



ORIGINAL ARTICLE

Determinants of working until retirement compared to a transition to early retirement among older workers with and without chronic diseases: Results from a Dutch prospective cohort study

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Abstract

Aim: The ageing society and recent policy changes may lead to an increase of older workers with chronic diseases in the workforce. To date, it is unclear whether workers with chronic diseases have specific needs while employed. The aim of this study is to explore the differences in determinants of working until retirement compared to a reference group who have transitioned to early retirement among workers with and without chronic diseases. **Methods:** Dutch workers aged 57–62 years ($n = 2445$) were selected from an existing prospective cohort study, ‘STREAM’. The potential determinants were categorized into: individual, health, work-related and social factors. Logistic regression analyses were performed to determine the associations between these determinants and working until retirement – once for workers with and once for those without chronic diseases. To test differences, we included an interaction term between the determinant and the covariate ‘having a chronic disease yes/no’ in the analyses of the total population. **Results:** In total, 1652 (68%) persons were employed from 2011 to 2013. The majority of the determinants appeared to be similar for workers with or without a chronic disease; the interaction terms for these determinants and the covariate ‘having a chronic disease’ showed a p -value higher than 0.05, except for one individual factor (i.e. mastery) and one work-related factor (i.e. autonomy), which showed a p -value below 0.05. Higher mastery and higher autonomy were statistically significantly associated with working until retirement for those with chronic diseases, whereas they were not for those without chronic diseases. **Conclusions: Differences between workers with and without chronic diseases may exist for working until a statutory retirement age. Interventions aimed at encouraging work participation of older workers should make a distinction between the two groups. Autonomy at work and mastery were found to be factors that may promote work participation until higher age, specifically for older workers with chronic diseases.**

Key Words: Longitudinal studies, ageing, employment, chronic disease, retirement, older workers

Background

To prevent the effects of an ageing society on social security systems, governments in many Western countries have implemented reforms to stimulate prolonged working lives for older workers. These reforms generally apply to the total working population, and do not take into account the presence of chronic

disease in older workers. Older workers often suffer from chronic diseases more frequently than their younger colleagues, since the prevalence of chronic diseases increases with age. In the European Union, approximately 52 million people aged 55 to 74 years were found to have at least one longstanding illness or

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health problem – about half of this age group [1]. In several Western countries, measures are taken to discourage older workers from exiting the workforce via a disability pension [2]. This may lead to an increase of older workers with chronic diseases in the workforce.

To date, it is unclear whether or not older workers should be considered as a homogeneous group or if a subgroup of older workers with chronic diseases has specific needs for work participation. A large and growing body of literature reveals that having a chronic disease might negatively affect work participation. These studies have shown that work participation rates are lower in a population with chronic diseases compared to those without, and when employed, workers with chronic diseases are more likely to take sick leave than their healthy colleagues [3–5]. Thus, we can hypothesize that older workers with chronic diseases will experience more, and likely distinct, limitations at work in comparison with those without chronic diseases. Previous studies have found that individual, health and social factors, as well as working conditions, are associated with early retirement among the entire population of older workers [6–9]. Given recent policy changes to stimulate older workers staying in the workforce until a higher age, it is relevant to document the differences of the factors that influence work participation between older workers with and without chronic diseases.

Several attempts have been made to investigate the differences in factors influencing work participation between the two groups. Koolhaas et al. [10] did not find relevant differences in experienced obstacles and retention factors among workers with and without chronic disease. In contrast, Boot et al. [11] showed that the roles of physical workload and psychosocial resources at work differed in predicting having paid work compared to exiting from the workforce among older workers with and without chronic diseases. Furthermore, Leijten et al. [12] found a statistically non-significant indication that certain unfavourable work-related factors (i.e. higher physical load, higher psychological job demands, lower autonomy, lower social support) increased the risk of early retirement among workers with chronic diseases. Taken together, these studies suggest that differences exist among those with and without chronic diseases, although the findings have been inconsistent.

The inconsistent findings may be interpreted in the light of some methodological drawbacks in the aforementioned studies. First, the results of the study by Koolhaas et al. [10] were based on cross-sectional data. Second, in the study by Boot et al. [11] it was not possible to correct for confounders, due to statistical power constraints. In the same study, three exit routes (i.e. unemployment, disability pension, early retirement) were used as one reference category ‘exit

from the workforce’ [11]. This might have led to an underestimation of the effects since determinants of exit from work may play a distinct role depending on the specific exit route. A previous study in 2002 (Baanders et al. [5]) showed that differences in demographic factors and disease characteristics exist between fully work-disabled and unemployed persons. Therefore, we have chosen to focus on one exit route with similar eligibility for workers with and without chronic disease – early retirement. It is unlikely that older workers without chronic diseases are leaving the workforce with a disability pension.

Aim

The aim of this study was to explore the differences and similarities in determinants of working until a statutory retirement age (i.e. working as an employee) compared to a reference group who had transitioned to early retirement among older workers (aged 57–62 years) with and without chronic diseases.

Methods

Sample

Data were used from an existing prospective cohort study, the Study on Transitions in Employment, Ability and Motivation (STREAM). In 2010, 15,118 respondents in total participated in the first wave of data collection. Participants between 45 and 64 years filled out an annual online questionnaire on various topics (among others, employment status, work characteristics and health) in 2010 (T1), 2011 (T2), 2012 (T3), 2013 (T4) and 2015 (T5). We have used data from T2, T3 and T4, since data from T5 was not yet available. Details on the STREAM study design can be found elsewhere [13].

Participants who were employed and aged 57–62 years at baseline (T1), and who had valid data on the outcome measurement at the first three follow-ups (T2, T3, T4), were included in this study. This age group was selected since these participants were ‘at risk’ for early retirement. Those who had no valid data on the outcome measurement (38%) include participants who went on disability pension ($n = 202$) or became unemployed ($n = 203$) during one of the first three follow-ups, and participants who had missing data on the outcome measurement (having paid work in 2011, 2012 or 2013, or being (early) retired in 2011, 2012 or 2013). In total, 2445 participants were included in this study (see Figure 1 for the flowchart).

Having a chronic disease. The presence of a chronic disease was determined by asking participants whether they had one of the following chronic diseases: hands,

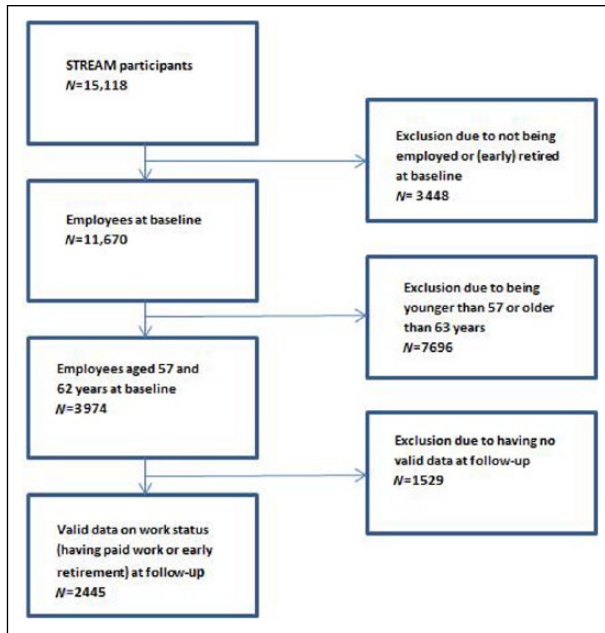


Figure 1. Flowchart of the study population.

arms, legs, feet or back and neck symptoms; migraine or severe headache; cardiovascular diseases; asthma, bronchitis, emphysema; gastrointestinal disorders; diabetes; severe skin disease; psychological complaints; hearing problems; epilepsy; life-threatening disease (e.g. cancer); problems with vision; or other long-standing diseases. The participants were classified into two groups: those who answered 'none', and those who had at least one of the listed chronic diseases. As we were interested if the presence of a chronic disease influenced work participation, we have included all chronic diseases.

Outcome variable

The outcome variable was defined as working until the statutory retirement age, and is referred to as working until retirement throughout this paper. The Dutch pension system contains three pillars: public old-age pension, occupational pensions and private provisions. The public old-age pension, which is available for all insured residents, is paid from the statutory retirement age of 65 years (until 2013), and is provided by the government. During the studied period, early retirement pensions were offered by occupational pension funds, which allowed full retirement between the age of 60 years and the statutory retirement age. In the present study, respondents who indicated to be retired early or retired below the age of 65 years were categorized into the early retirement group. The outcome variable was categorized into two groups: (1) having paid work in the

period from 2011 until 2013; and (0) taking (early) retirement in 2011, 2012 or 2013.

Determinants

The determinants consisted of categorical, dichotomous and continuous variables. Continuous variables were included as a categorical variable (i.e. divided into quartiles), to check on the linear relationship between the variable and the outcome variable. If a linear relationship was found, then the variable was included as a continuous variable. If no linear relationship was found then the variable was dichotomized at the median value. In addition, the variable was also divided in tertiles (see Appendix 1).

Individual factor. Mastery was measured using the Pearlin Mastery Scale [14]. Mastery is defined as a person feeling in control of events. This scale has seven items with a five-point scale ranging from totally disagree to totally agree. A higher score reflects a higher degree of mastery. Mastery was analysed as a continuous scale.

Health (-behaviour) factors. Perceived physical and mental health were measured using the physical component summary scale and the mental component summary scale of the Short Form-12 Health Survey, respectively [15]. The scales range from 0 to 100 (0 = worst and 100 = best possible health status). Depressive symptoms were measured using the 10-item Centre for the Epidemiological Studies of Depression Short Form (CES-D10 score), with a five-point Likert scale ranging from almost never to always; higher scores reflect more depressive symptoms [16,17]. Depressive symptoms were analysed as a continuous scale. Questions regarding recovery and relaxation consisted of three items on whether individuals are: still occupied by their work after a working day; affected by events at work; and able to relax. This variable was measured using a five-point Likert scale ranging from totally disagree to totally agree, and was dichotomized. Physical activity was defined as the number of days per week a person is physically active for at least 30 minutes (range 1–7 days).

Work-related factors. Working full-time was defined as working >34 hours per week (yes/no) [18]. Physical workload was assessed using five items based on force exertion, static load and vibration. Job demands were assessed using four items on how fast, much, hard and hectic an individual had to work. Autonomy was assessed using five items on an individual's opportunity to make decisions, decide the order and speed of performing tasks, find solutions and take time off. Emotional burden was assessed using three items

based on whether an individual finds that work creates difficult emotional situations, is emotional demanding and if they are emotionally involved in work. Mental load was assessed using three items based on whether work activities require intensive thinking, thoughts and attention. Social support was assessed using four items regarding colleagues and/or supervisors' willingness to help and listen to work-related problems. All of these variables were assessed using a five-point Likert scale ranging from almost never to always. Physical workload, job demands, autonomy and emotional burden were analysed as continuous scales. Mental load and social support were dichotomized at the median value.

Social factors. Regarding work–family balance, two variables were used: 1) do you miss or neglect family activities because of your work (yes/no); and 2) do you miss or neglect work activities because of family responsibilities (yes/no).

Potential confounders

Age (years), gender (male/female), educational level, financial situation and household composition (alone/not alone) were included as potential confounders. Educational level was categorized as low (primary school, lower and intermediate secondary school or lower vocational training), intermediate (higher secondary school or intermediate vocational training) and high (higher vocational training, or university or higher). Financial situation was measured using the following question: 'What is the financial situation of your household now?'. This variable was dichotomized into 0) those who said to have 'some money left/a lot of money left' and 1) those who said to be 'very or somewhat short of money'.

Analyses

Descriptive statistics (e.g. means, standard deviations, frequencies and percentages) were used to report baseline characteristics for older workers with and without chronic diseases.

Logistic regression analyses (SPSS Statistics version 22) were performed separately for older workers with chronic diseases and those without chronic diseases to determine the associations between the determinants and working until retirement. Covariates (i.e. age, gender and educational level) were included in the model as confounders. For each determinant, the odds ratio (OR) and 95% confidence interval (CI) were reported.

To test differences between the groups with and without chronic disease, we included an interaction-term between the determinant and the covariate

'having a chronic disease yes/no' in the analyses on the total population. By studying multiplicative interaction, subgroups of individuals can be identified in which the determinant is likely to have the largest effect on the outcome measurement. Effect modification was considered statistically significant if the interaction-term between the covariate and the determinant showed a *p*-value below 0.05.

Sensitivity analysis

First, a sensitivity analysis was conducted to test a main effect of having a chronic disease on working until retirement. In addition, multiplicative interaction was also tested for those who have a chronic disease, and stated that their disease hampered work activities.

Second, a sensitivity analysis was performed to include disability pension and unemployment as other exit routes in the analyses. This outcome variable was categorized into two groups: (1) having paid work in the period from 2011 until 2013; and (0) leaving the work force via disability pension, unemployment or early retirement in 2011, 2012 or 2013. Disability pension, unemployment and early retirement were defined based on whether participants stated to currently be receiving disability pension, to be unemployed or retired early. In the Netherlands, employees receive 100% of their wages during the first 52 weeks of sickness absence, and 70% of their wages during the second 52 weeks of sickness absence. These payments are provided by the employers. After two years of sickness absence, a person can apply for a disability benefit (WIA). Depending on the degree of wage loss due to functional limitations, the government provides the WIA payments.

Results

Baseline characteristics

The baseline characteristics of older workers with and without chronic diseases are presented in Table I. In total, 1652 (68%) persons had paid work in the period from 2011 to 2013, whereas 793 (32%) persons had retired early in 2011, 2012 or 2013. From the total study population (*n* = 2445), 1516 (62%) reported having at least one chronic disease.

Determinants of working until retirement in older workers with and without chronic diseases

The adjusted analyses revealed that a better perceived physical health status and fewer depressive symptoms were statistically significant determinants

Table I. Baseline characteristics for the workers with and without chronic diseases.

Characteristics	Category, range		Chronic disease (n = 1516)	No chronic disease (n = 929)
Working until retirement	Yes	N (%)	981 (65%)	671 (72%)
Age	Years	Mean (SD)	59.3 (1.7)	59.3 (1.7)
Male gender		N (%)	876 (58%)	547 (59%)
Educational level	Low	N (%)	447 (30%)	269 (29%)
	Intermediate	N (%)	552 (36%)	297 (32%)
	High	N (%)	517 (34%)	363 (39%)
Financial situation	Difficulties	N (%)	227 (15%)	93 (10%)
Household composition	Alone	N (%)	329 (22%)	165 (18%)
<i>Individual factor</i>				
Mastery	1–5	Mean (SD)	3.7 (0.6)	3.9 (0.6)
<i>Health (-behaviour) factors</i>				
Perceived physical health	0–100	Mean (SD)	48.7 (8.8)	55.4 (3.9)
Perceived mental health	0–100	Mean (SD)	52.8 (8.2)	54.6 (5.7)
Depressive symptoms	1–5	Mean (SD)	1.5 (0.4)	1.3 (0.3)
Recovery/relaxation after work	Higher (≥ 2.9)	N (%)	701 (46%)	442 (48%)
Physical activity	1–7	Mean (SD)	4.3 (2.1)	4.5 (2.2)
<i>Work-related factors</i>				
Working >34 hours	Yes	N (%)	825 (54%)	546 (59%)
Physical workload	1–5	Mean (SD)	1.8 (0.9)	1.6 (0.8)
Job demands	1–5	Mean (SD)	3.1 (0.8)	3.0 (0.8)
Autonomy	1–5	Mean (SD)	3.8 (0.7)	3.9 (0.7)
Emotional burden	1–5	Mean (SD)	2.5 (0.8)	2.4 (0.8)
Mental load	Higher (≥ 4.3)	N (%)	828 (55%)	467 (50%)
Social support	Higher (≥ 3.5)	N (%)	911 (60%)	583 (63%)
<i>Social factors</i>				
Miss/neglect family activities due to work	Yes	N (%)	771 (51%)	443 (48%)
Miss/neglect work activities due to family responsibilities	Yes	N (%)	496 (33%)	251 (27%)

SD: standard deviation.

of working until retirement for those with chronic diseases (OR 1.02, 95% CI 1.00–1.03; OR 0.59, 95% CI 0.43–0.79) and those without chronic diseases (OR 1.06, 95% CI 1.02–1.10; OR 0.58, 95% CI 0.34–0.99) (Table II). Furthermore, in older workers with chronic diseases, better perceived mental health (OR 1.02, 95% CI 1.01–1.04), higher mastery (OR 1.24, 95% CI 1.01–1.52) and higher autonomy (OR 1.34, 95% CI 1.12–1.60) were significantly associated with working until retirement.

Two determinants of working until retirement were found to significantly differ between workers with and without chronic diseases, indicating that subgroups regarding the presence of a chronic disease can be identified in which these determinants are likely to have the largest effect on working until retirement. While among older workers with chronic diseases higher autonomy was a statistically significant determinant (OR 1.34, 95% CI 1.12–1.60) of working until retirement, this determinant was not significantly (OR

0.96, 95% CI 0.75–1.24) associated with working until retirement among those without chronic diseases. Furthermore, the analyses showed that among workers with chronic diseases, a higher degree of mastery had a statistical significant effect on working until retirement (OR 1.24, 95% CI 1.01–1.52), while this determinant was not significantly associated (OR 0.79, 95% CI 0.58–1.08) for those without chronic diseases. The remaining determinants of working until retirement compared to the transition to early retirement were not statistically different in ORs between those with and without chronic diseases.

Sensitivity analysis

The likelihood of working until retirement was significantly lower for those with chronic diseases compared to those without. The crude analysis showed an OR of 0.7, with 95% CI 0.6–0.8, and for the adjusted analysis an OR of 0.6 and 95% CI 0.5–0.8 was found.

Table II. Odds ratios (OR) and 95% confidence intervals (95% CI) for associations between determinants and working until retirement in logistic regression analyses.

Characteristics	Category, range	Chronic disease		No chronic disease		P-value for interaction with having a chronic disease*
		Crude models	Adjusted models [^]	Crude models	Adjusted models [^]	
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	
<i>Individual factor</i>						
Mastery	1-5	0.97 (0.83-1.15)	1.24 (1.01-1.52)	0.79 (0.61-1.01)	0.79 (0.58-1.08)	0.01
<i>Health (-behaviour) factors</i>						
Perceived physical health	0-100	1.01 (1.00-1.02)	1.02 (1.00-1.03)	1.02 (0.98-1.05)	1.06 (1.02-1.10)	0.15
Perceived mental health	0-100	1.00 (0.99-1.01)	1.02 (1.01-1.04)	0.99 (0.96-1.02)	1.00 (0.97-1.04)	0.21
Depressive symptoms	1-5	0.92 (0.73-1.16)	0.59 (0.43-0.79)	0.81 (0.53-1.23)	0.58 (0.34-0.99)	0.74
Recovery/relaxation after work	Higher	0.88 (0.72-1.09)	0.98 (0.76-1.27)	0.93 (0.70-1.24)	0.88 (0.62-1.26)	0.73
Physical activity	1-7	1.01 (0.96-1.06)	1.00 (0.94-1.07)	1.00 (0.94-1.07)	1.04 (0.95-1.12)	0.61
<i>Work-related factors</i>						
Working >34 hours	Yes	1.07 (0.87-1.32)	1.29 (0.93-1.78)	1.02 (0.76-1.37)	1.07 (0.70-1.65)	0.63
Physical workload	1-5	0.97 (0.86-1.10)	0.86 (0.74-1.00)	1.04 (0.86-1.26)	0.86 (0.68-1.10)	0.84
Job demands	1-5	1.22 (1.07-1.39)	1.03 (0.87-1.21)	1.16 (0.97-1.38)	1.08 (0.87-1.35)	0.84
Autonomy	1-5	1.02 (0.89-1.18)	1.34 (1.12-1.60)	0.81 (0.66-1.00)	0.96 (0.75-1.24)	0.03
Emotional burden	1-5	0.98 (0.86-1.11)	0.87 (0.74-1.01)	1.04 (0.87-1.24)	0.86 (0.69-1.07)	0.92
Mental load	Higher	1.09 (0.88-1.35)	1.06 (0.82-1.38)	1.07 (0.81-1.43)	1.01 (0.70-1.44)	0.74
Social support	Higher	0.97 (0.78-1.20)	0.93 (0.71-1.20)	1.52 (1.13-2.04)	1.33 (0.93-1.91)	0.13
<i>Social factors</i>						
Miss/neglect family activities due to work	Yes	1.21 (0.98-1.50)	1.19 (0.92-1.56)	1.21 (0.91-1.62)	1.11 (0.77-1.58)	0.62
Miss/neglect work activities due to family responsibilities	Yes	1.09 (0.87-1.37)	0.97 (0.74-1.28)	1.29 (0.93-1.80)	1.17 (0.78-1.76)	0.51

Bold values significant at 0.05.

*Multiplicative interactions on total population.

[^]Adjusted for age, gender and education, financial situation and household composition.

When focusing on those who have a chronic disease and stated that their disease hampered activities at work ($n = 710$ (47%)), no significant multiplicative interactions were found ($p > 0.05$).

Regarding the analyses with disability pension and unemployment as other exit routes, significant multiplicative interactions were also found for mastery (p -value: 0.02) and autonomy (p -value: 0.04), but also for working full-time (p -value: 0.04).

Discussion

The majority of the determinants of working until retirement appeared to be similar for older workers with and those without chronic diseases; however, autonomy and mastery showed distinct effects among both groups of older workers.

First, in line with the results of Boot et al. [11], we found that older workers with chronic diseases and high autonomy at work were more likely to work until retirement. Leijten et al. [12], showed an indication

that workers with lower autonomy had a greater risk of early retirement. Although their result was based on the same dataset as the one used in the current study, their study used another population since they included all workers aged 45 years and above. We found that the determinant mastery showed a disparate effect for older workers with chronic diseases compared to those without chronic diseases, whereas Boot et al. [11] found no difference for this determinant. Various reasons may explain the contrasting finding, such as the differences in type of chronic illnesses studied and severity of health problems among both populations. Furthermore, the association between mastery/autonomy and prolonged work participation might also have a reverse causality. Participating in paid work might increase your feeling of mastery, and those who participate at work at older ages are more likely to have jobs with autonomy. There might be an association between the jobs that require autonomy and certain characteristics of people participating in those jobs (e.g. having a higher sense of mastery).

Older workers with chronic diseases were less likely to work until retirement. However, most determinants did not interact with the presence of a chronic disease in their associations with working until retirement. We found that a better self-perceived physical health was a determinant of working until retirement for both groups of older workers. Both groups also had similar estimates for the association between depressive symptoms and working until retirement. These results confirm findings from previous studies, which have shown that poor health and more depressive symptoms are associated with early retirement [19,20]. However, subgroups in self-perceived health status may exist since previous findings have shown that older workers decide to retire early while in good health [21].

Early retirement is only one exit route from paid employment among older workers. Other possible exit routes are disability pensions and unemployment. All these exit routes depend on the eligibility criteria of disability pension and retirement [22,23]. If a person is not eligible for a disability pension, alternative exit routes may be explored, and early retirement can be a relatively easy accessible option. Therefore, these exit routes can be considered 'competing' processes. Previous studies have shown that exiting by work disability and unemployment were both associated with having a chronic disease [23,24]. Since the aim of this study was to investigate the similarities and differences in determinants of working until retirement between older workers with and without chronic diseases, we chose one exit route in which both groups had a similar eligibility for exit from the workforce (i.e. early retirement). As a result of this choice, we did not include disability pension and unemployment as exit routes in the reference group in the main analysis of our study. However, we conducted a second sensitivity analysis by including disability pension and unemployment as exit routes, and no major differences in results were found compared to the results of the main analysis (data not shown).

Since we included all workers at baseline, and excluded workers who had left work via a disability pension, it is likely that a large group of older workers with chronic diseases had already left the workforce, thus leaving a selection of relatively healthy older workers with and without chronic diseases in this study. This selection also included those older workers with chronic diseases who might have adjusted their working conditions to their abilities and limitations resulting from their disease. This is also called the healthy worker effect, which might explain why we found many similarities in determinants of working until retirement for both groups of older workers [25].

The major strength of this study is that we used longitudinal data from a prospective study, which

made it possible to investigate the longitudinal associations of working until retirement. Furthermore, information on numerous variables were available in STREAM, which made it possible to correct for confounders and include various determinants. A limitation of our study is that all variables were based on self-report. For example, work status and finances were based on the participants' interpretations instead of objective register data (e.g. source of income and yearly income as registered by Statistics Netherlands). However, previous studies have shown that self-reported finances was a stronger predictor for work participation compared to the more objective measurements of finances [6,26]. It is possible that the group of older workers with chronic diseases is too heterogeneous to have found significant results in this study, since we included all chronic diseases listed on the questionnaire in one group. Due to a small number of participants for each specific disease, we were not able to perform separate analyses for each chronic disease. A previous study by Leijten et al. [12] showed that having psychological and musculoskeletal health problems predicted early retirement. Further research with larger sample sizes is needed to explore the differences and similarities between determinants of working until retirement for various chronic diseases separately.

The most important implication of this study is that the population of older workers may not be considered as a homogeneous group when it comes to working until retirement, since the likelihood for those with chronic diseases to work until retirement was lower compared to those without chronic diseases. Differences in working until retirement between older workers with and without chronic diseases were found for one individual factor (i.e. mastery) and one work-related factor (i.e. autonomy). Individual-based interventions should aim at improving the sense of mastery (i.e. having more control over events) in workers with chronic diseases. Furthermore, work adjustments, such as an increase of autonomy, may be implemented to stimulate longer working lives among older workers with chronic diseases. Examples of these adjustments regarding autonomy are: improving possibilities to decide when to take a break from work, and decide how, when and where to perform tasks. A previous study on the effect of a work reorganization intervention showed that an increase in job control served as the mediator in the improvement of a person's mental health, sickness absence rates and self-rated performance [27]. Further research is needed to investigate whether the directions for these interventions may result in prolonged work participation among workers with chronic diseases.

In conclusion, the majority of determinants of working until the statutory retirement age compared to a transition to early retirement appeared to be similar for Dutch older workers with and without chronic diseases. However, interventions aimed at encouraging work participation of older workers should consider making a distinction between the two groups. Autonomy at work (e.g. using work-related interventions) and mastery were found to be factors that may promote work participation until higher age, specifically for older workers with chronic diseases.

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Declaration of conflicting interests

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Appendix 1

Table III. Odds ratios (OR) and 95% confidence intervals (95% CI) for associations between determinants and working until retirement in logistic regression analyses.

Characteristics	Category, range	Chronic disease		No chronic disease		P-value interaction term with having a chronic disease*
		Crude models	Adjusted models [^]	Crude models	Adjusted models [^]	
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	
Recovery/ relaxation after work	Higher	0.88 (0.72–1.09)	0.98 (0.76–1.27)	0.93 (0.70–1.24)	0.88 (0.62–1.26)	0.73
	1–5	0.89 (0.77–1.03)	0.95 (0.80–1.31)	0.89 (0.74–1.09)	0.89 (0.70–1.14)	0.76
	Tertiles: 1	ref	ref	ref	ref	0.27
	2	0.99 (0.76–1.28)	0.94 (0.68–1.29)	0.88 (0.62–1.25)	1.14 (0.73–1.75)	–
Mental load	3	0.94 (0.73–1.22)	1.07 (0.78–1.47)	0.75 (0.53–1.07)	0.77 (0.50–1.19)	–
	Higher	1.09 (0.88–1.35)	1.06 (0.82–1.38)	1.07 (0.81–1.43)	1.01 (0.70–1.44)	0.74
	1–5	1.10 (0.94–1.30)	1.09 (0.89–1.34)	0.93 (0.75–1.16)	0.89 (0.68–1.17)	0.18
	Tertiles: 1	ref	ref	ref	ref	0.40
Social support	2	1.31 (0.99–1.73)	1.35 (0.95–1.90)	0.99 (0.69–1.43)	1.05 (0.66–1.66)	–
	3	1.11 (0.85–1.46)	1.08 (0.77–1.52)	1.31 (0.99–1.73)	0.85 (0.53–1.35)	–
	Higher	0.97 (0.78–1.20)	0.93 (0.71–1.20)	1.52 (1.13–2.04)	1.33 (0.93–1.91)	0.13
	1–5	0.97 (0.85–1.12)	0.93 (0.79–1.10)	1.29 (1.07–1.55)	1.19 (0.96–1.49)	0.10
	Tertiles: 1	ref	ref	ref	ref	0.19
	2	1.04 (0.81–1.35)	1.02 (0.74–1.40)	1.40 (0.98–2.01)	1.22 (0.79–1.89)	–
	3	1.06 (0.81–1.38)	0.99 (0.72–1.37)	1.63 (1.16–2.29)	1.44 (0.95–2.18)	–

Bold values significant at 0.05.

*Multiplicative interactions on total population.

[^]Adjusted for age, gender and education, financial situation and household composition.