Original article

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Changes in working life expectancy with disability in the Netherlands, 1992–2016

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Objectives Like other western countries, the Netherlands has abolished early retirement schemes and is currently increasing the statutory retirement age. It is likely that also older workers with disabilities will be required to work longer. We examine the change in working life expectancy (WLE) with disability of older workers by comparing data from three periods: 1992–1996, 2002–2006 and 2012–2016.

Methods Data are from the Longitudinal Aging Study Amsterdam (LASA). Respondents aged 55–65 with a paid job at baseline were included (N=1074). Disability was measured using the Global Activity Limitations Indicator (GALI). First, a continuous-time three-state survival model was created. Second, WLE with and without disability were estimated using MSM and ELECT in R. The modifying effects of gender and educational level were examined.

Results Among those initially in paid employment, total WLE increased over 20 years. For example at age 58, total WLE increased from 3.7 to 5.5 years. WLE with disability at age 58 increased from 0.8 to 1.5 years. There was no difference in WLE with disability between male and female workers or low- and highly educated workers.

Conclusions Between the 1990s and the 2010s, subsequent generations of older workers with disabilities have extended their working lives. The findings emphasize the importance of workplace interventions that facilitate older workers with disabilities to maintain well-being and work ability. In addition, the question arises whether current exit routes out of the workforce are still adequate.

Key terms ageing; older worker; retirement; work ability.

Western societies are facing demographic changes such as ageing of the population and shrinkage of the workforce (1). Like other policy-makers, the Dutch Government has taken action to counteract the negative financial consequences of these changes. Policy measures include discouraging early work exit through early retirement, disability pensions and unemployment by making these routes less attractive. In addition, the statutory retirement age is currently being raised. Parallel to these policy measures, the average actual retirement age has increased from <61 years in the early 1990s to 64.5 years in 2016 (2, 3).

In the 1990s and early 2000s, employers and the Dutch Government financially supported early retirement, which was common (3). However, this regulation has been phased out since 2005/2006 and early retirement has become financially unattractive (4, 5). Furthermore, the statutory retirement age, with its accompanying basic state pension, is increasing gradually from 65 years in 2012 to 67 years and three months in 2022; a further increase is foreseen (6, 7). Since 1966, workers with occupational limitations due to poor health could rely on the social security system to receive a disability benefit. In 2002, regulations were adjusted to support disabled workers with trainings and trial placements in order to withdraw them from and prevent them from entering the disability scheme; in 2006, the qualification criteria for receiving a disability pension became stricter (8, 9). From 1987, people who became unemployed and met specific criteria were eligible for benefits for

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more than five years under the Unemployment Insurance Act. An extension of another three and a half years was possible with the "follow-up-benefit" (9), but this was abolished in 2003. In 2006, the maximum period of receiving unemployment benefits was adjusted to 38 months (10). The benefit to workers aged ≥63 years to bridge the gap between the unemployment benefit and the basic state pension was reduced (11).

A substantial number of people aged ≥55 are in poor health, which is likely to affect their labor participation (12, 13). Poor health creates a discrepancy between job requirements and work capabilities (14). According to a systematic review, self-perceived health, mental health, chronic diseases, musculoskeletal diseases and respiratory diseases increase the likelihood of early exit. This exit has several routes, eg, via disability benefits, unemployment or early retirement (13). Older adults who continue working despite poor health may experience reduced productivity. Musculoskeletal complaints, multimorbidity and psychological disorders are associated with low performance and increased sickness absence (15). Other studies stress that it is not the disease itself that limits work participation, but the consequences of the disease and, in particular, associated disabilities (16, 17).

The extent to which changes in employment policy regulations have affected the number of years older adults work with disability is yet unknown. This can be measured with the working life expectancy (WLE) measure. This summary measure is similar to life expectancy, which is often divided in years into good and poor health (18), but with exit from the workforce as the final state instead of death. Nurminen et al (19) introduced WLE in a cohort of Finnish municipal workers and examined the number of years the participants work in different states of work ability. Burdorf & Jansen (20) focused on the years workers lose in the workforce due to low-back pain, comparing workers with high versus low physical load. Lièvre et al (21) compared healthy life expectancy with healthy WLE at age 50 in 12 European countries. In their study, the unhealthy state was a combination of a chronic physical or mental health problem, illness or disability and limitations in daily activities. Although various health measures were used in these studies, all emphasize the importance of considering disability when addressing WLE.

It can be expected that WLE with disability is different for men and women, as well as low- and highly educated workers. Women often work part-time and men full-time (22), consequently the threshold to exit the workforce may be lower for women. This is in particular the case for women with a partner because the household is often less dependent on the income of the woman (23, 24). Lièvre et al (21) showed that in the Netherlands, at age 50, unhealthy WLE was 2.1 years for men and 1.5 years for women. Based on these gender differences and the policy reforms regarding early exit that have taken place, we expect that in particular men work increasingly more years with disability. With regard to educational level, there is evidence that highly educated workers have the economic resources to exit work early. As early retirement schemes have been diminished and disability schemes have become stricter, we expect that, particularly in recent years, low-educated workers have been working with disability for more years compared to highly educated workers (25).

This study examines the change in WLE of older workers with disability by comparing cohort data of three different time periods: 1992–1996, 2002–2006 and 2012–2016. Due to policy changes that have limited early retirement routes in the Netherlands, we expect that the number of years older adults work with disability has increased. In addition, we expect that men and low-educated people work increasingly more years with disability compared to women and highly educated people, respectively.

Methods

Sample

Data are from the Longitudinal Aging Study Amsterdam (LASA). LASA is a continuing Dutch population-based cohort study on predictors and consequences of changes in physical, cognitive, social and emotional functioning with ageing (26, 27). The first LASA cohort (1992/1993) consisted of 3107 older adults aged 55–85, of which 966 were aged 55–65. In 2002/2003 and 2012/2013, new cohorts were started with 1002 and 1023 adults aged 55–65 years, respectively. Follow-up interviews took place every three years. For this study, data of the first two observations were analyzed (T0 and T1). Observations in 1992/1993, 2002/2003 and 2012/2013 were considered as baseline for the three cohorts. Respondents with a paid job at baseline were selected (N=1315). We excluded workers who did not participate in the study at T1 (i) for other reasons than dying (N=125), (ii) due to missing information on health (T0 or T1) or employment status (T1), (iii) because they had opted for a shortened face-to-face interview at T1 (N=30) or a shortened telephone interview at T1 (N=80), or (iv) for other reasons (N=6). The main reasons for not participating at T1 were lack of interest. Only six respondents reported health reasons. Non-response at T1 was not selective in terms of age, gender, educational level and baseline disability. The final study sample consisted of 1074 respondents, of which 23% belonged to the first cohort, 36% to the second cohort and 41% to the third cohort. This reflects that in recent years the proportion of workers in the age category 55–65 years increased.

Outcome

The outcome variable consists of three possible states, being in the workforce without disability (state 1), in the workforce with disability (state 2) and out of the workforce (state 3). At baseline, all respondents are in either the first or second state. At follow-up, they are in all three states.

Disability is measured using the Global Disability Indicator (GALI) (28). In LASA, the following questions are asked: "Do health problems limit your normal daily activities?" (yes, severely; yes moderately; no) and, if so, "Do these limitations last for more than three months?" (yes; no). If both questions were answered positively, the respondent was classified as having disability. This binary variable is commonly used for estimating healthy life expectancies (29). Two other measures of disability were used to check the robustness of findings: six self-reported questions and a Chair Stand Test. The six questions concerned difficulty in climbing or descending stairs of 15 steps without stopping, getting dressed and undressed, sitting down and standing up from a chair, cutting one's toenails, walking outside for five minutes, and using public transport. These questions were selected from the validated Organization for Economic Cooperation and Development Questionnaire (30). If the respondent had (some) difficulties on at least one item, he or she was classified as having disability. The Chair Stand Test involved standing up and sitting down with folded arms, five times at usual pace. The total time needed was recorded by the interviewers. To categorize this variable, quartiles were used based on the time required in the total LASA sample in this age group (31). Respondents in the upper quartile (requiring ≥13 seconds to perform the test), those who used their arms, and those who could not perform the test at all, were categorized as having disability.

In state 3, the respondents have stopped working. The age at which people stopped paid work was assessed with the question "In which month and which year did you stop doing paid work?". If the month and year of exit from the workforce was unknown (N=36), the date halfway between the two interviews was used to calculate the age of exit from the workforce. For the deceased respondents (N=20), the age of exit from the workforce is calculated based on the date of death minus six months – provided this date was not earlier than the baseline interview – because it can be assumed that in most cases there has been a period of illness before death in which respondents did not work.

Covariates

Age at the time of the interview was based on the date of interview and the birthdate. The birthdate and gender were obtained from the municipal registry. Highest level of education completed comprises three levels: low (elementary school, lower vocational education or less), moderate (general intermediate, intermediate vocational, and general secondary education), and high (higher vocational education, college, and university). Age was used as continuous variable; cohort, gender and educational level as dummy variables.

Statistical analyses

Baseline characteristics were examined for the three cohorts, including a breakdown for workers with and without disability. Differences in age were tested using ANOVA, and differences in gender, educational level and disability were tested using χ^2.

In the three-state survival model the times of transitions between the first and second state are interval-censored. This means that the exact transition times between these states are assumed to lie somewhere between two observations and that transitions from state 1 to state 2, or the reverse, may take place several times. State 3 is an absorbing state, meaning that respondents can enter this state only once, the exact transition time of which is used from the data.

First, the model was fitted to the data with the MSM package in R, which estimates hazards for state transitions for age and cohort dummies (32). Based on the hazards, hazard ratios (HR) and transition probabilities were derived. An age-dependent model was used, which assumes that state transitions increase or decrease log linearly with age. Subsequently, using disability prevalence and transition probabilities, WLE were estimated with ELECT, a set of functions in R (33). ELECT provides total WLE divided into WLE with and without disability. Confidence intervals (CI) were calculated using simulation based on the maximum likelihood estimation (1000 repetitions). After estimating WLE for a range of specified ages, the results are presented in age-based figures. In figures 1 and 2, the total WLE for all workers, independent of their health state, and for workers who already have disability are presented. Both are estimated based on the total study sample. To improve readability, we discuss only WLE at age 58, the median baseline age. WLE for three categories of workers (workers independent of their health state, workers who already have disability and workers who do not have disability) from age 55–68 are available online (supplementary file A, www.sjweh.fi/show_abstract.php?abstract_id=3765).

Second, the modifying effects of gender and educational level were examined. In MSM, additional hazards for state transitions for gender and educational level were estimated. Subsequently, WLE were estimated stratified by cohort and gender and by cohort and educational level. WLE estimates for one sub-group (eg,

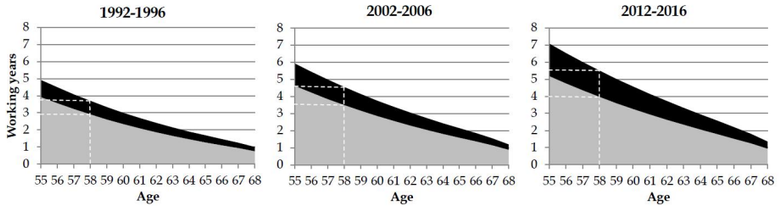

Figure 1. Working life expectancies (WLE) for all workers, independent of their initial health state, comparing three time periods (N=1074). Black=disability; grey=no disability. Note, years with and without disability are presented cumulatively.

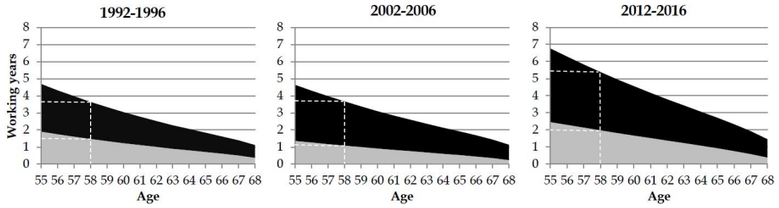

Figure 2. Working life expectancies (WLE) for workers with disability at the specified ages comparing three time periods (N=1074). Black=disability; grey=no disability. Note, years with and without disability are presented cumulatively.

low-educated) were compared with the 95% CI of the estimates for another sub-group (eg, highly educated) and vice versa, to determine significant differences. In addition, interaction between cohort and gender and cohort and educational level was tested to check whether state transitions differed for gender and educational level over the cohorts, based on HR with 95% CI.

Third, the robustness of findings was checked by repeating the analyses using indicators of disability based on self-report and the Chair Stand Test. WLE at age 58 with 95% CI were compared for the three indicators.

Results

Baseline descriptive characteristics

The proportion of workers with disability increased over the cohorts, as well as the proportion of female workers (table 1). Educational level increased over the cohorts both for workers with and without disability. Moreover, in the third cohort, workers without disability were more often highly educated, while workers with disability were more often moderately educated. Mean age increased only among workers without disability.

Number of years worked with disability

In figure 1, the estimated WLE are presented for each age year for all initial workers independent of their health state. For example, at the age of 58, total WLE was 3.7 years (95% CI 3.2–4.2) in the first cohort, 4.6 years (95% CI 4.0–5.1) in the second cohort, and 5.5 years (95% CI 4.9–6.0) in the third cohort. Across these cohorts, the estimated number of years worked with disability also increased. It was 0.8 (95% CI 0.6–1.1), 1.1 (95% CI 0.8–1.4), and 1.5 (95% CI 1.2–2.0) years, respectively in the three cohorts. The increase in number of years worked with disability over the three cohorts is related to the increase in the prevalence of disability (see table 1). Furthermore, workers who already had a disability stayed in the workforce longer while having a disability. figure 2 shows that at the age of 58, this number of years increased from 2.2 years (95% CI 1.5–3.1) in the first cohort, to 2.6 (95% CI 2.0–3.3) in the second, and to 3.4 years (95% CI 2.7–4.1) in the third cohort.

Gender differences in WLE

There were no gender differences in total WLE, WLE with disability and WLE without disability between workers in the three cohorts. Neither was there an interaction of cohort with gender in state transitions (results available in supplementary file B, www.sjweh.fi/show_abstract.php?abstract_id=3765).

Education-based differences in WLE

Estimates of WLE stratified by educational level showed no difference in WLE with disability between low- and highly educated workers in any of the cohorts (see table 2). There were education-based differences in total WLE in the second and third cohort. Highly educated workers had a higher total WLE compared to low-educated workers. Tests of interaction effects of cohort with educational level indicated that differences between low, moderate and highly educated workers did not change over time (results available online in supplementary file C, www.sjweh.fi/show_abstract.php?abstract_id=3765).

Table 1. Baseline characteristics of the study sample [M=mean; SD=standard deviation]

Disability [a*]	Cohort 1								Cohort 2								Cohort 3								Total			
	No disability (N=210)				Disability (N=38)				No disability (N=308)				Disability (N=72)				No disability (N=343)				Disability (N=103)				(N=1074)			
	M	SD	N	%	M	SD	N	%	M	SD	N	%	M	SD	N	%	M	SD	N	%	M	SD	N	%	M	SD	N	%
Gender [a*]																												
Men			129	61			28	74			182	59			46	64			180	52			62	60			627	58
Women			81	39			10	26			126	41			26	36			163	48			41	40			447	42
Education [a*** d* e*** f*]																												
Low			89	42			17	45			89	32			31	43			65	19			23	22			323	30
Moderate			74	35			15	39			105	34			24	33			131	38			51	50			400	37
High			47	22			6	16			105	34			17	24			147	43			29	28			351	33
Age [a*** e**]	59.0	2.8			58.8	2.6			58.7	2.7			58.6	2.7			59.4	2.6			59.3	2.6			59.0	2.7		

*** P>0.001; ** P>0.01; * P>0.05.
[a] Significant difference among respondents between cohort 1, 2 & 3.
[b] Significant difference between respondents with and without disability in cohort 1.
[c] Significant difference between respondents with and without disability in cohort 2.
[d] Significant difference between respondents with and without disability in cohort 3.
[e] Significant difference among respondents without disability between cohort 1, 2 & 3.
[f] Significant difference among respondents with disability between cohort 1, 2 & 3.

Table 2. Working life expectancies (WLE) at age 58 for all workers, independent of their health state, stratified by educational level (N=1074). [CI=confidence interval.]

Educational level	WLE without disability		WLE with disability		Total WLE	
	Years	95% CI	Years	95% CI	Years	95% CI
1992–1996						
Low	2.60	2.13–3.08	0.86	0.56–1.24	3.46	2.92–4.01
Moderate	2.96	2.44–3.48	0.80	0.51–1.15	3.75	3.14–4.35
High	3.56 [a]	2.87–4.23	0.60	0.34–0.99	4.16	3.39–4.93
2002–2006						
Low	2.95	2.50–3.48	1.17	0.79–1.60	4.12	3.52–4.77
Moderate	3.36	2.83–3.98	1.07	0.70–1.47	4.43	3.81–5.09
High	4.14 [a]	3.43–4.84	0.91	0.58–1.31	5.04 [a]	4.26–5.77
2012–2016						
Low	3.32	2.66–3.91	1.81	1.27–2.41	5.14	4.26–5.82
Moderate	3.75	3.12–4.35	1.68	1.18–2.20	5.43	4.64–6.02
High	4.65 [a]	3.94–5.33	1.29	0.88–1.79	5.94 [a]	5.14–6.68

[a] Values differ from low educated workers, with P<0.05

WLE robustness

There were no differences in WLE with disability using the GALI, the six self-reported questions and the Chair Stand Test (results available in supplementary file D, www.sjweh.fi/show_abstract.php?abstract_id=3765). This indicates that the estimates for WLE with disability are robust for differences between disability indicators.

Discussion

This study aimed to examine the change in WLE with disability of older workers comparing cohorts of workers in the 1990s, 2000s and 2010s. WLE with disability of older workers, independent of their health state, increased over the years. There were no differences in WLE with disability between male and female workers, and between low- and highly educated workers.

Contextualizing the results

For workers aged ≥55, WLE with disability increased over the years. This is due to an increase in both the prevalence of disability among older workers and the number of years older workers with disability remain in the workforce. The incremental increase in the second and the third cohort suggests a direct effect from the abolishment of early exit routes and stricter requirements for disability benefits. These measures were introduced between 2002–2006 (9). However, other societal developments also have contributed. The increase in educational level and decrease of physical labor has enabled older workers to work until older ages (34). Moreover, the awareness that peers are also working until older ages has been suggested to enhance older workers' willingness to continue working (35).

This study showed that there were no differences in WLE with disability between male and female workers, nor did this potential difference increase over the years. We hypothesized that women would have a lower WLE with disability compared to men, which is in line with previous research (21). Women often have part-time jobs with a corresponding lower income, and most of them have a bread-winning male partner who is usually older (23, 24, 36). Both may lower the threshold for women to exit early (22). However, working in a part-time job may also facilitate older women to continue working. These opposing factors appear to outweigh each other. Data from Statistics Netherlands show that only since 2012 have women exited the workforce earlier compared to men. The difference increased from 0.1 year in 2012

to 1.0 year in 2016 (2). However, these small differences in the 2010s did not appear to affect WLE with disability differently for men and women in our study and did not, therefore, increase the gender differences.

In addition, we hypothesized that WLE with disability would be higher for low- compared to highly educated workers, in particular in the third cohort. Good economic circumstances offer opportunities for early exit (37), and highly educated workers generally have more economic resources to exit work early compared to low-educated workers (25). However, this hypothesis was not supported. There was no difference in WLE with disability between low- and highly educated workers. Neither did the effect of educational level change over the cohorts. It seems that the reformed social security is still adequate enough in giving low-educated workers the opportunity to exit the workforce early, which keeps socioeconomic differences limited. Data from Statistics Netherlands show that low-educated workers indeed more often exit the workforce through disability and unemployment schemes (2). Another explanation could be that highly educated workers choose to continue working with disability, while low-educated workers are required to continue working, which masks socioeconomic differences. It may be expected low-educated workers suffer more from continuing work with disability compared to highly educated workers. First, low-educated workers have more often physically demanding jobs, which makes it more difficult to perform the job in presence of disability (38, 39). Second, low-educated workers are less likely to cope with their disability in their job (40). Third, highly educated workers more often make use of part-time retirement arrangements, which enables them to continue working with disability while low-educated workers continue working in their normal intensity (41). Therefore, especially among the low-educated workers, working with disability could result in a discrepancy between job requirements and work capabilities (14), which in turn can affect their work ability and productivity (42), as well as their well-being (43).

Methodological considerations

The use of data from the Longitudinal Aging Study Amsterdam (LASA) has several advantages. First, LASA is based on a representative sample of the Dutch older population, which offers a representative sample of the older working population as well. Second, LASA started in 1992, which provides an unique opportunity to compare WLE with disability over a period of 20 years. Third, in LASA multiple measures are available for disability. This allowed us to conduct a robustness check of our findings. Similar results were found when different measures of disability are used.

There are also limitations of this study. First, the sample of workers was relatively small. This gives statistical power issues when subgroups are compared. However, in the main analysis the three cohorts were pooled, improving the power. Still, we refrained from building an extended multivariate model and added the covariates gender and educational level separately in the model. Second, we included respondents in paid employment at baseline and exit from work was an absorbing state, meaning that non-workers who returned to work are not represented. Thus, WLE is estimated for workers only and not for all persons at a particular age. This may limit comparability with other studies, eg, Lièvre et al (21) and Nurminen et al (44). However, it is likely that omitting those who returned to work had only a negligible underestimating effect because the probability of returning to work is low among older adults (45). Moreover, the current study sample was too small to analyze non-workers at baseline and those returning to work. Third, selection bias in the form of the healthy worker effect could have played a role (46). Before the age of 55, people may have exited the workforce already due to disabilities. However, it will not undermine the inference of the WLE as these are estimated conditionally that one reaches the age of ≥55 while being in a paid job. In addition, we do not think that non-response had led to selection bias because non-response was not selective in terms of baseline disability, and the main reason for drop-out was lack of interest, thus not health-related. Fourth, WLE are estimated for all ages included in the study sample (55–68 years) because over the entire age range, a proportion of the sample was still active in the workforce. It must be noted that the WLE estimated at the highest ages are based on the hazards for state transitions computed at the younger ages and might be less adequate. Therefore, we discussed only the WLE at age 58 years, the median baseline age. Fifth, working with disability is not necessarily related to reduced work ability, as defined by Ilmarinen (47), and the association with work ability may vary between highly and low-educated workers. Unfortunately, there was no measure on work ability available in LASA.

Implications for research and practice

The recent rise in WLE with disability could mean that disabled workers are well supported by their employers or colleagues to continue working or that contemporary working conditions are more suitable to facilitate prolonged working with disability. Alternatively, disabled workers could be forced to continue working due to their financial situation. This may lead to reduced well-being and productivity of disabled workers. A study among older workers in the 2010s suggests that the increase of WLE with disability is involuntary as a result of having too little time to adapt to the increased retirement age (39). More research into differences in well-being and productivity between disabled and non-disabled workers might help to assess the impact of the increase of WLE with disability. In addition, attention has to be paid to the work ability of disabled low-educated workers, both in research and at the workplace.

In the meantime, employers should support their disabled employees. Older workers with disability may benefit from managerial support and professional advice on how to cope at work in the presence of disability (48). However, effective interventions for older workers to maintain their work ability and promote sustainable employability are lacking (49). In addition, the Dutch Government plays an important role in accommodating disabled workers to make a dignified exit from the workforce. The increased WLE with disability asks for re-evaluation of the current exit routes out of the workforce.

In view of the ongoing increase in the statutory retirement age, WLE with disability and possible differences between men and women, and between low- and highly educated workers, should be monitored to prevent socioeconomic differences.

Concluding remarks

Between the 1990s and the 2010s, subsequent generations of older workers have extended their working lives with disability. The findings emphasize the importance of workplace interventions that facilitate older workers with disability to maintain well-being and work ability. In addition, the question arises whether current exit routes out of the workforce are still adequate.

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Conflict of interest

The authors declare no conflict of interest.

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