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# In-Depth Study of the Workers' Perspectives to Enhance Sustainable Working Life: Comparison Between Workers With and Without a Chronic Health Condition

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**Abstract** *Purpose* To gain in-depth understanding of the number and type of experienced ageing problems, obstacles to perform work tasks, retention factors to maintain work and support needs to continue working life in the next years among workers aged 45 years and older with and without a chronic health condition. *Methods* A survey of workers' perspectives on problems, obstacles, retention factors and needs due to ageing was carried out in 3,008 workers aged 45 years and older in nine different companies. To classify the open-ended questions we used the International Classification of Functioning and disability (ICF). *Results* Older workers with a chronic health condition reported more problems due to ageing (56 vs 34 %;  $p < .001$ ), more obstacles (42 vs 16 %;  $p < .001$ ) and more needs (51 vs 31 %;  $p < .001$ ) compared to those without a chronic health condition. No relevant differences were found on type of experienced problems, obstacles, retention factors and needs between both groups. Problems and obstacles were found on physiological and psychological functions. Retention factors and needs to enhance sustainable working life were particularly reported on work-related environmental factors. *Conclusion* Because workers with a chronic health condition experienced more problems, obstacles and needs, the largest

gain of occupational intervention can be achieved in these workers. However, our findings suggest that interventions aimed to enhance sustainable working life of older workers can be similar in content for persons with and without chronic health conditions and should have a central focus on work-related factors.

**Keywords** Ageing problems · Chronic health condition · Obstacles and retention factors · Support needs · Sustainable working life · Workers' perspectives

## Introduction

Because of the ageing population, employers will be confronted with manpower in which older workers are represented more strongly than before [1]. Enabling and encouraging older workers to remain on the labour market is important. Mobilising the full potential of older people is a key response to those demographic changes, which require the promotion of a healthy working life [2]. However, the process of ageing burdens on physical and mental health status [3] and is significantly associated with a decreased work ability [4] and early discontinuation of working life [5, 6]. Due to the aging population, an increase of the incidence of chronic health conditions in the working population is expected in the next 20 years. Perceived health declines with age, and the prevalence of chronic health conditions increases after the age of 45 years [7, 8] and have an adverse impact on the employability of the older workers [9, 10]. The higher prevalence of chronic health conditions is in turn strongly related to more 'fatigue' and 'emotional exhaustion', which are correlated with perceived work stress [11, 12]. Thus,

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deterioration in health status due to ageing will make workers more vulnerable in the labour process.

The increase in problems due to ageing as well as health related problems from the age of 45 years onwards implies the importance of attention to obstacles and retention factors for maintaining or enhancing a sustainable working life. Several prognostic studies have identified problems and risk factors associated with sustainable employability for ageing workers in general [13–16]. However, little is known about the workers' perspectives on obstacles, retention factors and support needs with regard to continuing their working life. There have been some studies on obstacles and motivators in the work situation from a patients' perspective or workers with health conditions, but these have been conducted in specific populations [12, 17, 18]. In addition, several studies have shown that the presence of a chronic condition has impact on work ability [3, 19], work disability [8] and productivity [9]. Therefore it is conceivable that the number and type of problems, obstacles, retention factors and needs differ between workers with and without a chronic health condition. Insight into these factors is an important next step towards the development of strategies and (preventive) measures aimed at addressing the potential workforce shortages in daily practice.

The aim of the present study is to compare the number and type of experienced problems, obstacles, retention factors and support needs among workers aged 45 years and older with and without a chronic health condition.

## Methods

The data of this cross-sectional in-depth survey study were obtained from workers aged 45 years and older. Nine companies in the northern part of the Netherlands, invited by their occupational health physicians, were willing to participate in the study. Three large size companies ( $\geq 1,000$  workers), two medium sized companies ( $\geq 500$  workers) and four small companies ( $< 500$  workers) participated. These companies represented four sectors: health care (two companies;  $n = 4,097$ ), education (3 companies;  $n = 3,167$ ), government (1 company;  $n = 563$ ) and industry (3 companies;  $n = 590$ ). A self-administrated questionnaire including an information letter about the study with instructions on how to fill in the questionnaire was sent to all workers aged 45 years and older of the nine companies ( $n = 8,417$ ). All companies enclosed a letter of recommendation. The anonymity of respondents and confidentiality of the information they provided were guaranteed. Four weeks after the initial mailing, all workers received a written reminder. The data were collected in February and March 2008.

Ethical approval was sought from the Medical Ethics Committee of the University Medical Center Groningen, which advised that, according to Dutch law, ethical clearance was not required for this study.

## Measures

We used self-constructed dichotomous (yes/no) questions and open-ended questions. The first question assessed whether the workers experienced ageing problems: 'Do you encounter problems in working life due to ageing?'. The next two questions concerned the obstacles and retention factors for continuing working life: 'Do you experience obstacles in performing work tasks due to ageing problems?' and 'Are there factors in your work which facilitate you in maintaining a sustainable working life?'. The fourth question was about the support needs to continue working life in the coming years: 'Do you need support in the work situation to continue working life in the coming years despite ageing?'. For each question with a 'yes' answer, the workers were asked to report a maximum of the three most important examples which were on top of their mind.

Additionally, the questionnaire included questions about: age, gender, education, occupation, sector and whether the worker experienced a chronic health condition. Education was categorized into no education/primary school, lower vocational education, intermediate secondary and vocational education, higher vocational education and university and other or unknown. Occupation was divided into four groups: executive, secretarial, policy and management. In accordance with many other studies, a chronic health condition was defined as 'the subjective experience of long-term irreversible disease of more than 3 months duration' [20, 21]. It was assessed by asking the respondents the following question: 'Do you currently have a long-term or chronic health condition of more than 3 months duration without the prospect of recovery?' (yes/no).

## Classification System

To classify and compare the workers' perspectives we used the International Classification of Functioning, Disability and Health (ICF) [22]. The ICF is a classification of human functioning and disability developed by the World Health Organisation to systematically categorize health and health-related states as well as contextual factors that may impact those states [22]. It offers a taxonomy for the classification of functions, structures, activities, participation and a list of external factors. The ICF does not contain a taxonomy for work-related external factors and no consensus has been reached for a list of personal factors [23, 24]. Therefore, we used the expanded classification as

described by Heerkens et al. [23] to classify the work-related external factors. For the personal factors we used the update of the provisional list of personal factors as described in the Newsletter on the WHO Family of International Classifications [24].

### Classifying Data

To link the data to the ICF codes, the updated linking rules developed by Cieza et al. [25, 26] were used. Following the linking rules, the open ended data was linked to the most appropriate corresponding ICF category, identified with its unique alphanumeric codes that indicate the components of the ICF: 'Body functions' (B), 'Body structures' (S), 'Activities and participation' (D), 'Environmental factors' (E). For classifying the 'Work-related environmental factor' and 'Personal factors' we used the alphanumeric codes 'W' and 'P' respectively. In each classified component of the ICF, the categories are arranged in a stem-branch-leaf scheme. Consequently, a higher level (more detailed) category shares the lower-level categories of which it is member. Classification of the data in this study took place on the highest level available of the ICF components (mostly fourth or fifth). If the example reported by the workers did not provide sufficient information to make a decision about the most precise ICF category, the concept was deemed not definable and was assigned the code Nd (Not defined). When not definable answers referred to a health condition we used Nd-hc (Not defined-health condition). If an answer described an aspect, which was not covered by the expanded ICF, it was assigned Nc (Not covered) [25].

We conducted a pilot to test the usability of the ICF in the current study. Two practising occupational health physicians, all familiar with the ICF, and the first author (WK) categorised a random sample of 200 workers independently, and compared and discussed their results. In case of disagreement (16 %), differences were discussed until consensus was reached. During the pilot we developed a short list of the relevant ICF-codes in our study. During the pilot we developed a short list of the relevant ICF-codes in our study. In addition, the usability of the additional stem-branch-leaf scheme for the 'Work-related environmental factors' and 'Personal factors' was tested. An short example of the list of classification codes used in this study is shown in Table 1. The complete list used in this study can be obtained from the authors. Two authors (WK, JV) categorised all data. They categorised 30 % independently and compared their results, to minimize the risk of bias.

### Data Analyses

A description of the socio-demographic characteristics was given by frequencies, standard deviations, means and

percentages for the total sample and for both groups of workers with and without chronic health conditions. To estimate differences between both groups the *t* test was used for the continue variable age. The Chi square statistics was used for the categorical variables. We examined the differences in proportion of persons experiencing problems, obstacles, retention factors and needs between workers with and without a chronic health condition by using logistic regression. We adjusted the analysis for gender and occupation.

The number and type of problems due to ageing, obstacles, retention factors and needs to continue work and the ICF codes identified were given by frequencies and percentages for workers with and without chronic health conditions separately. The different problem, obstacle, retention and need items were summated over the respondents and the top 10 most frequently reported were presented. All analyses were carried out with the statistical package SPSS version 20.0 (IBM Corp, Released 2011, IBM SPSS Statistics, Armonk, NY).

### Results

Out of the 8,417 workers aged 45 and older who were invited to participate in the study, 3,008 returned the self-administered questionnaire. The mean response rate was 36 % and varied for the nine companies between 28 % in a large health care company and 58 % in one small company in the industrial sector. We excluded 25 workers from the study because of missing data on experienced problems, obstacles, retention factors or needs. A description of the socio-demographic characteristics is presented in Table 2. The mean age of the workers was 53.4 years (SD 5.0) ranging from 45 to 64 years. Fifty-one per cent of the workers was female, and 60 % was working in an executive occupation. Most workers were highly educated (59 %) and most of them were working in the sectors education (42 %) and health care (41 %). Thirty-seven per cent ( $n = 1,109$ ) of the workers reported the presence of a chronic health condition. Significant differences for workers with and without a chronic health condition were found on gender and occupation. The percentage of female workers was higher in workers with a chronic health condition. Workers in executive (40 %) and secretarial/administrative (41 %) functions reported more chronic health conditions than policy workers (32 %) and management (29 %).

### Comparison of the Experienced Problems, Obstacles, Retention Factors and Support Needs

In the total sample, 1,246 (42 %) of the workers reported problems due to ageing, 763 (26 %) reported obstacles to

**Table 1** Example of the list of classification codes between the self-reported answers and corresponding ICF components including the work-related external factors and personal factors

ICF code <sup>a</sup>				ICF category title
1st level	2nd level	3rd level	4th level	
B1				Mental functions
	B140			Attention functions
		B1400		Sustaining attention
	B144			Memory functions
		B1441		Long-term memory
B2				Sensory functions and pain
	B210			Seeing functions
		B2100		Visual acuity functions
	B280			Sensation of pain
		B2801		Pain in body part
			B28010	Pain in head and neck
			B28013	Pain in back
D4				Mobility
	D415			Maintaining a body position
		D4152		Maintaining a kneeling position
		D4153		Maintaining a sitting position
		D4154		Maintaining a standing position
D7				Interpersonal interactions and relationships
	D740			Formal relationships
		D7400		Relating with persons in authority
		D7401		Relating with subordinates
		D7402		Relating with equals
E2				Natural environment and human-made changes to environment
	E225			Climate
		E2250		Temperature
		E2251		Humidity
P				Personal related environmental factors
	P100			Socio-demographic factors
		P1010		Age
		P1020		Gender
		P1030		Education
		P1040		Partnership/marriage
		P1050		Income
	P500			Work related personal
		P5010		Occupation/profession
		P5020		Occupational status
		P5030		Commitment to work
		P5060		Work history
		P5110		Need for work

**Table 1** continued

ICF code <sup>a</sup>				ICF category title
1st level	2nd level	3rd level	4th level	
		P5120		Success
W				Work-related environmental factors
	W100			Work content
		W1010		Job tasks
			W10101	Supervising colleagues
			W10102	Delegating tasks
			W10103	Tasks reduction
		W1020		Skills required
		W1030		Decision authority
	W500			Organisation
		W5010		Organisation culture
			W50101	Manners
			W50102	General attitude towards absenteeism
		W5010		Company type

<sup>a</sup> The complete list used in this study can be obtained from the authors

perform work due to ageing problems, 2,451 (82 %) experienced retention factors maintaining a sustainable working life and 1,142 (38 %) reported that they had special support needs to continue their working life in the coming years (data not shown). Workers with a chronic health condition reported significantly more problems due to ageing (56 vs 34 %;  $p < .0001$ ), more obstacles to perform work due to ageing problems (42 vs 16 %;  $p < .0001$ ) and more support needs to continue their working life in the next coming years (51 vs 31 %;  $p < .0001$ ) compared to workers without a chronic health condition. The mean number of problems, obstacles and needs reported per person were higher for workers with a chronic health condition compared to workers without a chronic health condition, i.e. problems due to ageing (1.88 vs 1.74), obstacles (1.93 vs 1.62) and support needs (1.51 vs 1.41). No difference was found between both groups for the experienced retention factors (see Table 3).

### Classification of the Workers' Perspectives

After linking the data to the components of the ICF (Body functions, Body structures, Activities and Participation, Environmental factors) the percentages of reported answers on the ICF components showed similar results for workers with and without a chronic health condition (CHC) (Table 3). The most experienced problems due to ageing were reported on the ICF component 'Body functions'

**Table 2** Characteristics and number of experienced problems, obstacles, retention factors and needs

n = 2,983	Total sample (n = 2,983)		Workers with a chronic health condition (n = 1,109; 37 %)		Workers without a chronic health condition (n = 1,874)	
	n	%	n	%	n	%
Mean age (SD)	53.4 (5.0)		53.5 (4.8)		53.3 (5.0)	
Female workers <sup>a</sup>	1,527	51	621	56	906	48
Education						
No education/primary school	52	2	21	2	31	2
Lower vocational education	451	15	181	16	270	14
Intermediate secondary and vocational education	707	24	264	24	443	24
Higher vocational education and university	1,761	59	638	58	1,123	60
Other or unknown	12	<1	5	<1	7	<1
Sector						
Health care	1,213	41	466	42	747	40
Education	1,267	42	469	42	798	43
Production	231	8	98	9	174	9
Government	272	9	76	7	155	8
Occupation <sup>a</sup>						
Executive	1,786	60	708	64	1,078	58
Secretarial/administrative	375	13	152	14	223	12
Policy	385	13	123	11	262	14
Management	398	13	115	10	283	15
Unknown	39	1	11	1	28	1

<sup>a</sup> Chi square statistics shows significant differences between workers with and without a chronic health condition ( $p < .001$ )

(with CHC: 71 % vs without CHC: 74 %), followed by work-related factors (15 vs 17 %) and ‘Activities and Participation’ (7 vs 6 %). Problems on the other ICF components were hardly reported. The most experienced obstacles to perform work were reported least often on the ICF components ‘Work-related environmental’ (with CHC: 37 % vs without CHC: 40 %), ‘Body functions’ (32 vs 39 %) and ‘Activities and Participation’ (29 vs 19 %). The components ‘Work-related environmental’ (with CHC: 58 % vs without CHC: 60 %), ‘Activities and Participation’ (24 % of both groups), and ‘Personal factors’ (16 vs 15 %) were reported as retention factors to maintain a sustainable working life. Support needs to continue working life were particularly reported on the component ‘Work-related environmental factors’ with 92 and 95 % respectively for both workers with and without a chronic health condition.

The most frequently reported problems, obstacles, retention factors and needs were similar for workers with and without a chronic health condition (see Table 4). Most frequently experienced problems due to ageing were problems with energy level, recalling information stored in long-term memory and bringing it into awareness (retrieval of memory), functions related to sustaining muscle contraction of all muscles of the body for the required period of time (endurance of all muscles of the body) and the

seeing function for both distant and near vision (visual acuity functions). The most frequently reported obstacles to perform work due to ageing problems were tasks which require concentration for the period of time required (sustainable attention), lifting and carrying object, working schedules and work pace. The most frequently reported retention factors to maintain a sustainable working life were: creating and maintaining formal relations with people in the same position (relating with equals), beginning and maintaining interactions with others for a short or long period of time (forming relationships), job tasks and creating and maintaining formal relations with people in positions of lower rank or prestige relative to one’s own social position (relating with subordinates). The most frequently reported support needs to continue working life in the next coming years were working less hours, tasks reduction, reducing time pressure, improvement of the physical conditions in the work place and ergonomic adjustments (see Table 4).

## Discussion and Conclusion

Our study shows that older workers with a chronic health condition experience more problems due to ageing, more obstacles to perform work and more needs to continue

**Table 3** The number and type of reported examples of the workers’ perspectives of problems, obstacles, retention factors and needs linked to ICF codes

	Workers with a chronic health condition (n = 1,109) <sup>a</sup>								Workers without a chronic health condition (n = 1,874) <sup>a</sup>							
	Problems		Obstacles		Retention factors		Needs		Problems		Obstacles		Retention factors		Needs	
Number of workers who reported yes (%)	617 (56)		465 (42)		910 (82)		560 (51)		629 (34)		298 (16)		1,541 (82)		582 (31)	
Mean (SD) number of reported per worker (total reported/N (yes))	1.88 (0.82)		1.93 (0.83)		2.00 (0.84)		1.51 (0.74)		1.74 (0.80)		1.62 (0.79)		2.00 (0.83)		1.41 (0.69)	
Reported answers on the ICF components <sup>b</sup>																
B Body functions	834	71	284	32	6	<1	7	<1	813	74	191	39	14	<1	1	<1
S Body structure	0	–	0	–	0	–	0	–	0	–	0	–	0	–	0	–
D Activities and participation	80	7	262	29	449	24	37	4	66	6	92	19	752	24	26	3
E Environmental factors	6	<1	0	–	4	<1	3	<1	4	<1	0	–	6	<1	2	<1
P Personal factors	6	<1	9	<1	302	16	16	2	13	1	0	–	467	15	6	<1
W Work-related factor	177	15	331	37	1,078	58	776	92	186	17	196	40	1,879	60	780	95
Not definable-Health conditions	54	5	6	<1	0	–	0	–	4	<1	2	<1	0	–	0	–
Not definable	6	<1	4	<1	8	<1	5	<1	2	<1	3	<1	11	<1	7	<1

<sup>a</sup> Logistic regression analyses, adjusted for gender and occupation, shows significant differences between experienced problems due to ageing ( $p < .001$ ), obstacles to perform work ( $p < .001$ ), and support needs continue their working life in the next coming years ( $p < .001$ ) between workers with and without a chronic health condition

<sup>b</sup> Workers were asked to report a maximum of the three most important examples of these factors which were on top of their mind

working life compared to older workers without chronic health conditions. Most problems due to ageing were linked to the ICF component ‘Body functions’ (B) which covers physiological functions of body systems, including psychological functions. Perceived obstacles to perform work due to ageing problems were mainly related to the ICF components ‘Body functions’ (B), ‘Activities and

participation’ (D) and ‘Work-related environmental factors’ (W). Retention factors for maintaining a sustainable working life and support needs to continue working life in the next coming years, were particularly reported on ‘Work-related environmental factors’ (W). Relevant differences in type of reported problems, obstacles, retention factors and needs with respect to enhance sustainable

**Table 4** Top 10 of the most frequently reported type of ageing problems, obstacles, retention factors and needs to continue work of workers with and without a chronic health condition

Workers with a chronic health condition				Workers without a chronic health condition			
ICF code	Freq	%	Item	ICF code	Freq	%	Item
Problems due to ageing				Problems due to ageing			
Total number reported n = 1,163				Total number reported n = 1,093			
B1300	196	17	Energy level	B1300	207	19	Energy level
B7402	87	7	Endurance of all muscles of the body	B1442	100	9	Retrieval of memory
B1442	76	7	Retrieval of memory	B2100	72	7	Visual acuity functions
B7152	64	6	Stability of joints generalized	B7402	70	6	Endurance of all muscles of the body
B1400	53	5	Sustaining attention	B7800	40	4	Sensation of muscle stiffness
B2100	46	4	Visual acuity functions	B1400	38	3	Sustaining attention
B7800	41	4	Sensation of muscle stiffness	W1101	36	3	Mental demands—obtaining and using new knowledge
B28013	40	3	Pain in back	B28013	33	3	Pain in back
W1101	30	3	Mental demands—obtaining and using new knowledge	B7152	32	3	Stability of joints generalized

**Table 4** continued

Workers with a chronic health condition				Workers without a chronic health condition			
ICF code	Freq	%	Item	ICF code	Freq	%	Item
B1643	24	2	Cognitive flexibility	B6702	29	3	Discomfort associated with menopause
Obstacles to perform work due to ageing				Obstacles to perform work due to ageing			
Total number reported n = 896				Total number reported n = 484			
B1400	134	15	Sustaining attention	B1400	89	18	Sustaining attention
D430	107	12	Lifting and carrying objects	W1080	45	9	Work pace
W3012	59	7	Working schedules	W3012	44	9	Working schedules
W1080	58	6	Work pace	D430	40	8	Lifting and carrying objects
W1010	57	6	Job tasks	W1010	24	5	Job tasks
B1300	37	4	Energy level	W3013	19	4	Shift work
W4011	24	3	Time pressure	B1300	13	3	Energy level
W3013	23	3	Shift work	B1442	13	3	Retrieval of memory
W1101	22	2	Mental demands—obtaining and using new knowledge	W1200	12	2	Mental demands—obtaining and using new technologies
D4154	22	2	Maintaining a standing position	B2100	11	2	Visual acuity functions
Retention factors to maintain working life				Retention factors to maintain working life			
Total number reported n = 1,847				Total number reported n = 3,129			
D7402	322	17	Relating with equals	D7402	498	16	Relating with equals
D7200	157	9	Forming relationships	D7200	269	9	Forming relationships
W1010	139	8	Job tasks	W1010	217	7	Job tasks
D7401	131	7	Relating with subordinates	W1101	196	6	Mental demands—obtaining and using new knowledge
P5050	117	6	Job satisfaction	D7401	198	6	Relating with subordinates
D7101	99	5	Appreciation in relationships	D7101	168	5	Appreciation in relationships
W1050	92	5	Autonomy	W2060	166	5	Work atmosphere
W1101	82	4	Mental demands—obtaining and using new knowledge	P5050	165	5	Job satisfaction
W2060	80	4	Work atmosphere	W1050	150	5	Autonomy
P2060	72	4	Purpose in life	W1060	115	4	Variation job tasks
Needs of support to continue working life in the next coming years				Needs of support to continue working life in the next coming years			
Total number reported n = 844				Total number reported n = 822			
W1013	95	11	Tasks reduction	W3015	109	13	Working hours
W3015	87	10	Working hours	W1013	76	9	Tasks reduction
W4011	67	8	Time pressure	W4020	51	6	Physical conditions work
W4031	50	6	Ergonomic conditions—furniture	W4011	50	6	Time pressure
W4020	48	6	Physical conditions work	W4034	47	6	Ergonomic conditions—tools and machinery
W4034	39	5	Ergonomic conditions—tools and machinery	W3013	45	5	Shift work
W5061	28	3	Policy of company	W4031	37	5	Ergonomic conditions—furniture
W3013	24	3	Shift work	W3011	28	3	Working hours
W3012	20	2	Working schedules	W5010	24	3	Organisation culture
W4030	19	2	Ergonomic conditions	W5061	24	3	Policy of company

working life between workers with and without chronic health conditions were not found.

In the past few years several studies have demonstrated that health status has a profound impact on the ability of workers to be actively engaged in paid employment and to

prolong their meaningful contribution to a productive society [3, 4, 13]. There is evidence from longitudinal studies that poor health, in particular self-perceived poor health, plays a role in exit from paid employment [27–29]. Our findings that workers with chronic conditions



experience more problems and obstacles and reported more support needs emphasize the vulnerability of this specific group of older workers and their need for preventive occupational interventions.

We found no large differences between workers with and without a chronic health condition with respect to the type of experienced problems, obstacles, retention factors and needs. Previous studies focussed on understanding why older workers continue to work and the obstacles and retention factors they encounter are mostly based on specific perspectives. These studies showed perceived perceptions of constraints of older workers (>60 years) [30–32], the ability to carry on working in specific occupations [13, 16], or working with (specific) chronic health conditions [12, 18, 33, 34]. Differences between workers with and without a chronic health condition we found in literature were addressed to fatigue, emotional exhaustion and perceived health complaints [11]. Qualitative or in-depth studies from the workers' perspectives of experienced types of ageing problems, obstacles, retention factors and needs in working life to compare with our results are scarce. Moreover, data about differences between workers with and without a chronic health condition of relevant factors from the workers' viewpoint to enhance sustainable working life were not found. That we found no differences in types of problems, obstacles, retention factors and needs between workers with and without a chronic health condition might suggest that preventive occupational interventions do not need to differentiate between workers with and without a chronic health condition.

The importance of the components 'Body function' and 'Work-related environmental factors' was in line with our expectations. Ageing has been found to be strongly related to a decrease in physical and cognitive functioning [3, 35, 36]. Good health and physical fitness were perceived to be facilitators to work participation from the workers' point of view [31, 32]. In addition, prognostic studies focussing on different working populations or health conditions have shown that work related adjustments such as reducing work hours, changing the type of work, reducing physical demands and work stress were relevant factors to maintain work participation [12, 13, 37]. This study shows that most workers are aware that their problems due to ageing mainly concern 'Body functions'. However, they assume that the burden of these ageing problems will not disappear and that adjustments in the work situation are necessary to enhance sustainable working life. In line with this they report work-related retention factors and needs to remain and continue work participation. With respect to preventive occupational interventions this suggest that workers at risk could be identified by their problems on 'Body functions', but that the intervention must focus on creating a balance between workload and the workers individual capacity.

As many problems, obstacles, retention factors and needs are named by the participants in this study, the results do not indicate a specific intervention. Nor do the results support the development of different interventions for workers with and without a chronic health condition. Most experienced problems are reported on the ICF component 'Body Function', but the impact of those problems on obstacles to perform work were different from the workers' perspectives. Obstacles were reported on the ICF components 'Body Functions', 'Activities and Participation' as well as 'Work related factors'. Support needs to continue work were particularly reported on the ICF component 'Work-related factors'. However, the requested adjustment were spread on different work-related factors. Thus, a preventive intervention to overcome the challenge of an ageing workforce should be tailor-made and able to deal with individually experienced problems and needs. From previous research we know that empowerment and self-management interventions could contribute to a sustainable working life for both workers with and without a chronic health condition [38, 39]. It is also known that supervisors are most likely to receive the first request for accommodations from workers and are responsible for facilitating these workers [40, 41]. Therefore, important elements of such a preventive and tailor-made intervention should base on: (a) an inventory of (work-related) problems, obstacles and personal development opportunities, and (b) the possibility to discuss work-related environmental factors and adaptations based on the individual worker. A booklet for workers to encourage a structured dialogue with the supervisor to identify the experienced problems and to explore possible solutions of the worker, might be a useful starting point for a tailor-made and effective intervention in which both the worker and the supervisor can take their responsibility. Such an intervention is focussed on increasing the problem-solving capacity of the workers and stimulating their awareness of their role and responsibility towards a healthy working life, with support of the supervisor.

A strength of our study is that we used open ended questions to give as much room as possible to the workers' own perspective on their problems due to ageing, obstacles and retention factors in work participation and needs to continue working life. This design elucidates data from the experiences of the workers themselves, because the questions were not directed towards a number of set answering categories. The open-ended questions enabled authentic themes to be named, independent from prevailing constructs, instruments, or questionnaires, and thus give an in-depth overview. However, this study is not a qualitative study, but an in-depth study of the workers' perspectives on problems, obstacles, retention factors and needs to increase sustainable work. Subsequently, the data was categorised by using the framework of the ICF model. The ICF proved highly useful for the

content comparison of the workers' perspectives of the open-ended data. Expanding the ICF classification by using a list of work-related environmental factors and personal factors as well was helpful. However, in a future revision of the ICF component 'Work-related environmental factors' the classification of job tasks could be more specified (e.g. tasks reduction, supervising colleagues, teamwork) and aspects referring to 'working at home' should be included.

A limitation of this study is that the overall response rate of 36 % at baseline could have led to selective participation. Because of the anonymous study design, we were not able to investigate the characteristics of the non-responders properly. The results of our study might not be representative for workers in the production sector because of the underrepresentation of these workers in our study. Nevertheless, we believe there is no reason to expect that workers with problems due to functional age or a chronic health condition returned the questionnaire less frequently than workers without problems. The questionnaire addressed a variety of themes, and did not emphasize functional age or chronic health conditions. Another potential limitation is that the current study does not distinguish between specific chronic health conditions because of the lack of knowledge of the severity and limitations of the conditions. It is possible that severely ill and chronically disabled are in most cases excluded from working life and their perspectives are not included in our sample. The workers who are still working, might be a select, relatively healthy group of the general population of this age. Because of this selection bias due to the healthy worker effect, the results in this report are probably an underestimation of the problems in the entire age group [42, 43]. To make no difference between workers suffering from various chronic health conditions in relation to a sustainable working life is supported by Detaille et al. [18, 44] among physically ill workers. They showed that different groups of chronically ill workers were experiencing the same themes that they perceived to be important for continuing their work, although their priority varied. Finally, this study is an in-depth study using open ended questions, but it is not a qualitative study involving material derived from interviews or observation. Defining and judging the open ended data was sometimes difficult because the context for interpretation was missing. However, to control for the quality of the information gathered, a two step-method was used. First, we conducted a pilot study. In a further attempt to minimize the risk of bias, an additional 30 % of the data were analysed independently by two authors. We assume that the opportunity to gain in-depth information of the workers' perspectives of a large group of workers in different occupations and organisations is more valuable than using predefined constructs or a small set of qualitative data. Moreover, because of the complementary knowledge

of the investigators and the generally clear description of the open-ended answer, we do not expect that the method used in this study has led to a distorted picture.

In conclusion, older workers with a chronic health condition reported significantly more problems due to ageing as well as obstacles to continue their working life and support needs to continue work in the upcoming years, compared to workers without a chronic health condition. However the type of problems, obstacles, retention factors and support needs were very similar, with problems mostly related to bodily functions, and retention factors and needs mostly related to work-related factors. These findings suggest that interventions aimed to enhance sustainable working life of older workers can be similar for persons with and without chronic health conditions and should have a central focus on work-related factors.

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