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Work Adjustments in a Representative Sample of Employees with a Chronic Disease in the Netherlands

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Abstract *Purpose* The aims of this study are: (1) to describe the prevalence of needed and implemented work adjustments in a representative sample of Dutch employees with a chronic disease; and (2) to assess the effects of needed and implemented work adjustments on sick leave. *Methods* The prevalence of work adjustments was assessed in employees with a chronic disease, aged between 15 and 65 years ($n = 7,687$) from the 2007 Netherlands Working Conditions Survey (NWCS). Of these, $N = 2,631$ employees participated in the Netherlands Working Conditions Cohort Study (NWCCS) measurements in 2008 and 2009. The NWCCS data were used to investigate the effects of work adjustments on sick leave. All data were self-reported. A repeated measures ANOVA was performed to analyse differences in sick leave in 2007, 2008

and 2009 between employees with and without a need for work adjustments, for those who reported an implemented work adjustment and those who did not. *Results* In 2007, the prevalence of implemented work adjustments among Dutch employees with a chronic disease was 22 %, while 30 % reported the need of a work adjustment. In employees with and without a need for work adjustments in 2007, a work adjustment in 2008 was significantly associated with a decrease in sick leave from 2007 to 2009. *Conclusion* The need for work adjustments is higher than the implementation of work adjustments. Work adjustments should be considered more often for employees with chronic diseases, because implementation of a work adjustment is associated with a decrease in sick leave.

Keywords Chronic disease · Work adjustment · Sick leave · Employment

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Introduction

As a result of the ageing of the working population, it becomes more and more important to support workers to remain healthy and productive at work. With increasing age the risk of health problems, such as a chronic disease, increases [1]. In the Netherlands, 36 % of the employees reported a long-standing disease or handicap, of whom 51 % stated that they were at least slightly hampered in work performance due to their health condition [2]. It is thus of increasing importance to support workers with chronic disease to stay at work.

Previous research has shown that participation in paid work of people with a chronic disease is lower compared to those without a chronic disease [3]. However, if they are involved in work, they show more sick leave [4] and have

more often long-term work disability [5, 6]. Besides negative consequences for the individual, sick leave and work disability have major consequences for society, such as high disability costs and loss of skills and experience for the labor force.

Work adjustments are a way to accommodate employees with a chronic disease at work. According to the Model of Workload and Capacity, work adjustments are considered to be helpful to solve problems at work by improving the match between work demands and work capacity [7]. Work adjustments may be the result of a structured intervention following sick leave, but may as well be organized informally. Research on work adjustments in patients with a chronic disease is sparse. Previous studies have shown that employees with a physical illness were more likely to receive a work adjustment [8, 9]. A Canadian cohort study has shown that offering and accepting work adjustments was associated with workplace factors and age, rather than health-related factors [10]. A recent study in the Netherlands showed that employees with a chronic disease reported a need for work adjustments regarding working hours and work tasks [11]. A limitation of this study was that it was performed within a selective sample of individuals with a chronic disease interested in following a rehabilitation program. Research on the effects of workplace adjustments is most often performed in the context of a randomized controlled trial and in specific health problems e.g., by using participatory ergonomics [12]. When implemented, these interventions appear to be effective on work-related outcomes, such as return to work [12]. However, the implementation of work adjustments is often poor [13].

So far, studies of work adjustments in the general population of employees with a chronic disease have not been conducted. As a result, we do not know how often work adjustments are needed and are being implemented in employees with a chronic disease, and if work adjustments have an effect on work-related outcomes such as sick leave.

This study has two aims: (1) to describe the prevalence of needed and implemented work adjustments in a representative sample of Dutch employees with chronic diseases, and (2) to assess sick leave over time of employees with a chronic disease who did or did not indicate a need for a work adjustment, for those who reported an implemented adjustment and those who did not.

Methods

Participants

For this study, data from the Netherlands Working Conditions Survey (NWCS) and the Netherlands Working Conditions Cohort Study (NWCCS) were used.

For the first aim of the study, we used the survey data from NWCS 2007. This is referred to as part 1. For the second aim of the study, we used the cohort data from NWCCS 2007, 2008 and 2009. This is referred to as part 2. The study was exempt from Medical Ethical Review. Personal details of participants were only used to send the questionnaires. As this is a secondary analyses, the researchers received an anonymous dataset for analyses.

Part 1: Netherlands Working Conditions Survey (NWCS)

The NWCS consists of yearly surveys. Data of the NWCS 2007 were used [14]. Employees aged 15-64 years were included, while self-employed individuals were excluded. In 2007, 80,000 individuals were sampled from the Dutch working population database of Statistics Netherlands including information on all jobs falling under employee national insurance schemes, and being liable to income tax. Sampling was random, except for a 50 % over-sampling of employees aged younger than 25 years and of employees with a non-Western ethnic origin, since the response rate in these two groups was known to be relatively low. Individuals received the written questionnaire by postal mail at their home address in the first week of November 2007. More details about the protocol have been published elsewhere [14].

In total, 32.8 % of the employed individuals responded to the questionnaire and were available for analysis in 2007 ($n = 22,759$). The responses were weighted for gender, age, sector, ethnic origin, level of urbanization, geographical region, and level of education, to obtain a sample distribution that corresponded to the population distribution of all employees in The Netherlands. For the first part of the study, all employees with a chronic disease and valid data on work adjustments were selected from the 2007 sample: $n = 7,687$ (34 %).

Part 2: Netherlands Working Conditions Cohort Study (NWCCS)

All participants of the NWCS 2007 were asked if they were willing to participate in the NWCCS. In November 2008, $N = 19,161$ persons that had provided consent to future contact received the first follow-up questionnaire of the NWCCS. In November 2009, the second follow-up questionnaire was sent to the 10,532 responders of the first follow-up questionnaire.

From the $N = 7,687$ employees in 2007 $N = 2,631$ (34 %) completed cohort questionnaires in 2008 and 2009. Since we assumed that work adjustments are only relevant for workers who were hampered by their health condition in their work performance, analyses were restricted to those

who reported limitations at work in 2007 ($n = 1,189$). Limitations at work were assessed using the following question: ‘Do you experience limitations at work because of your disease, disorder or handicap?’ with answering categories of: (1) not at all, (2) slight limitations, and (3) severe limitations.

Chronic Disease

The presence of a chronic disease was assessed using one question at baseline: ‘Do you have one or more of the following chronic diseases, disorders or handicaps, and if so, could you please indicate which?’ (more than one answer allowed). Answering categories were: none; problems with arms or hands (including arthritis, rheumatoid disorders and complaints of the arm, neck and/or shoulder [CANS]); problems with legs or feet (including arthritis and rheumatoid disorders); problems with back or neck (including arthritis, rheumatoid disorders, and CANS); migraine or severe headache; cardiovascular disease; asthma, bronchitis, or emphysema; stomach or bowel disorders; diabetes; severe skin disorders; mental disorders; hearing problems; epilepsy; life-threatening disease (e.g. cancer, AIDS); vision problems; other chronic diseases.

Measurements

Need for work adjustments were assessed using the following question: ‘Do you think work adjustments are needed because of your health condition?’ with the answering options: no adjustments needed; adjustments in devices or furniture needed; adjustments in working hours needed; adjustments in the amount of work needed; change of job or job tasks needed; education or retraining needed; adjustments in access to the office needed; and other adjustments needed. Multiple answers were allowed. Answers were dichotomized into ‘any adjustments needed’ (yes/.no).

Implemented work adjustments were assessed using the following question: ‘Over the past 12 months, have any adjustments been made in your work or working environment because of your health condition?’ with answering options: no adjustments; adjustments in devices or furniture; adjustments in working hours; adjustments in the amount of work; change of job or job tasks; education or retraining; adjustments in access to the office; and other adjustments. Multiple answers were allowed. For part 2 of the study, answers were dichotomized into ‘any work adjustments implemented?’ (yes/no).

Sick leave was assessed by asking the number of work days on sick leave during the past 12 months. The sickness absence rate was calculated per person by dividing the number of work days on sick leave by the respondent’s contractual working hours in work days per year.

In addition, *age* (years), *gender* (male/female), *educational level*, and *contractual working hours* were assessed. Educational level was categorized according to the highest level attained into low (primary school, lower and intermediate secondary schooling, or lower vocational training), intermediate (higher secondary schooling or intermediate vocational training), and high (higher vocational training or university).

Analyses

Part 1

To calculate the prevalence of needed and implemented work adjustments descriptive analyses were performed. Prevalence of both needed and implemented adjustments in 2007 was calculated for the total group of employees with a chronic disease and separately for groups with musculoskeletal disorders, asthma/COPD, diabetes, cardiovascular disorders, and mental disorders.

Part 2

To study the interaction between needed work adjustments in 2007 (yes/no) and implemented work adjustments in 2008 (yes/no) and the course of sick leave from 2007 to 2008 to 2009 we formed four groups (Table 1).

A repeated measures ANOVA with Bonferroni post hoc tests was performed with sick leave (measured in 2007, 2008 and 2009) as dependent variable and year of measurement (2007, 2008, 2009) as within-subject factor. The distribution of sick leave is skewed to the left (Fig. 1). As transformation did not lead to a normal distribution, we decided to use the skewed data to facilitate the interpretation.

To compare the course of sick leave from 2007 to 2009 between the four work adjustment groups, the group variable was assigned as between subject factor. The interaction between year (sick leave in 2007, 2008 or 2009) and work adjustment group was the main outcome measure. A significant interaction implies that changes in sick leave from 2007 to 2008 to 2009 are significantly different between the four work adjustment groups. $P < 0.05$ was considered statistically significant. All analyses were performed with IBM SPSS Statistics 20 for Windows.

Results

Part 1: Prevalence of Work Adjustments in 2007

Description of Survey Sample

The total sample consisted of 7,687 employees with a chronic disease, most of whom reported musculoskeletal

Table 1 Groups for analyses on needed and implemented work adjustments

Work adjustments groups	Implemented work adjustment (2008)	
	NO	YES
Need for work adjustment (2007)		
NO	<i>Group 1</i>	<i>Group 2</i>
	No adjustment in 08, not needed in 07	Adjustment in 08, not needed in 07
YES	<i>Group 3</i>	<i>Group 4</i>
	No adjustment in 08, needed in 07	Adjustment in 08, needed in 07

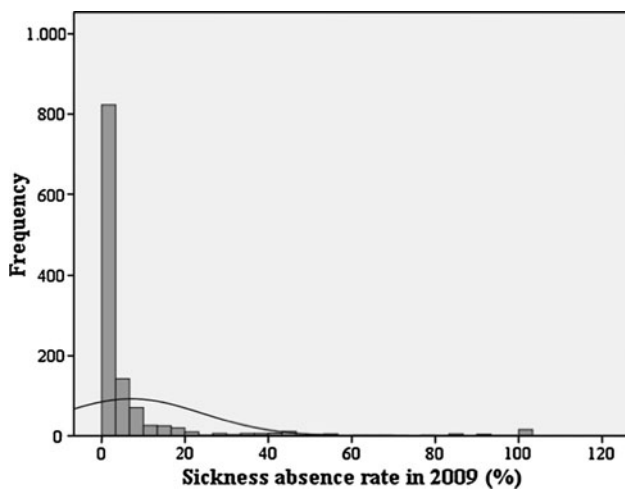


Fig. 1 Distribution of sickness absence rate (%) in 2009

disorders (41.5 %), followed by asthma or COPD (14.8 %) (Table 2). Due to comorbidity, the groups in each column partially overlap.

Employees with asthma/COPD or mental disorders had a lower age compared to the groups with cardiovascular disease or diabetes, which also had a higher percentage of males. Level of education was relatively high in the group with mental disorders and relatively low in the group with diabetes. Prevalence of comorbidity was high, and above 50 % in the groups with mental disorders, cardiovascular disease and diabetes. Average contract size was 31 h per week (Table 2).

Prevalence of Work Adjustments

Table 3 shows the needed and implemented work adjustments for the different chronic diseases. A need for a work adjustment was reported by 29.6 % of all employees with a chronic disease. Employees with musculoskeletal disorders and mental disorders reported most often a need for work adjustment (38.8 and 42.5 %, respectively). In the total group, adjustments in furniture or tools were needed most often (10.3 %).

Table 2 Sample characteristics of employees reporting a chronic disease (Survey data 2007)

	All	MSD	A/CO	CVD	MD	DIA
<i>n</i>	7,687	3,193	1,141	548	526	447
%	100	41.5	14.8	7.1	6.8	5.8
Age						
Mean	42.8	44.6	40.3	51.5	41.6	49.8
SD	11.8	11.2	11.9	8.8	10.8	9.3
Gender						
Male (%)	51.2	50.3	49.3	73.8	47.2	65.3
Female (%)	48.8	49.7	50.7	26.2	52.8	34.7
Level of education						
Low (%)	28.5	29.6	26.7	32.6	29.1	36.1
Middle (%)	44.3	45.0	43.5	38.4	40.8	41.6
High (%)	27.2	25.4	29.8	29.0	30.1	22.4
Comorbidity (%)	25.8	38.5	42.1	54.2	51.0	50.2
Contract size (Hours/week)						
Mean	31.4	31.2	31.7	32.8	30.2	33.5
SD	10.3	10.3	10.4	10.0	10.0	9.6

MSD musculoskeletal disorders, *A/CO* asthma or COPD, *CVD* cardiovascular disease, *MD* mental disorders, *DIA* diabetes

Overall, 21.7 % reported the implementation of a work adjustment in 2007. Employees with asthma and COPD (13.8 %) or diabetes (14.2 %) reported an implemented work adjustment least often, whereas those with mental disorders (33.5 %) and musculoskeletal disorders (30.1 %) reported an implemented work adjustment most often. In the total group, Implemented adjustments in tools or furniture were reported most often (9.4 %).

Part 2: Sick Leave from 2007 to 2009 and Work Adjustments

Description of Cohort

From the employees with a chronic disease in the 2007 sample, 2,631 (33 %) completed the 2008 and 2009 questionnaires. In the 2007 sample, 3,858 participants reported a chronic disease and limitations at work due to health complaints. As this was the baseline sample for our analyses, of which 1,189 completed three follow-up measurements, the loss to follow-up in this subgroup was 69 %.

Compared to the representative cross-sectional sample of 2007, the subsample that completed the three follow-up measurements and reported limitations at work due to health (*n* = 1,189) was older, more often female, and higher educated. The prevalence of comorbidity, work adjustments, and contract size were not different between the 2007 sample and the cohort with complete follow-up data.

Table 3 Needed and implemented work adjustments of employees with a chronic disease in Netherlands Working Conditions Survey 2007

Work adjustments Needed (%)	All <i>n</i> = 7,642	MSD <i>n</i> = 3,163	A/CO <i>n</i> = 1,138	CVD <i>n</i> = 548	MD <i>n</i> = 522	DIA <i>n</i> = 444
Any	29.6	38.8	25.2	28.2	42.5	23.0
Tools/furniture	10.3	16.5	9.1	6.2	7.1	4.4
Working times	6.2	8.1	4.1	8.6	11.0	7.3
Amount of work	8.4	10.5	6.1	9.1	16.7	7.2
Tasks/job	5.4	6.9	3.5	8.5	12.6	5.1
Education	2.2	2.6	1.3	1.8	5.1	2.2
Accessibility office	0.4	0.3	0.5	0.3	0.4	0.2
Other	6.6	7.4	8.8	4.7	10.0	4.5
Implemented (%)	<i>n</i> = 7,687	<i>n</i> = 3,193	<i>n</i> = 1,141	<i>n</i> = 548	<i>n</i> = 526	<i>n</i> = 447
Any	21.7	30.1	13.8	20.3	33.5	14.2
Tools/furniture	9.4	16.5	5.7	4.6	7.4	3.1
Working times	6.3	7.5	3.7	9.6	16.9	6.4
Amount of work	4.0	4.3	2.1	6.0	8.7	2.5
Tasks/job	4.9	6.3	2.5	4.9	9.3	5.0
Education	0.5	0.6	0.5	0.7	0.9	0.5
Accessibility office	0.1	0.1	0.1	0.1	0.2	0.0
Other	3.4	4.0	3.5	2.7	5.2	2.0

MSD musculoskeletal disorders, A/CO asthma or COPD, CVD cardiovascular disease, MD mental disorders, DIA diabetes

Bold values are the highest percentages per disease group

Almost half of the sample did not report a need for a work adjustment in 2007, nor an implemented work adjustment in 2008 (48.4 %) (Table 4). Those who reported a need for a work adjustment in 2007 were older (groups 3 and 4), and those who reported an implemented work adjustment were more often female and reported comorbidity more often (groups 2 and 4). Level of education was quite high; 37.9 % reported a high education and only 20.1 % a low education. Average contract size was 30.7 h. Contract size and level of education were similar across the four groups (Table 4).

Sick Leave (2007–2009) and Work Adjustments

For the total group (*n* = 1,189), sick leave was significantly lower in 2008 and 2009 compared to 2007. In Fig. 2 sick leave for the four different groups is presented. Sick leave in all 3 years was significantly lower in group 1 that did not report a need for a work adjustment, nor an implemented work adjustment (group 1) compared to the other three groups (Fig. 2). Sick leave in the groups with an implemented work adjustment (groups 2 and 4) was significantly higher compared to sick leave in the groups without implemented work adjustment (groups 1 and 3).

A significant interaction was found for work adjustment groups and year of measurement. This implies that the change in sick leave over time (2007, 2008 and 2009) was significantly different between the four work adjustment

Table 4 Population description of the longitudinal sample (Cohort data 2007–2009)

Work adjustments groups	1	2	3	4	Total
Needed in 2007	No	No	Yes	Yes	
Implemented in 2008	No	Yes	No	Yes	
<i>n</i>	575	134	350	130	1,189
%	48.4	11.3	29.4	10.9	100
Age					
Mean	45.4	44.0	46.3	47.7 ^a	45.8
SD	10.3	10.5	9.7	9.8	10.1
Gender					
Male (%)	47.0	35.8	46.6	42.3	45.2
Female (%)	53.0	64.2	53.4	57.7	54.8
Level of education					
Low (%)	19.9	19.4	19.8	20.8	20.1
Middle (%)	41.8	43.3	42.4	40.8	41.9
High (%)	38.3	37.3	37.8	38.5	37.9
Comorbidity (%)	26.6*	26.1*	39.7*	36.2*	31.3
Contract size (Hours/week)					
Mean	30.2	29.7	31.7	31.5	30.7
SD	9.7	8.6	9.4	10.6	9.6

^a Significantly different from group 2; * *p* < 0.05

groups. Post-hoc analyses revealed that the decrease in sick leave from 2007 to 2009 was significantly larger in the groups reporting an implemented work adjustment (6.9 and

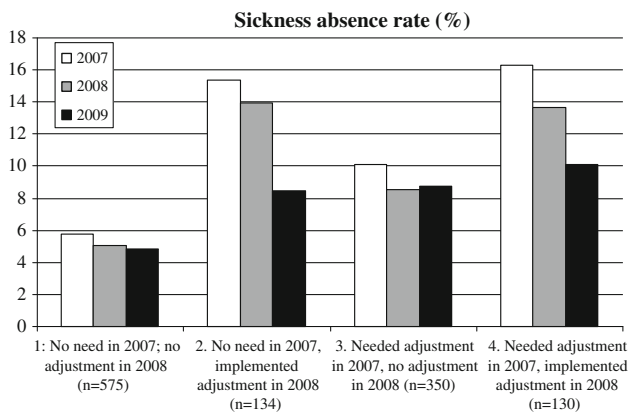


Fig. 2 Sickness absence rate (%) in 2007, 2008 and 2009 in employees with a work limiting chronic disease with and without a need for and/or implemented work adjustment (Part 2)

6.2 % in group 2 and 4, respectively) compared to the groups not reporting an implemented work adjustment (0.9 and 1.4 % in group 1 and 3, respectively). Sick leave did not decrease significantly over time in the groups without implemented work adjustments (groups 1 and 3).

Discussion

This study showed that the prevalence of work adjustments among employees with a chronic disease in 2007 was 21.7 %, while 29.6 % of all employees with chronic disease needed a work adjustment. Employees with a chronic disease who reported an implemented work adjustment in 2008 had a significantly higher reduction of sick leave from 2007 to 2009 compared to employees with a chronic disease who did not report an implemented work adjustment.

Prevalence of Work Adjustments in Employees with a Chronic Disease

This study showed that within the population of employees with chronic disorders (34 % of the total employee population in the Netherlands), one-fifth (21.7 %) received a work adjustment in the preceding 12 months.

The prevalence of work adjustments found in the present study was higher than in a previous study on a representative Dutch sample of employees with chronic disorders, which was conducted in 2000. In this study, 16 % of the employees with a chronic disease reported a work adjustment [9]. The difference may reflect a true increase in work adjustments due to efforts put in reducing work disability and improving working conditions to improve workforce participation in the Netherlands in the past decennium. However, in the present study, only employees were

included, whereas in the previous study also self-employed persons were included.

Internationally, studies on work adjustments did not focus on general working populations, but rather on specific subgroups. For example, a Canadian study reported that 35 % of a claimant population absent from work due to a work-related injury received a work arrangement [15]. An important factor that should be mentioned here is that differences in the prevalence of work adjustments may be due to differences in responsibilities of stakeholders and social security systems. In the Netherlands: employers are obliged to pay the salary of their employees during the first 2 years of sick leave and have the responsibility to be actively involved in the return to work process. This implies that the expected return on investment for employers can be high if investing in work adjustments leads to reduction or even prevention of sick leave.

The prevalence of implemented work adjustments differed between chronic disorders from 14 % (diabetes) to 30 % (musculoskeletal disorders). This is in line with previous research showing that a physical health condition was predictive of receiving work adjustments [8, 9]. The type of work adjustments in the present study was in line with the characteristics of the diseases; employees with mental disorders more often reported adjustments in working times and those with musculoskeletal disorders reported adjustments in tools or furniture more often. More recently, a study published in 2012 on employees with cancer in Norway showed that 26 % received a work adjustment, most often an adjustment in the number of working hours per week [16]. Unfortunately, we are unable to present data on the subgroup with cancer, because of the small sample size. However, our study shows that differences existed between different chronic diseases when it comes to the prevalence of work adjustments.

The need for a work adjustment in 2007 was consistently higher (plus 8–12 %) than the prevalence of implemented work adjustments in all groups. It remains unclear whether the respondents shared their needs for a work adjustment with their supervisors. Previous studies have shown that supervisors are not always informed about chronic diseases of their employees. Disclosure of a chronic disease has been shown to be an important issue for employees with asthma or COPD [17, 18], or depression [8]. Disclosure is needed to start a dialogue on work adjustments, but employees may be worried about negative side effects of disclosure. Perceived support from the supervisor or colleagues may be beneficial. In a recent qualitative study it was concluded that workplace characteristics, such as autonomy and support, can facilitate the implementation of necessary work adjustments [19].

In contrast with other studies, the group with mental disorders reported the highest prevalence of implemented

work adjustments. This is not in line with a previous study where the prevalence of work adjustments was found to be low for employees with depression compared to employees with other chronic diseases [8]. Since mental disorders are one of the main causes of work disability in the Netherlands, there is a lot of attention to mental disorders in occupational health and safety policies and strategies. A reduction of working hours to enhance (partial) return to work for workers with mental health problems is part of the guideline of the Netherlands Society of Occupational Medicine [20].

In an ideal situation, work adjustments are implemented in an early stage to prevent sick leave, rather than as an answer to sick leave. Future research is needed to gain more insight into this large group of employees with a need for a work adjustment, to find out what the barriers for the implementation of a needed work adjustment are.

Sick Leave from 2007 to 2009 and Work Adjustments

Employees who reported an implemented work adjustment in 2008 had a significantly larger decrease in sick leave over time compared to the those without implemented work adjustment. The groups with an implemented work adjustment in 2008 had significantly higher sick leave in 2007. Sick leave may be an important trigger to implement a work adjustment. The guideline of the Netherlands Society of Occupational Medicine on mental health problems states that work adjustments are part of the return to work process [20]. This is in accordance with previous research, since Baanders et al. [9] showed that having problems at work was the most important predictor of work adjustments. Sick leave was not taken into account in their study, but it is likely that problems at work due to a chronic disorder may have led to sick leave.

The decrease in sick leave may then be explained by the fact that the limitations perceived at work because of the chronic disease may be reduced, as was shown in a previous study. In that study, we showed that perceived poor health was associated with more sick leave in employees with chronic disorders, and that this association could be explained partially by perceived limitations at work [21].

According to the Model of Workload and Capacity, work adjustments can be helpful to solve problems at work by improving the match between work demands and work capacity [7]. The decrease in sick leave we found is in line with previous research. From a review on intervention studies in employees with musculoskeletal disorders we know that interventions at the workplace are effective in reducing sick leave [12].

The group with an implemented work adjustment in 2008 had the highest sick leave in 2007. However, the group with a need for a work adjustment only, also had a higher sick leave

than the group without a need and without an implemented work adjustment (group 1). This implies that the group with a need for a work adjustment might as well benefit from a work adjustment. It would be interesting to find out if work adjustments have been discussed between employees in this group and their supervisors. However, it should be mentioned that although sick leave in the group who expressed a need for a work adjustment is higher than in the group without needs, sick leave does not increase over time, despite the fact that no work adjustment has been implemented. Hypothetically, the chance for an implemented work adjustment will increase when sick leave increases.

From the size of the group who received a work adjustment in 2008 but did not express a need for a work adjustment in 2007 ($n = 134$), it appears that implementation of a work adjustment is not necessarily preceded by a need. However, since we focused on the need in 2007 and the implementation in 2008, we might have missed the needs that arose in between the two measurements of 2007 and 2008.

Methodological Considerations

The major strength of this study is the large sample of workers with chronic disease, which was representative for the Dutch population of employees. This gave us the opportunity to study the prevalence of work adjustments in the Dutch working population. In addition, the longitudinal design used for the second part enabled us to study the course of sick leave following the implementation of work adjustments over time.

Unfortunately, loss to follow-up in the cohort study was high (69 %). This might be due to the recruitment strategy. In the 2007 survey, respondents were asked to indicate if they agreed to be contacted again for comparable research. Because of this, the baseline of the cohort also consisted of participants who were not willing to complete yearly questionnaires beforehand. In the longitudinal sample older, higher educated, and female employees were over-represented, which should be taken into account when generalizing the findings from this longitudinal study.

As our aim was to explore sick leave changes over time in four work adjustment groups, we decided to perform repeated measures ANOVA rather than multivariate analyses. This implies that we did not adjust for potential confounders. We do not know of any established confounders for the relationship between work adjustments and sick leave besides sick leave in the past, before 2007, as this is a predictor of sick leave in the following year, and may also be a precursor of work adjustments. We do not expect that correcting for confounders would have changed our results relevantly, as in our design, our participants act as their own reference.

All information used for this study relied on self-reported data, so that recall and attribution bias may have occurred. In addition, common method variance may have led to spurious results. Hence, a discrepancy between actual and self-reported sick leave or implemented work adjustments cannot be ruled out. Recently, however, the self-report data on sick leave used in this study were linked, and compared to the Statistics Netherlands registration of absenteeism from work. This study showed that the validity of the self-reported data was at least as high as the registration data [22]. Unfortunately, we could not differentiate between self-imposed work adjustments and work adjustments officially sanctioned by the employer. The fact that we did not differentiate between formal and informal work adjustments probably increased the likelihood to report a work adjustment. However, employer support may be underestimated as this may not be taking into account by the workers while answering this question.

Implications for Research and Practice

Our finding that one-third of the employees with chronic disease reported a need for a work adjustment, and 20 % reported implementation of a work adjustment a year later needs further investigation, in particular whether the need reported in the questionnaire was discussed with the supervisor.

Possibly, the time between the perception of the need for a work adjustment and the implementation maybe larger than the 1 year follow-up we had in this study, but other causes may exist, such as barriers for implementation of work adjustments. Another topic of investigation would be to increase our understanding of the moment at which work adjustments are being implemented. From our data it appeared that sick leave might be a trigger for implementation, but this cannot be confirmed since we measured with yearly intervals. If sick leave is indeed the trigger for implementation, efforts should be made to explore ways to implement a work adjustment before sick leave has occurred.

Future research should be conducted with other large representative and longitudinal datasets to confirm our findings. In addition, it would be interesting to gain insight into the relation between the types of needed and the implemented work adjustments. In the present study, due to the relatively small longitudinal sample size and the relatively large variety of work adjustments, we could not relate a need for a specific work adjustment to a specific type of implemented work adjustment. It is, for example, likely that one employee expressed a need for an adjustment in the amount of work in 2007 and reported an implemented adjustment in furniture in 2008. We expect that the effects of work adjustments on sick leave will be even larger if a need for a specific work adjustment is

followed by the implementation of that specific work adjustment. This needs to be confirmed in future studies.

Conclusions

We conclude that in 2007, work adjustments were implemented in 21.7 % of the Dutch population of employees with chronic disease. Based on the finding that 29.6 % expressed a need for work adjustments in 2007, it is expected that there is room for improvement of implementation of work adjustments. Work adjustments should be considered more often for employees with chronic disorders, since the reduction in sick leave over time was larger in groups who reported an implemented work adjustment than in groups who did not report implemented work adjustments. In addition, since sick leave appeared to be the trigger to implement work adjustments in employees with chronic disease, our suggestion is to start a discussion about work adjustments with employees with chronic disorders in an earlier phase, i.e. before sick leave occurs. Work adjustments should not only be part of sickness and disability management programs, but should be implemented as preventive measures.

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