are freely available.<sup>26</sup>

For the purpose of this study, our sample includes individuals in paid-employment, aged between 30 and 59 years, with available information on self-rated health at the year of enrolment in the study and on their employment status at 1-year follow-up. Our age selection is motivated by our interest to capture exit from paid employment prior to the Statutory Pension Age. To ensure that workers finished education, participants chosen were aged at least 30 years. A follow-up period of 1 year was used instead of the maximum follow-up period of 4 years in the EU-SILC longitudinal cohort, because employment protection level may change in a country from year to year. Each year, from 2003 until 2013, a representative sample of the employed population in a country was followed for 1 year. This longitudinal cohort was used to investigate the influence of yearly changes in country-specific indicators of employment protection on paid employment among permanent and temporary workers. Our sample includes 334 999 participants with available information on the variables of interests.

### Employment status

The labour force status was self-reported by respondents at each wave and classified into six mutually exclusive categories: employment (employee or self-employed, full-time or part-time), disability (unfit to work, permanently disabled), unemployment, retirement, economic inactivity (fulfilling domestic tasks and care responsibilities and other inactivity) and other (in military service, student). Based on the self-reported employment status at 1-year follow-up, four different pathways out of paid employment were defined: disability, unemployment, retirement and economic inactivity. We generated an additional variable capturing all of the above pathways ('exit from paid employment through all pathways'). Participants who left paid employment due to other reasons (military service or education) were excluded from the study (1.0% of total study population).

### Self-rated health

Self-rated health of all participants at baseline was used. Participants were asked to rate their own general health on a 5-point scale, ranging from 'very good', 'good', 'fair' and

'bad' to 'very bad'. Those reporting less than 'good health' were defined as having poor self-rated health.<sup>27</sup>

### Educational level

Participants were divided into three groups according to their level of educational attainment on the basis of the International Standard Classification of Education (ISCED-97): high education was defined as higher vocational training or university (ISCED 5–6), intermediate education was defined as higher secondary and intermediate vocational training (ISCED 3–4) and low education was defined as lower secondary education, primary and pre-primary education (ISCED 0–2).<sup>28</sup>

### Gross domestic product

Gross domestic product (GDP) per capita at market prices is defined as the expenditure on final goods and services minus imports, and represents the economic performance of a country. GDP is expressed in US\$ per capita, constant prices and purchasing power parity, indexed to inflation and exchange rates. The Organisation for Economic Co-operation and Development (OECD) database of GDP per country per year is available online.<sup>29</sup>

### Employment protection legislation

Individual-level data from the EU-SILC were linked to country- and year-level data on two key indicators of EPL constructed by the OECD.<sup>30</sup> These indicators measure the procedures and costs involved in dismissing individuals or groups of workers and the procedures involved in hiring workers on fixed-term or temporary work agency contracts. The indicators have been built using the OECD Secretariat's own reading of statutory laws, collective bargaining agreements and case law as well as contributions from officials from OECD member countries and advice from country experts.<sup>30</sup> Based on the OECD classification, two indicators of EPL were included in the current study: individual and collective dismissals of workers with permanent contracts (eprc\_v2) and regulation of temporary contracts (ept\_v1). These indicators typically are measured on a cardinal scale from 0 to 6, with higher scores implying more stringent procedures and higher costs involved in individual or collective dismissal of workers with permanent contracts (eprc\_v2), or more stringent regulations of temporary contracts (ept\_v1)<sup>31</sup> (online supplementary tables S1 and S2).

### Statistical analysis

This longitudinal cohort was used to investigate the influence of yearly changes in country-specific indicators of employment protection on paid employment among permanent and temporary workers. To analyse the association between changes in employment protection level and the probability of exit from paid employment, the following pooled logistic regression model with fixed effects for country and year was used:  $\text{Log}(p_{ijt}/(1-p_{ijt})) = \beta_0 + \beta_1 E_{jt} + \beta_2 X_{ijt} + \beta_3 G_{jt} + \beta_4 C_j + \beta_5 T_t + \varepsilon_{ijt}$ , where  $i$  represents a person,  $j$  represents a country and  $t$  represents time.  $p$ =the probability that the outcome measure is equal to 1 (=exit from paid employment),  $E$ =employment protection level,  $X$ =individual characteristics (age, sex, education, health),  $G$ =GDP for each country in each year,  $C$ =a set of dummy variables representing country fixed effects and  $T$ =a set of dummy variables representing period (year) fixed effects.  $\beta_0$ =intercept,  $\beta_1$ =parameter indicating the association between changes in employment protection and exit from paid

employment,  $\beta_2$ =parameters indicating the association between individual characteristics and exit from paid employment,  $\beta_3$ =parameter indicating the association between GDP and exit from paid employment,  $\beta_4$  and  $\beta_5$ =parameters indicating differences in probability to exit paid employment between countries and years and  $\varepsilon$ =error term. This analytical technique (with fixed effects for country and year) removes confounding by unmeasured time-invariant country characteristics and unmeasured common trends across all countries, and essentially quantifies the association between changes in employment protection and the probability to exit paid employment, net of country differences and common time trends. Analyses were done for total exit from paid employment as well as for each pathway out of paid employment. For each pathway, one reference group consisted of persons who continued to be employed or left employment through another pathway. ORs with corresponding 95% CIs were calculated as measure of association. In all analyses, SEs were clustered at the country level.

The association between changes in employment protection level and exit from paid employment among workers in poor versus good health was analysed by including an interaction term of individual health and employment protection level in the model. The following model was used:

$$\text{Log}(p_{ijt}/(1-p_{ijt})) = \beta_0 + \beta_1 E_{jt} + \beta_2 \text{health}_{ijt} + \beta_3 \text{health}_{ijt} * E_{jt} + \beta_4 X_{ijt} + \beta_5 G_{jt} + \beta_6 C_j + \beta_7 T_t + \varepsilon_{ijt}$$

The difference between healthy and unhealthy workers in the association between changes in employment protection and exit from paid employment was estimated by  $\beta_3$ . The effect of changes in employment protection among healthy workers (dichotomous variable for health coded 0 for good health and 1 for poor health) or among unhealthy workers (dichotomous variable for health coded 0 for poor health and 1 for good health) was estimated by  $\beta_1$ . In addition, the association between changes in employment

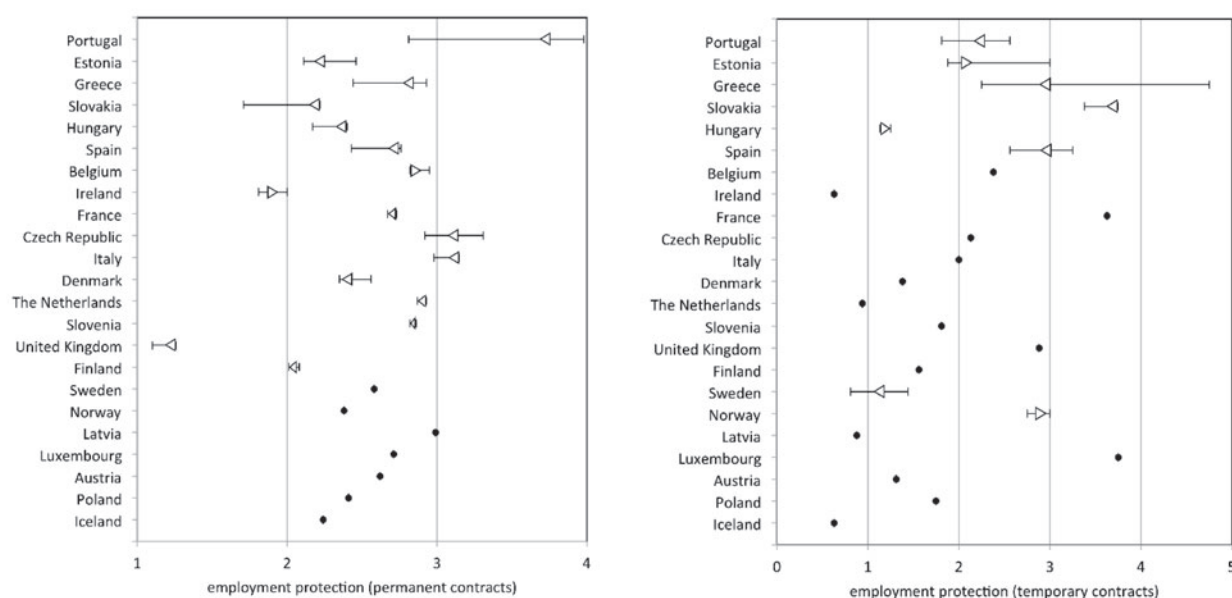
protection and exit from paid employment among lower-, intermediate- and higher-educated workers was analysed by including a cross-level interaction term between educational level and employment protection level in the model. All analyses were performed using Stata statistical software V.14 (StataCorp).

## RESULTS

Employment protection of permanent workers decreased in 14 of 23 European countries, with the largest decrease being observed in Portugal (from 4.0 to 2.8), Slovakia (from 2.2 to 1.7) and Greece (from 2.9 to 2.4). Employment protection of workers with temporary contracts decreased in five European countries and increased in three European countries. The largest decrease in employment protection of temporary workers was observed in Greece (from 4.8 to 2.3), whereas the largest increase was found in Estonia (from 1.9 to 3.0) (figure 1 and online supplementary table S3).

The upper panel of table 1 shows the association between individual characteristics and exit from paid employment through different pathways. Lower-educated workers were more likely to exit paid employment via disability status (OR 2.81, 95% CI 2.34 to 3.36), unemployment status (OR 2.70, 95% CI 2.28 to 3.20), early retirement (OR 1.31, 95% CI 1.01 to 1.69) and economic inactivity (OR 2.18, 95% CI 1.77 to 2.67) compared with higher-educated persons. In addition, respondents in poorer health had higher likelihood of transitioning from paid employment into disability status (OR 7.17, 95% CI 5.72 to 8.99), unemployment status (OR 1.51, 95% CI 1.40 to 1.63), early retirement (OR 1.12, 95% CI 0.93 to 1.34) and economic inactivity (OR 1.22, 95% CI 1.12 to 1.33) compared with respondents in good health.

The lower panel of table 1 shows the influence of changes in employment protection on exit from paid employment based on a regression model including fixed effects for country and year. Reduced employment protection for permanent workers in European countries increased the likelihood of transitions into



**Figure 1** Change in employment protection level in 23 European countries between 2003 and 2014. A decrease ( $\triangleleft$ ), an increase ( $\triangleright$ ), or no change ( $\bullet$ ) in employment protection level in European countries. The largest decrease in employment protection of permanent workers was found in Portugal (from 4.0 to 2.8), whereas the largest decrease in employment protection of temporary workers was found in Greece (from 4.8 to 2.3).

**Table 1** Association between individual- and country characteristics and different pathways out of paid employment among employed persons (n=334 999) in 23 European countries of a rotating panel (EU-SILC) between 2003 and 2014

	Mean (SD)	Exit from paid employment				
		Unemployment (n=12 829) OR (95% CI)	Early retirement (n=3805) OR (95% CI)	Disability (n=1920) OR (95% CI)	Economic inactivity (n=6670) OR (95% CI)	All pathways (n=25 254) OR (95% CI)
Age	43.6 (8.2)	0.97 (0.97–0.98)	1.17 (1.04–1.31)	1.04 (1.03–1.06)	0.97 (0.95–0.99)	1.00 (0.99–1.01)
	N (%)					
Gender						
Male	174 581 (51.1)	1	1	1	1	1
Female	160 418 (47.9)	1.09 (0.98–1.20)	1.12 (0.76–1.65)	1.07 (0.89–1.27)	4.87 (3.81–6.23)	1.58 (1.41–1.78)
Education						
High	95 070 (28.4)	1	1	1	1	1
Intermediate	159 441 (47.6)	1.76 (1.53–2.01)	1.13 (0.96–1.32)	1.82 (1.59–2.08)	1.28 (1.08–1.51)	1.52 (1.41–1.64)
Low	80 488 (24.0)	2.70 (2.28–3.20)	1.31 (1.01–1.69)	2.81 (2.34–3.36)	2.18 (1.77–2.67)	2.36 (2.14–2.60)
Health						
Good	262 243 (78.3)	1	1	1	1	1
Poor	72 756 (21.7)	1.51 (1.40–1.63)	1.12 (0.93–1.34)	7.17 (5.72–8.99)	1.22 (1.12–1.33)	1.64 (1.45–1.85)
	Mean (sd) min-max					
GDP	33.74 (10.40) 16.66–88.30	0.91 (0.88–0.95)	0.93 (0.82–1.06)	0.98 (0.88–1.10)	0.99 (0.93–1.05)	0.94 (0.92–0.96)
Employment protection of permanent workers (eprc_v2) (decrease)	2.64 (0.51) 1.10–3.98	0.91 (0.44–1.90)	3.45 (1.76–6.76)	1.55 (0.90–2.66)	1.20 (0.70–2.07)	1.31 (0.94–1.83)
Employment protection of temporary workers (ept_v1) (decrease)	2.18 (0.87) 0.63–4.75	1.37 (1.07–1.76)	6.29 (3.17–12.48)	1.36 (0.82–2.25)	0.99 (0.55–1.78)	1.58 (1.20–2.09)

OLS regression models included individual characteristics (age, sex, education, health) and country characteristics (GDP and employment protection (eprc-v2 or ept-v1)) with fixed effects for country and year.

EU-SILC, European Union Statistics on Income and Living Conditions; GDP, gross domestic product; OLS, ordinary least squares.

early retirement (OR 3.45, 95% CI 1.76 to 6.76). Reduced employment protection for permanent workers was not associated with other pathways of exit from paid employment. Less employment protection for temporary workers increased the likelihood to exit from paid employment (OR 1.58, 95% CI 1.20 to 2.09), due to the increased likelihood of early retirement (OR 6.29, 95% CI 3.17 to 12.48) and unemployment (OR 1.37, 95% CI 1.07 to 1.76).

Table 2 illustrates the results based on the regression analyses including the interaction term between health and employment protection. Reduced employment protection for permanent workers increased the risk of exit from paid employment more among workers in poor health compared with workers in good health. This is particularly the case for early exit due to retirement. A reduction in employment protection increased the odds of retirement more among workers in poor health (OR 4.46, 95% CI 2.26 to 8.78) than among workers in good health (OR 2.58, 95% CI 2.00 to 3.32), with a statistically significant interaction effect between health and employment protection of 1.73 (95% CI 1.39 to 2.15), as shown in online supplementary table S4. A reduction in employment protection for temporary workers increased the risk of exit from paid employment among workers in poor health (OR 1.63, 95% CI 1.23 to 2.16) as well as among workers in good health (OR 1.56, 95% CI 1.23 to 2.16) (table 2 and online supplementary table S4).

Table 3 illustrates the results based on the regression analyses including the interaction term between education and employment protection. When employment protection for permanent workers was reduced, higher-educated workers were less likely to become unemployed (OR 0.67, 95% CI 0.34 to 1.30) compared with lower-educated workers (OR 0.97, 95% CI 0.46 to 2.04), with an interaction effect between education and employment

protection of 1.45 (95% CI 1.00 to 2.12), as shown in online supplementary table S5. Similarly, a reduction in employment protection for temporary workers increased the risk of becoming unemployed more among lower-educated workers (OR 1.47, 95% CI 1.13 to 1.90) than among higher-educated workers (OR 1.21, 95% CI 0.95 to 1.54), with an interaction effect between education and employment protection of 1.21 (95% CI 1.02 to 1.45) (table 3 and online supplementary table S5).

## DISCUSSION

The majority of the 23 European countries included in our study reformed employment protection legislations between 2003 and 2014, and most of these reforms reduced the level of employment protection. Reduced employment protection of permanent workers increased odds of early retirement, especially among workers in poor health. Reduced employment protection of temporary workers increased odds of early retirement and unemployment among workers in poor health as well as workers in good health. The impact of a reduced employment protection on unemployment was stronger among lower-educated workers compared with higher-educated workers.

The finding that a reduction in employment protection levels within European countries was associated with increased odds of exit from paid employment supports the evidence from earlier studies. A longitudinal study among 26 European countries, analysing national differences in employment protection and the risk of exit from paid employment, showed that a higher employment protection level was associated with reduced exit from paid employment.<sup>17</sup> In addition, two comparative studies of European countries indicated that in countries with higher

**Table 2** Association between change in employment protection and pathways out of paid employment among employed persons in good or poor health in 23 European countries of a rotating panel (EU-SILC) between 2003 and 2014

	Exit from paid employment				
	Unemployment	Early retirement	Disability	Economic inactivity	All pathways
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Decrease in employment protection of permanent workers</b>					
Among workers in good health	0.85 (0.42–1.74)	2.58 (1.30–5.10)	1.15 (0.61–2.16)	1.24 (0.72–2.14)	1.16 (0.88–1.54)
Among workers in poor health	0.99 (0.49–2.03)*	4.46 (2.26–8.78)*	1.69 (0.98–2.91)	1.15 (0.68–1.95)	1.52 (1.08–2.13)*
<b>Decrease in employment protection of temporary workers</b>					
Among workers in good health	1.36 (1.06–1.75)	6.15 (3.09–12.22)	1.29 (0.80–2.10)	1.02 (0.58–1.80)	1.56 (1.18–2.06)
Among workers in poor health	1.40 (1.08–1.80)	6.42 (3.17–13.01)	1.39 (0.83–2.31)	0.92 (0.49–1.73)	1.63 (1.23–2.16)

OLS regression models included age, sex, education, GDP and employment protection×health with fixed effects for country and year.

\*Significant interaction employment protection×health ( $p < 0.05$ ).

See online supplementary table S4 for the value of OR's for interactions.

EU-SILC, European Union Statistics on Income and Living Conditions; GDP, gross domestic product; OLS, ordinary least squares.

employment protection (eg, Sweden), higher employment levels were found compared with countries with lower employment protection (eg, United Kingdom).<sup>24 25</sup> These earlier studies analysed differences in employment protection level *between* countries, whereas the current study analysed changes in employment protection *within* countries. Our model enabled us to control for time-invariant country-level variables, an improvement over prior studies that relied on cross-country variation.

Lower-educated workers were more likely to exit paid employment, and policy reforms that reduced employment protection level resulted in increasing gaps in paid employment according to educational level. Prior evidence suggests that this increased gap in employment may also increase inequalities in health. For example, a longitudinal study using EU-SILC data from 28 European countries between 2008 and 2011 found a decrease in self-rated health after persons became unemployed.<sup>10</sup> Likewise, a longitudinal study using EU-SILC data from Italy between 2007 and 2010 found a worsening of health among persons who left paid employment.<sup>11</sup>

Reducing employment protection of permanent workers in European countries increased exit from paid employment more among workers in poor health compared with workers in good health. In concordance with this finding, a longitudinal study among 26 European countries (EU-SILC data) showed that a higher employment protection level was associated with smaller

inequalities in the risk of exit from paid employment between healthy and unhealthy women.<sup>17</sup> This suggests that in most countries, employment protection laws benefit workers in poor health more than it benefits workers in good health. A potential explanation is the fact that poor health is often a potential cause for dismissal.<sup>18</sup>

Our study suggests that higher flexibility in labour contracts increases the risk of exit from paid employment, but with different exit routes among different social groups. Exit out of paid employment mainly occurred through early retirement in all social groups. Among permanent workers, reduced employment protection increased early retirement more strongly among workers in poor health. The fact that impacts are largely on early retirement is of significant policy relevance, as Governments have increasingly developed policies to prevent early retirement and encourage working after the age of 65.<sup>32</sup> Prior evidence suggests that early retirement increases the risk of financial hardship later in life.<sup>33</sup> Pension policy reforms over the last two decades have restricted access to early retirement schemes in most European countries, with the aim of extending working lives.<sup>34</sup> Our findings suggest that these policies, when paired with reduced employment protection, may have long-term implications for the financial well-being of workers approaching pensionable age, particularly for those in poor health.

Among lower-educated workers, a stronger impact of reduced employment protection of permanent workers on

**Table 3** Association between change in employment protection and pathways out of paid employment among higher-, intermediate- or lower-educated workers in 23 European countries of a rotating panel (EU-SILC) between 2003 and 2014

	Increase in exit from paid employment				
	Unemployment	Early retirement	Disability	Economic inactivity	All pathways
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Decrease in employment protection of permanent workers</b>					
Among higher educated workers	0.67 (0.34–1.30)	4.04 (1.88–8.66)	1.23 (0.58–2.57)	1.41 (0.80–2.47)	1.22 (0.91–1.63)
Among intermediate educated workers	0.86 (0.45–1.66)	3.01 (1.41–6.40)*	1.50 (0.84–2.66)	1.27 (0.72–2.25)	1.26 (0.95–1.67)
Among lower educated workers	0.97 (0.46–2.04)*	3.47 (1.79–6.75)	1.61 (0.94–2.75)	1.15 (0.69–1.92)	1.34 (0.94–1.93)
<b>Decrease in employment protection of temporary workers</b>					
Among higher educated workers	1.21 (0.95–1.54)	6.21 (2.82–13.66)	1.30 (0.81–2.08)	1.14 (0.68–1.94)	1.53 (1.17–2.00)
Among intermediate educated workers	1.29 (0.99–1.69)	5.74 (2.81–11.74)	1.32 (0.80–2.18)	1.02 (0.57–1.81)	1.50 (1.15–1.96)
Among lower educated workers	1.47 (1.13–1.90)*	6.40 (3.26–12.53)	1.38 (0.83–2.30)	0.94 (0.51–1.75)	1.63 (1.24–2.15)

OLS regression models including age, sex, education, GDP and employment protection×education with fixed effects for country and year.

\*Interaction employment protection×education ( $p < 0.05$ ).

See online supplementary table S5 for the value of OR's for interactions.

EU-SILC, European Union Statistics on Income and Living Conditions; GDP, gross domestic product; OLS, ordinary least squares.

unemployment was found compared with higher-educated workers. Higher-educated workers may avoid unemployment by choosing or being offered early retirement benefits. It has been suggested that higher-educated workers have the financial resources to retire before the statutory age, whereas lower-educated workers have to rely more on statutory pension schemes.<sup>35</sup> Vulnerable groups, such as lower-educated workers, may more often become unemployed because they do not have the necessary economic means to take up early retirement. Unemployment may mean people would be at higher risk of poverty and worse health.<sup>10</sup>

### Strengths and limitations

A strength of the current study is the use of comparable longitudinal data from a large number of European countries. Individual longitudinal data on health and employment status from EU-SILC were combined with information on country-specific employment protection. However, a limitation of using EU-SILC data is the variation in mode of data collection, translations and cultural interpretation.<sup>22</sup> The assessment of self-perceived health has been shown to be useful in evaluating health status in large epidemiologic studies and has been shown to be a strong predictor of mortality.<sup>36</sup> Comparisons in self-rated health measures between different cultures do need to be made with caution.<sup>37</sup> A disadvantage was the use of self-reported employment status, which may differ from registered employment status and between European countries. For example, non-employed persons may consider themselves unemployed only when they are actively looking for work, whereas others on unemployment benefits may have categorised themselves as economically inactive. In addition, it is difficult to distinguish illness-based retirement from non-illness-based retirement. In the Nordic countries, ill-health is one of the eligibility criteria for early retirement.<sup>38</sup> Some individuals with illness-based retirement may have categorised themselves as retired instead of being disabled.

Another strength of the study is the analytical model including fixed effects for country and year. This removes confounding by time-invariant country-level unobservable variables and unmeasured common trends across all countries. However, country-specific time-varying confounders remain a threat to causal inference. If governments have closed the option to exit paid employment through early retirement during our study, individuals would by definition be less likely to exit through early retirement. Therefore, our estimate for early retirement would incorporate the impact of such reforms. The same reasoning could be valid for other policies concerning, for example, more stringent eligibility criteria for disability- or unemployment benefits.

Typically, unemployment benefits do not fall strictly under the definition of employment protection legislation, which focuses on laws and regulation that concern procedures and costs associated with dismissing individuals or groups of workers and hiring of workers on fixed-term contracts. However, it is possible that legislation on unemployment benefits may affect the level of employment protection, for example, if there are collective agreements that enable certain workers to transit to benefits without dismissal.

The associations between reforms in EPL on exit from paid employment were investigated in 23 European countries. However, the effects of changes in employment protection legislation on exit from paid employment may differ between countries, depending on their initial level of employment protection. In countries with a higher level of employment protection,

a decrease in employment protection may have a different effect compared with countries with a lower level of employment protection. Future studies should examine heterogeneity across countries with different institutional characteristics.

The short follow-up period may be considered as a limitation, as the full effects of changes in EPL on exit from paid employment may take longer. Therefore, the effect of changes in employment protection legislation on exit from paid employment may be different in the medium and longer term. However, the design of our study with a short follow-up was deliberate to assess the influence of yearly changes in EPL in European countries.

Although more lenient employment protection regulations may increase flows out of employment, they may also increase flows into employment, for example, because employers are more incentivised to hire workers that may be more easily dismissed. Our study shows that reforms that reduce employment protection increase the risk of exit from paid employment among lower-educated workers and workers in poor health. The impact of legislative changes on entering paid employment is also relevant, but outside the scope of the current study. Further research is therefore needed to understand the consequences of changes in employment protection for unemployed persons or those entering the labour market.

### CONCLUSION

Employment protection legislation reforms aiming at flexibilisation of the labour market increased the risk of early exit from employment, especially among lower-educated workers and workers in poor health. Policy measures to protect the employment of workers in poor health and those with lower education and in poor health may help reducing their employment disadvantage.

#### What is already known on this subject

- ▶ In European countries, higher employment protection is believed to reduce disadvantage in labour market outcomes for individuals in poorer health. However, empirical evidence is limited, with no studies examining how recent reforms to employment protection laws aimed at 'flexibilisation' of the labour market influence the employment opportunities of workers in poorer health.

#### What this study adds

- ▶ Employment protection legislation reforms aimed at flexibilisation of the labour market disproportionately increase the risk of early exit from paid employment for workers with lower education and poor health. To reduce their employment disadvantage, policy measures are needed to protect employment in these vulnerable groups.

**Contributors** MS prepared the data, conducted the analysis, and drafted and revised the paper. SWJR, LC, ACOP, KOH and MA participated in the analysis and commented on the paper. AB conceptualised the study, participated in the analysis, commented on the paper and is the guarantor. All authors approved the final version.

**Funding** This work was conceived with financial support from award no. 208060001 by ZonMW within the Joint Programming Initiative More Years Better Lives (WORKLONG project) framework.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Data availability statement** Data are available upon reasonable request.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Merel Schuring <http://orcid.org/0000-0002-0354-9109>

Mauricio Avendano <http://orcid.org/0000-0002-7295-2911>

#### REFERENCES

- OECD. Protecting jobs, enhancing flexibility: a new look at employment protection legislation. *OECD Employment Outlook* 2013;
- Barbieri P, Scherer S. Labour market flexibilization and its consequences in Italy. *Eur Sociol Rev* 2009;25:677–92.
- Kahn LM. Employment protection reforms, employment and the incidence of temporary jobs in Europe: 1996–2001. *Labour Econ* 2010;17:1–15.
- Guell M, Petrongolo B. How binding are legal limits? Transitions from temporary to permanent work in Spain. *Labour Econ* 2007;14:153–83.
- Schuring M, Robroek SJ, Burdorf A. The benefits of paid employment among persons with common mental health problems: evidence for the selection and causation mechanism. *Scand J Work Environ Health* 2017;43:540–9.
- Schuring M, Robroek SJ, Lingsma HF, et al. Educational differences in trajectories of self-rated health before, during, and after entering or leaving paid employment in the European workforce. *Scand J Work Environ Health* 2015;41:441–50.
- Bartley M. Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health* 1994;48:333–7.
- Karsten PI, Moser K. Unemployment impairs mental health: meta-analyses. *J Vocat Behav* 2009;74:264–82.
- Janlert U. Unemployment as a disease and diseases of the unemployed. *Scand J Work Environ Health* 1997;23:79–83.
- Toge AG, Blekesaune M. Unemployment transitions and self-rated health in Europe: a longitudinal analysis of EU-SILC from 2008 to 2011. *Soc Sci Med* 2015;143:171–8.
- Sarti S, Zella S. Changes in the labour market and health inequalities during the years of the recent economic downturn in Italy. *Soc Sci Res* 2016;57:116–32.
- van den Berg T, Schuring M, Avendano M, et al. The impact of ill health on exit from paid employment in Europe among older workers. *Occup Environ Med* 2010;67:845–52.
- van Rijn RM, Robroek SJ, Brouwer S, et al. Influence of poor health on exit from paid employment: a systematic review. *Occup Environ Med* 2014;71:295–301.
- Schuring M, Schram JLD, Robroek SJW, et al. The contribution of health to educational inequalities in exit from paid employment in five European regions. *Scand J Work Environ Health* 2019;45:346–55.
- Virtanen P, Janlert U, Hammarstrom A. Health status and health behaviour as predictors of the occurrence of unemployment and prolonged unemployment. *Public Health* 2013;127:46–52.
- Schuring M, Burdorf L, Kunst A, et al. The effects of ill health on entering and maintaining paid employment: evidence in European countries. *J Epidemiol Community Health* 2007;61:597–604.
- Reeves A, Karanikolos M, Mackenbach J, et al. Do employment protection policies reduce the relative disadvantage in the labour market experienced by unhealthy people? A natural experiment created by the Great Recession in Europe. *Soc Sci Med* 2014;121:98–108.
- GOV.UK. Dismissals due to illness. Available <https://www.gov.uk/dismiss-staff/dismissals-due-to-illness>
- Burgerlijk\_Wetboek. Opzeverbod tijdens ziekte [Prohibition of dismissal during illness]. Available [https://wettenoverheid.nl/BWBR0005290/2019-11-15/#Boek7\\_Titeldeel10\\_Afdeling9\\_Artikel670](https://wettenoverheid.nl/BWBR0005290/2019-11-15/#Boek7_Titeldeel10_Afdeling9_Artikel670)
- Carr E, Fleischmann M, Goldberg M, et al. Occupational and educational inequalities in exit from employment at older ages: evidence from seven prospective cohorts. *Occup Environ Med* 2018;75:369–77.
- Schuring M, Robroek SJ, Otten FW, et al. The effect of ill health and socio-economic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands. *Scand J Work Environ Health* 2013;39:134–43.
- van der Wel KA, Dahl E, Thielen K. Social inequalities in 'sickness': European welfare states and non-employment among the chronically ill. *Soc Sci Med* 2011;73:1608–17.
- OECD. *In it together: why less inequality benefits all*. Paris: OECD Publishing, 2015.
- Burström B, Whitehead M, Lindholm C, et al. Inequality in the social consequences of illness: how well do people with long-term illness fare in the British and Swedish labor markets? *Int J Health Serv* 2000;30:435–51.
- McAllister A, Nylén L, Backhans M, et al. Do 'flexicurity' policies work for people with low education and health problems? A comparison of labour market policies and employment rates in Denmark, The Netherlands, Sweden, and the United Kingdom 1990–2010. *Int J Health Serv* 2015;45:679–705.
- Eurostat. Available <http://ec.europa.eu/eurostat/web/income-and-living-conditions/overview>
- Fayers PM, Sprangers MA. Understanding self-rated health. *Lancet* 2002;359:187–8.
- Unesco. *International standard*. Classification of Education, 1997.
- OECD. Stat. Available [http://stats.oecd.org/index.aspx?DatasetCode=SNA\\_TABLE1](http://stats.oecd.org/index.aspx?DatasetCode=SNA_TABLE1)
- OECD. Calculating summary indicators of EPL strictness: methodology. Paris. Available <http://www.oecd.org/employment/emp/38940931.pdf> 2014.
- OECD. OECD indicators of employment protection. Available <http://www.oecd.org/els/emp/oecdindicatorsofemploymentprotection.htm>
- OECD. *Pensions at a glance 2017: OECD and G20 Indicators*. Paris: OECD, 2017.
- Angelini V, Brugiavini A, Weber G. Ageing and unused capacity in Europe: is there an early retirement trap? *Econ Policy* 2014;24:463–508.
- OECD. *Pensions at a Glance 2019: OECD and G20 Indicators*. Paris: OECD Publishing,
- de Wind A, Geuskens GA, Ybema JF, et al. Health, job characteristics, skills, and social and financial factors in relation to early retirement: results from a longitudinal study in the Netherlands. *Scand J Work Environ Health* 2014;40:186–94.
- Burström B, Fredlund P. Self rated health: is it as good a predictor of subsequent mortality among adults in lower as well as in higher social classes? *J Epidemiol Community Health* 2001;55:836–40.
- Jurges H. True health vs response styles: exploring cross-country differences in self-reported health. *Health Econ* 2007;16:163–78.
- Nordic\_Social-Statistical\_Committee. *Old-age pension systems in the Nordic countries* Copenhagen. NOMESKO-NOSOSKO 2008. ISBN978-87-90248-38-3. urn:nbn:se:norden:org:diva-4604