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Educational inequalities in extending working lives

de Breij, S.

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7 | General discussion

Extending working lives is high on the political agenda in many European countries. Policies are generally generic, aimed at the entire group of older workers, thereby neglecting to address the heterogeneity of this group. In this thesis the main focus was on educational inequalities in extending working lives.

The objectives of this thesis were threefold:

- To identify determinants of early work exit across educational groups;
- To identify work place determinants of health in older workers across educational groups;
- To identify determinants of health after work exit across educational groups.

In this chapter, the main findings from this thesis are summarized and discussed. In Table 1, the main findings per chapter can be found. Furthermore, methodological issues and implications for policy, practice and research are addressed.

Main findings

Determinants of early work exit across educational groups

Ageing is accompanied by a decrease in health. With workers having to work up to increasingly higher ages, the role of poor health in early exit from paid work is becoming increasingly important. In our longitudinal study, we examined health determinants of early work exit and investigated whether the associations between poor health and early work exit differed by educational level (chapter 2). The idea was that poor health may have a greater impact on low educated workers, because compared to higher educated workers, they have more physically demanding jobs and have less resources to be able to continue working when facing health problems. We found that poor self-rated health (SRH), functional limitations, and depression were risk factors for early work exit in all four countries. Health effects were particularly evident for involuntary exit routes, i.e. disability pension and unemployment.

Poor physical and mental health were more common among lower educated workers, in all four participating countries: the Netherlands, Denmark, England, and Germany. But not only did we find educational differences in the prevalence of poor health, in some occasions,

the associations between poor health and early work exit also differed across educational groups. In the Netherlands and England, the effects of SRH and functional limitations on early work exit were stronger in lower educated workers. The finding that the modifying effect of education on the association between health and early work exit differed across countries, suggests that macro-level factors, i.e. factors at the country-level, play a role.

In chapter 3, we examined which macro-level factors were associated with early work exit and with educational inequalities in early work exit, using SHARE data. Lower educated workers generally exited the work force more often early than those with a higher educational level. There were differences in early work exit across the 14 countries included in the study. We found that the macro-level pull factors, i.e. factors making early exit from the labour market financially more attractive, seem to have an effect only on the lower educated workers. The educational differences in the effects of these pull factors, i.e. unemployment replacement rates, expenditure on passive labour market policies (e.g. expenditure on unemployment benefits), and implicit taxes on continued work, suggest that low educated workers' financial reasons to continue working become less important when facing more generous benefits.

Work place determinants of health in older workers across educational groups

In chapter 2 we showed that poor physical and mental health are important risk factors for early work exit. To gain a more comprehensive understanding of determinants of poor health in older workers we investigated the associations between work characteristics and health in older workers in the Netherlands, in chapter 4. Compared to higher educated workers, low educated workers more often had high physical demands, low psychosocial demands, low variation in tasks, and low autonomy. High physical demands were associated with poorer SRH and functional limitations, but only in low educated workers. The health of higher educated workers was not affected by physical demands. Psychosocial demands, operationalized as cognitive demands, e.g. doing tasks that require a lot of concentration and working fast and under time pressure, were positively associated with better SRH. We also found positive health effects of high variation in tasks and high autonomy. The positive association between autonomy and SRH was found in the lower educated workers only. Having an active job, i.e. a job with high demands and high autonomy, was associated with better health than having a high-strain job, i.e. a job with high demands and low autonomy. The combination of high demands and high control may lead to active learning and motivation and is beneficial for one's health ¹. Generally, this effect of job strain was strongest in the lower educated workers.

Determinants of health after work exit across educational groups

Not only do work demands and resources affect health during working life, but the findings in chapter 5 showed that the effects are long-term and remain after having exited the workforce. The aim of chapter 5 was to examine whether educational level is associated with health after work exit, and whether work characteristics mediate this association. We used data from the Netherlands, Denmark, England, Germany, and Finland. We found that lower educated retirees reported poorer health than their higher educated peers. We also found that work characteristics were associated with health after work exit, sometimes even up to 12-15 years. The duration of these associations differed by country and by work characteristic. Physical demands, psychosocial demands, variation in tasks, and autonomy at work all partially mediated the association between educational level and self-rated health after work exit, i.e. work characteristics could in part explain the educational differences in health after work exit. Although there were some country differences, these mediating effects were generally observed in all five countries. However, after including these mediators into the statistical models, substantial associations between educational level and health after work exit remained.

In addition to factors at the work place, factors at the macro-level may play a role in health and health inequalities after work exit. In our study combining the expenditure and the institutional approach across 18 countries (chapter 6), we found that a higher total expenditure as well as a higher expenditure on health, housing, and ‘other social policy areas’ (non-categorical cash benefits to low-income households and other social services) was associated with better SRH in men and women. In women, high old age expenditure was also associated with better SRH. With regard to educational inequalities, we found that the educational differences in SRH after work exit were smaller in countries with a higher old age expenditure, a higher unemployment expenditure, and a higher total social expenditure, than in countries with lower expenditures in these areas, in both men and women. A higher expenditure on health and a higher minimum pension replacement rate (in women only) and a higher expenditure on survivors and a higher unemployment replacement rate (in men only) similarly attenuated the association between educational level and health.

Discussion of the main findings

Working conditions and health

As a result of technological improvements and more strict health and safety legislations, work demands have changed. Accordingly, research in the last decades has shifted from

studying the physical to studying the psychosocial work environment ². Chapters 4 and 5, however, showed that physical demands still play an important role in the health of older workers. High physical demands were associated with poor health in older workers and these health effects remained after work exit. High cognitive demands, variation in tasks, and autonomy on the other hand, were associated with better health in current and former workers.

Low educated workers were exposed more often to adverse working conditions than higher educated workers. Working conditions partially explained the health inequalities after work exit, lending support to the differential exposure hypothesis ³, which suggests that those with a low socioeconomic position are more exposed to stressors compared to those with a high socioeconomic position. In addition, our finding that the effects of adverse working conditions on health are stronger in the lower educated compared to the higher educated, supports the differential susceptibility hypothesis ³, which states that health inequalities are due to the differential impact of the stressors on health. Lower educated workers may be more susceptible to the impact of adverse working conditions because they possess fewer resources to cope with these stressors at work. Low educated people usually have a lower sense of mastery ⁴, have less social support ⁵, and have less knowledge of and fewer financial means to access certain types of health care, e.g. physiotherapy ⁶ and mental health services ⁷.

Thus, if workers are to spend an extended part of their lives at work, health inequalities may increase, not only during working life, but also during retirement. Improving working conditions may help to reduce educational health inequalities. Because health is an important risk factor for early work exit, especially in lower educated workers, improving working conditions may also have a positive indirect effect on reducing the risk of early work exit.

The role of macro-level factors

Previous studies have shown that there is an association between early work exit and different measures of welfare state generosity ⁸⁻¹². In line with these studies, we found in chapter 3 that high unemployment replacement rates, a high expenditure on passive labour market policies, and high implicit taxes on continued work seem to discourage older workers to continue working, especially the lower educated. These pull factors may make early work exit especially attractive to low educated workers, since without generous benefits, they generally do not have the financial means to exit the work force early. Simply lowering benefits, however, is not a solution. Lower educated workers work under more adverse conditions and are facing more health problems than higher educated

workers. Some of them can no longer carry out their jobs and these policies give them the opportunity to exit the work force early. Cutting benefits would force these workers to stay in the labour market, which will likely result in further health deterioration, and consequently, to higher health care costs and lower productivity, if everything else remains the same ¹³.

Our findings in chapter 6 also show the positive impact of welfare state generosity. Consistent with previous studies ¹⁴⁻¹⁷, we found that higher social spending and higher replacement rates were associated with better health and smaller health inequalities after work exit. Those with a low educational level might benefit most from these social policies, because they are likely to have the least individual resources and are therefore more dependent on collective resources.

Educational inequalities in extending working lives

Nowadays, most European countries are increasing their statutory retirement ages for the population as a whole. Our results suggest that such a generic policy disproportionately affects the lower educated. Low educated workers, who have on average more demanding jobs and less resources than their higher educated counterparts, currently already often leave the labour market prior to the statutory retirement age. Especially workers with physically demanding occupations, that require a certain level of physical health, may not be able to work more years in these occupations, partly because their working conditions have negatively affected their health. Therefore, improving working conditions is important to maintain good health in older workers, reduce health inequalities, and extend working lives.

Low educated workers often exit the workforce prematurely because of disability and unemployment. These exit routes have been shown to negatively affect health after work exit ¹⁸⁻²¹. It could be beneficial if workers who are unable to continue working, even after adapting their work environments, could exit the workforce through early retirement opportunities. But even if lower educated workers are able to work up to the statutory retirement age, they would still spend their years in retirement in poorer health than higher educated retirees. These health inequalities are only partly explained by differences in work characteristics, which suggests that improving these work characteristics will not completely resolve health inequalities during retirement. Not only are the lower educated less healthy during retirement, they also spend less years in retirement due to their lower life expectancy ²². In the implications for policy and practice section of this chapter, I discuss possible alternatives to generic pension policies.

Taking into account inequalities in the feasibility and consequences of extending working lives is not only relevant from an equity perspective, it is also important with regard to work related and health care costs. If older workers need to stay in the workforce, despite their increasing health problems, costs due to loss of productivity ¹³, sickness absence ²³, disability and unemployment benefits ²⁴, and health care will likely increase.

Methodological considerations

This paragraph addresses general methodological considerations. Specific methodological concerns can be found in the discussion section of the specific chapters.

Education

Education reflects an individuals' material as well as non-material resources ²⁵. Educational attainment is generally completed in early adulthood and thus educational level among adults is relatively stable over time. When examining educational inequalities in health at older ages, the risk of reversed causation, i.e. health affecting education, is relatively small.

Educational systems differ across countries. Throughout this thesis we used the International Standard Classification of Education (ISCED) to operationalize education. Because of its high degree of cross-country standardization, the ISCED allows meaningful cross-country comparisons ²⁶.

The average level of educational attainment has increased in the last decades ²⁷ and may further increase in the future. When examining changes in inequalities over longer periods of time, for example to evaluate effects of policy changes, such distributional changes may bias results when using an absolute measure of education, as we did in this thesis. Therefore, in such studies, it may be advisable to take into account the distribution of educational level. A relative measure of education, such as the Relative Index of Inequalities (RII), examines inequalities between the lowest versus the highest educated, irrespective of how low and how high these educational levels are in absolute terms, and taking into account the size of the educational groups. Another distinction between absolute and relative measures can be made with regard to the outcome. In this thesis, we were interested in inequality in itself, and therefore examined relative inequalities. These relative inequalities, however, do not take into account absolute differences in the outcome across educational groups. Studying absolute inequalities, i.e. taking into account the prevalence of the outcome, may give additional insight into health inequalities and changes over time. For this purpose, rate differences or the Slope Index of Inequalities (SII) can be used. Both absolute and relative measures can give insight into educational inequalities

and how they change over time, depending on the aim of the study ^{28, 29}. These different measures would give different results, which should be kept in mind when comparing studies on health inequalities.

Early work exit

In chapters 2 and 3, we used early work exit as our outcome measure. In chapter 2, early work exit was defined as having no paid work after reporting having paid work at the previous wave and not having yet reached the statutory retirement age. Work exit was self-reported and could have different reasons: early retirement, disability, unemployment or economic inactivity (those leaving the labour market but not receiving income or benefits, e.g. homemakers). Ideally, one would conduct cause-specific analyses to identify determinants of each exit route specifically. Unfortunately, due to limited sample sizes and relatively infrequent occurrence of disability and unemployment, this was not possible in our studies.

In chapter 3 we used data from the SHARE study. Because not all countries participated in all measurement waves of the SHARE study, we used data from two consecutive waves only. Consequently, we did not follow respondents up until their statutory retirement age. Therefore, those who did not exit the workforce early at follow-up may still exit early at a later point in time, especially given the relatively low age at follow-up (58.3 years in men; 57.2 years in women). Associations between macro-level factors and early work exit may therefore have been underestimated.

Work characteristics

In chapters 4 and 5, the associations between work characteristics and health were examined. In both chapters, data from the LASA study were used. In LASA, work characteristics were derived from a general population job exposure matrix (GPJEM) ³⁰. By linking the Netherlands Standard Classification of Occupations 1992 (NSCO92) to physical and psychosocial work exposures as reported by 55-64-year-olds in the Netherlands Working Conditions Survey ³¹, a GPJEM with low, moderate, and high probability of exposure to demands and resources was developed ³⁰. When using self-reported measures of work characteristics, there is an increased risk of reversed causality, because unhealthy respondents may be more inclined to report higher job demands ³². The advantage of using a GPJEM is that it reduces this risk of reversed causality. The disadvantage of using a GPJEM, however, is that heterogeneity within occupations is not taken into account. In chapter 5, we also used the GPJEM in the Dutch sample, but in addition we used self-reported measures of work characteristics in the other four participating countries. Results from the Dutch sample did not systematically differ from the results from the other countries,

which suggests that objective and subjective measures of work characteristics indeed have similar explanatory power.

Psychosocial demands were operationalized differently across the studies used in chapters 4 and 5. In the ELSA, DEAS, and DLSA studies, psychosocial demands consisted mainly of items measuring time pressure and heavy work load. Many previous studies on psychosocial job demands have used Karasek's Job Content Questionnaire ³³ or similar measures to operationalize psychosocial demands. Like the measures used in ELSA, DEAS, and DLSA, these measures mainly include negative items, such as having conflicting demands and having insufficient time to do the work. In these studies, high psychosocial demands were shown to be associated with poor health ³⁴⁻³⁷. In LASA and FLAME, however, psychosocial demands did not only contain items on work load and time pressure, but also included more cognitive demands, e.g. having to make complicated decisions and doing tasks that require a lot of concentration. When using these datasets, high psychosocial demands were associated with better health. Thus, cognitive demands could reflect more positive challenges at work, which are likely beneficial for health, whereas demands such as having heavy workloads and having insufficient time to complete tasks are associated with poorer health. These findings show the importance of distinguishing between various psychosocial demands.

Self-rated health

In all chapters we used self-rated health (SRH) as (one of the) health indicators. SRH can be used as a global measure of health in the general population ³⁸. SRH is measured with a single question and is therefore an inexpensive, fast measure to assess health. SRH is a known predictor of mortality ^{39, 40}, with a predictive value as good as a health score based on 10 objectively measured parameters ⁴¹. SRH has also been shown to be associated with other health measures, e.g. physical performance ⁴², presence of disease ⁴³⁻⁴⁵, mental illness ^{39, 43}, and functional limitations ⁴⁴.

It has been suggested that SRH may have a different meaning across national contexts ⁴⁶. Studies have shown, however, that SRH was consistently associated with socioeconomic status ⁴⁷ and with medical and functional health outcomes across countries ⁴⁸.

It has also been argued that educational inequalities in health are biased when using SRH as the health outcome. There is evidence that higher educated older adults are more likely to report poorer SRH compared to their objective health status, which would underestimate actual health inequalities ⁴⁹⁻⁵¹. Other studies across a variety of countries, however, conclude that the magnitude of the association between education and SRH is similar to the association between education and mortality, suggesting that there is no evidence of bias when examining health inequalities by using SRH as opposed to mortality

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Attrition

Attrition implies that sample sizes of longitudinal studies decrease as the study progresses, leading to less precise estimates and potentially biased associations. While this is indeed the case when conducting complete case analyses, we used more sophisticated analysis methods, such as generalized estimating equations, in which subjects with incomplete data are not excluded from the analyses. When attrition is nonrandom, i.e. if attrition is selective with respect to the study variables, estimates may be biased. Attrition due to mortality is not an issue in our studies, which include relatively young and healthy older adults among whom mortality risks are very low. However, the healthy worker effect, i.e. workers with severe health problems may have already left the workforce prior to entering our studies⁵⁷, may have biased our results. In all studies in this thesis, enough variation in health remained, but results may have been underestimated since people with more severe health problems were underrepresented. Simulation studies have shown, however, that selective attrition yields biased descriptive statistics, but that estimates of association are more robust against attrition⁵⁸. To deal with item nonresponse, multiple imputation techniques were used in this thesis, following guidelines from the literature⁵⁹.

Causality and selection bias

Our studies were based on the idea that educational level and work characteristics are causally related to health. However, all findings from this thesis are based on observational studies. Therefore, causality cannot be proven. In our studies on the association between work characteristics and health, the associations might reflect some reversed causality. Employers may discriminate against unhealthy candidates for promotions, leaving them in occupational positions with less favorable working conditions, leading to health selection effects^{60, 61}. On the other hand, unhealthy workers may successfully transfer to less demanding occupations that better accommodate their health problems⁶¹.

Another type of selection effect that needs to be addressed when investigating older workers, is the healthy worker effect. The healthy worker effect entails that those who are still employed at older ages are relatively healthy, because those with severe health problems have already left the workforce⁵⁷. The associations between poor health and early work exit as well as the associations between educational level, work characteristics and health, may be underestimated due to a decrease in variation in health in our samples of older workers and retirees. Studies following people throughout their working lives are needed to distinguish health selection effects from health causation effects.

Statistical power issues

In chapter 2, we used data from four countries to examine early work exit. We could examine the associations between the three health indicators and each exit route in all countries except for disability pension in Germany, due to the low number of events ($n=23$). We could not examine educational differences in all cause-specific models, because of the low number of events in some of the strata and the low number of unhealthy cases in some countries. Our study, as well as previous studies⁶²⁻⁶⁵, showed that there are differences in the associations between health and the different exit routes. These findings highlight the importance of cause-specific analyses. Future research, using datasets with larger sample sizes, would be valuable to examine educational differences in determinants of each of the exit routes.

In chapters 4 and 6, we used data from SHARE and ELSA. There is no consensus yet on the minimum number of clusters needed for multilevel regression models to estimate unbiased parameters and standard errors, but some guidelines have been suggested, such as a minimum of 20⁶⁶ or 30⁶⁷ clusters. Although simulation studies have also shown that with only 10 clusters, regression coefficients are unbiased, but the standard errors of the second-level variances are affected by the small number of clusters⁶⁸. With a low number of clusters, there is also a higher risk of bias due to outliers. In chapters 4 and 6, only 14 and 18 countries, respectively, could be included in our studies. Also, sample sizes within some of the countries were fairly small. Therefore, we could not fit full models to examine the effects of multiple macro-level determinants on SRH and early work exit. To minimize the effects of outliers, we conducted sensitivity analyses in chapter 4 with dichotomized macro-level factors, which yielded similar results and thus are evidence of the robustness of our findings. In chapter 6, we conducted linear multilevel regressions and were primarily interested in the fixed effects of education, the macro-level factors, and their interaction. Therefore, we used the Kenward Roger adjustment in all analyses. This adjustment provides better inference of these effects by correcting for underestimation of standard errors in models with small numbers of clusters and has been proven to work well⁶⁹⁻⁷¹.

Generalizability

In chapters 2 and 5, we adopted a coordinated analysis approach. The same analytical models were tested with data from longitudinal studies from different countries. These countries were included in the overarching EXTEND project because they all have a strong focus on closing early retirement options and currently have high levels of employment among older workers, even though they represent different types of welfare state regimes. When conducting coordinated analyses, the generalizability of the results can

be evaluated more easily and the possibility that differences in findings across datasets are due to differences in analytic methods is decreased ⁷². Yet, differences may be related to operational definitions of key variables and other study design characteristics such as sampling frame.

In chapter 2, we found that poor SRH, functional limitations, and depression were risk factors for early work exit. These associations were found consistently across the four cohorts, indicating generalizability across countries. Although the associations between poor health and each exit route separately generally pointed in the same direction in the four cohorts, some differences were apparent for the early retirement and unemployment routes. We also found country differences in the modifying effect of education in the association between health and early work exit. These differences suggest that factors at the country level play a role. It could be, for example, that eligibility criteria and generosity of unemployment and disability pensions affect the associations between health and the different exit routes. Our study in chapter 3 indeed shows that generosity is associated with early work exit and that it affects lower educated workers differently compared to higher educated workers. Therefore, while we are confident that the association between poor health and early work exit is generalizable to other national contexts, the strengths of associations, and results with regard to determinants of specific exit routes and the modifying effect of education cannot necessarily be generalized from one country to another.

In chapter 5, we found in all five countries that low educated retirees reported a significantly poorer health after work exit than those who were higher educated. And although the strength and duration varied by country, associations between work characteristics and health after work exit were found consistently across the studies. We consistently found that physical demands, psychosocial demands, variation in tasks and autonomy at work partially mediated the association between educational level and health after work exit.

Implications for policy and practice

I propose several targets for intervention, to improve the health of older workers and retirees and to reduce health inequalities as well as to facilitate extending working lives.

First, the results throughout this thesis show the adverse effects of having a low educational level. Therefore, improving the educational level in the general population should be high on the political agenda. The OECD has suggested that, in the Netherlands, this could be achieved by making transitions between educational levels easier and by promoting and rewarding student motivation and excellence ⁷³. In addition, by making teaching

(financially) more attractive, the expected future teacher shortages may be avoided ⁷⁴. However, not everyone will be able to attain a higher educational level through the general education system. Thus, although the overall level of education increases, there will likely still be a group of low educated people. Because of this change in the educational distribution, relative inequalities may increase because the low educated become more selective and therefore may become more vulnerable. Lifelong learning can also play an important role in improving educational attainment. While lower educated workers could potentially benefit most, it is the higher educated worker who participates the most in learning activities ⁷⁵. Therefore, more learning opportunities should be offered to low educated workers specifically. In addition, employers giving better information on availability of these learning opportunities, more guidance, and more clarification on how these learning activities can benefit the workers, could facilitate lifelong learning in lower educated workers ^{75, 76}.

Second, it is recommended to implement workplace interventions to improve working conditions. Physical demands, psychosocial demands, autonomy, and variation in tasks have all been shown to be associated with health in older workers as well as in retirees. By improving these working conditions, workers' health will likely improve, especially among lower educated workers. Increasing levels of autonomy seems to be especially important. Interventions aimed at increasing autonomy at work have indeed been shown to be promising in maintaining and improving mental and physical health ⁷⁷, reducing sick leave, and increasing productivity ⁷⁸, also in manual workers ⁷⁷. To reduce physical demands at work, participatory ergonomics interventions, in which workers are actively involved in developing and implementing changes in the workplace, may be promising ⁷⁹. Improving working conditions may not only decrease the risk of early work exit because of poor health, but also because of job dissatisfaction ⁸⁰. Working conditions are in the first place the responsibility of the employer. However, governments may also help to improve working conditions, for example by stimulating employers to improve working conditions and setting an example in their own institutions ⁸¹.

Third, other determinants of health should be targeted. The studies in chapter 5 showed that work characteristics do not explain all educational differences in health in retirees and it is likely that this is also the case for older workers. There is ample evidence that health behaviours, e.g. smoking, physical activity, and diet ⁸²⁻⁸⁴, social and emotional factors, e.g. loneliness and social relationships ^{85, 86}, and psychological factors, e.g. mastery ⁸⁷ are also risk factors for poor health which could be targeted in interventions ⁸⁸⁻⁹⁰. It may be preferable to start these interventions in mid-life or even earlier to not only maintain good health in older workers, but to also prevent the onset of health problems.

Fourth, alternatives to generic pension systems should be considered. The statutory retirement age is increasingly being linked to the life expectancy. Because such generic

retirement policies have a disproportionate negative effect on the lower educated, alternatives that take into account educational inequalities should be considered. It has been proposed that those in demanding occupations should be able to retire earlier than those who are working in occupations that are less demanding. But while the general population seems to be willing to contribute to the early retirement of workers in demanding occupations ⁹¹, there is much debate about which occupations can be considered to be demanding. An alternative to making workers in demanding occupations eligible for retirement at an earlier age, is to link the pension eligibility age to the number of years worked over the lifetime. Such a policy is easier to implement. Since low educated workers, who more often have demanding jobs, generally enter the labour market at an earlier age than the higher educated, they can start their retirement earlier.

Recommendations for future research

In this thesis I have shown the importance of taking into account educational inequalities during and after working life. However, further research is necessary to gain more insight into the interrelations between educational level, health, and retirement.

First, when examining determinants of early work exit and health and inequalities therein, it would also be of interest to investigate factors from other domains, e.g. the emotional, social, and financial domain, and to examine the relative importance of these domains. For example, control beliefs ^{92, 93}, social participation ^{94, 95}, and financial well-being ^{96, 97} have all been shown to be associated with early work exit as well as health. Studies including several domains may give more starting points for interventions.

Second, research on educational inequalities in extending working lives will benefit from a life course perspective. By taking into account changes in careers and changes in health status over the life course, selection effects can be disentangled from causation effects. Also, when following workers over the life course, the influence of accumulation of exposures as well as duration, timing, and ordering of exposures can be examined ⁹⁸.

Third, it would be of interest to investigate the effects of the recent and future increases in the statutory retirement age on early work exit and pre- and post-retirement health in workers across educational levels.

Fourth, future research should include large datasets to overcome the power issues encountered in some of the studies in this thesis. The use of register data on pensions may be useful in such research. With large datasets, it would be possible to examine the modifying effect of education on determinants of different work exit routes. Furthermore, the effects of multiple macro-level factors and their interrelation could be modeled to give more insight into country differences in health, early work exit, and educational inequalities therein.

Conclusion

The objectives of this thesis were (1) to identify determinants of early work exit across educational groups, (2) to identify work place determinants of health in older workers across educational groups, and (3) to identify determinants of health after work exit across educational groups. At the micro-level, poor SRH, functional limitations, and depression were risk factors for early work exit. Poor health was more common in lower educated workers and in some countries, health effects on early exit were stronger in the lower educated. At the macro-level, pull factors, i.e. factors that make early retirement financially more attractive, were associated with a higher risk of early work exit, especially in the lower educated. High physical demands, low variation in tasks, low autonomy, and high job strain were associated with poorer physical and mental health. Educational differences were present in the exposure to these work characteristics, but also in the strengths of their associations with health, with lower educated workers being disadvantaged. Health inequalities are still present after work exit and can partly be explained by working conditions. Macro-level factors also play a role in the health of retirees. A higher social expenditure and higher replacement rates were associated with better health after work exit and smaller health inequalities. In conclusion, research and policies on extending working lives should take into account educational inequalities. If workers are to spend an extended part of their lives at work, health inequalities may increase. Lower educated older workers and retirees are an important target group for policy and intervention.

Table 1. Main findings per chapter

Chapter	Datasets	Main findings
1: General introduction	-	-
2: Educational differences in the influence of health on early work exit among older workers	<ul style="list-style-type: none"> • LASA • ELSA • DLSA • DEAS 	<ul style="list-style-type: none"> • Poor SRH, functional limitations, and depression were risk factors for early work exit, especially for disability pension. Poor health was more common in low educated workers. Educational differences were found in the effects of poor self-rated health (ENG) and functional limitations (ENG + NL), with stronger effects in the low educated workers.
3: Work characteristics and health in older workers: educational inequalities	<ul style="list-style-type: none"> • LASA 	<ul style="list-style-type: none"> • High physical demands, low variation in tasks, low autonomy, and high job strain were associated with poorer physical and mental health. Educational differences were found in the exposure to these work characteristics as well as in the strengths of their associations with health, with low educated workers being disadvantaged.
4: Educational differences in macro-level determinants of early exit from paid work: a multilevel analysis of 14 European countries	<ul style="list-style-type: none"> • SHARE • ELSA 	<ul style="list-style-type: none"> • Low educated workers were at higher risk of early work exit than higher educated workers. Macro-level factors, especially pull factors that make early exit financially attractive, e.g. a high minimum unemployment replacement rate, a high expenditure on passive labour market policies, and a low implicit tax on continued work, were associated with early work exit, but only in low educated workers.
5: Educational inequalities in health after work exit: the role of work characteristics	<ul style="list-style-type: none"> • LASA • ELSA • DLSA • DEAS • FLAME 	<ul style="list-style-type: none"> • Low educated retirees reported poorer health than their higher educated peers. Low educated workers had a higher risk of high physical demands and a lower risk of high psychosocial demands, high variation in tasks, and high autonomy at work. These work characteristics partially mediated the association between education and health after work exit.
6: Macro-level determinants of post-retirement health and health inequalities: a multilevel analysis of 18 European countries	<ul style="list-style-type: none"> • SHARE • ELSA 	<ul style="list-style-type: none"> • A higher social expenditure in several policy areas was associated with better SRH after work exit. Educational inequalities in SRH after work exit were smaller in countries with a higher social spending and higher replacement rates.
7: General discussion	-	-

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