Chapter 3
ICF from a Population Health Perspective: The Impact of Chronic Disease on Work Participation and Its Consequences for Intervention and Treatment

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3.1 Changing Ideas About Health

For more than 50 years, the WHO definition of health, formulated in 1948, has served well to describe health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. The paradigm shift introduced by this definition was its integral attention to health and its consequences in terms of disability, functioning, and quality of life. In recent years, attention has shifted from disease and limitations in activities and participation towards a person's capacity and ability to actively manage their life, despite the presence of a medical condition. Several researchers have challenged the classical definitions of health, such as provided by WHO, and argue for a definition of health as a dynamic process of adaptation and self-management [1].

These changing ideas about health are also reflected in the discussions about outcome measures within the framework of the World Health Organization's International Classification of Functioning, Disability, and Health (ICF). The adverse consequences of chronic disease are traditionally assessed by measuring disease activity, structural damage, and loss of function, especially in clinical studies. These outcome measures are well represented in the ICF domains. However, social participation is increasingly recognised as a core outcome measure among persons with chronic disease, in particular participation in paid employment [2]. Being out of the workforce due to disability and unemployment is one of the most important determinants of health inequalities in society [3]. From a perspective of population health, the interplay between chronic disease and work participation should be a central theme in decisions on treatment and rehabilitation.

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This chapter will primarily focus on the importance of work participation within the ICF framework. As a starting point, some descriptive information will be presented on the impact of ill health in maintaining paid employment. Subsequently, studies on rheumatoid arthritis will be used to illustrate how a chronic disease may interfere with being productive at work. Next, the influence of the social and physical work environment on optimal work participation will be discussed. This chapter will conclude with some recommendations for researchers, policymakers, and health professionals.

3.2 The Importance of Health for Labour Force Participation

In our ageing society, there is a clear need to increase work participation and sustain a productive workforce because of decreasing birth rates and increased life expectancy in most industrialised countries. Many countries are developing policies to stimulate labour force participation, particularly to encourage older workers to remain at work for a longer period. In this development of working longer at older age, workers with existing or emerging health problems are a vulnerable group. Ill health plays an important role in loss of paid employment, particularly due to disability pension and, to a lesser extent, unemployment [4]. On the individual level, loss of paid employment will not only increase financial and social problems, it may also contribute to onset of new health problems or to aggravation of existing health problems.

The importance of ill health on work participation can be illustrated in the Survey on Health and Ageing in Europe (SHARE study) [5]. This longitudinal study among citizens aged 50 years and older in various European countries has collected information by interview on different measures of health, for example: (i) the European version of self-perceived health, whereby the answers 'very bad', 'bad', and 'fair' can be used to define ill health, (ii) occurrence of at least one chronic disease as diagnosed by a physician, (iii) presence of clinically relevant symptoms indicating depression, based on at least four affirmative answers on the EURO-D 12 items scale of depression, and (iv) mobility problems based on the presence of at least one physical limitation with mobility, arm function, or fine motor function lasting longer than 3 months, derived from a limitative list of ten items, such as walking 100 meters, climbing stairs without resting, and reaching with arms above shoulder level. Figure 3.1 shows the associations of these four measures of health on the likelihood of becoming work disabled or unemployed during the 2-year follow-up period. A less-than-good self-perceived health had the strongest effect on becoming disabled (OR = 4.56, 95 % CI 2.88–7.22) or unemployed (OR = 2.09, 95 % CI 1.39–3.13). Interestingly, the presence of a chronic disease had comparable effects on disability and unemployment, but depressive symptoms and mobility problems had substantially less influence on exit from paid employment. These findings clearly suggest that different measures of health may exert a different influence on a worker's ability to remain in paid employment and that perceptions of one's own health may be more important than limitations in activities [4].

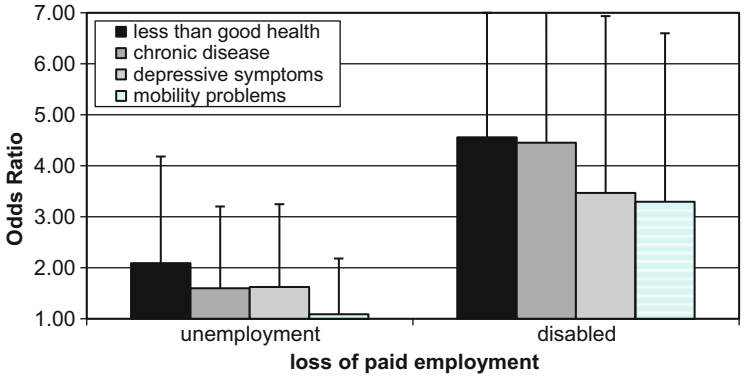

Fig. 3.1 The effects of different measures of ill health in 2004 on unemployment and work-related disability in 2006 in 11 European countries, expressed by adjusted odds ratios (Based on Ref. [4])

In Western countries, ill health is an important determinant of becoming or staying unemployed. Ill health is largely responsible for displacement from the labour force due to disability. Loss of paid employment may cause chronic disease, such as depression and cardiovascular disease.

The SHARE study clearly demonstrates the importance of health for labour force participation. However, an increased risk of displacement from the labour market during the 2-year follow-up period does not present sufficient insight into the consequences of ill health on paid employment during the life course of a person. In the past few years, new approaches have been developed that capture the long-term consequences of ill health for a sustained working life. One of the most promising new metrics is the work life expectancy (WLE) measure, which reflects how many years a person at a given age is expected to work in a paid job. A linked measure is the number of working years lost due to being out of paid employment, for example, due to work-related disability. A recent study on the Norwegian disability pension registry estimated that subjects with a permanent disability benefit lost about 15 years of their working life. Mental disorders contributed most to the total working years lost (33.8 %), followed by musculoskeletal disorders (29.4 %). Individuals with a mental disorder were awarded a disability benefit on average at much younger age than individuals awarded for a musculoskeletal disorder (46 years vs. 55 years, respectively) [6]. In a Canadian study, it was reported that working life of individuals with arthritis was reduced with about 4 years among men and 3 years among women [7].

Working life expectancy equals the number of years a person at a given age is expected to work in a paid job. Working years lost equal number of years out of paid employment. Individuals with arthritis will lose 3–4 years of paid employment due to their disease. Individuals with mental disorder may lose up to 15 years of paid employment.

The metric WLE can be adapted to construct a disease-work participation model that describes for each age, stratified by sex, the transitional probabilities from paid employment to disability and unemployment and the particular contribution of ill health to this displacement from the work force. Such models are extremely useful to estimate the total loss of working years across the life course of the workforce and the relative contribution of ill health to the working years lost. The aforementioned SHARE study was used to evaluate the hypothetical impact of health promotion by assuming that the particular role of ill health in the displacement from the workforce can be completely eliminated. This disease-work participation model starts with a reference population of persons at age 50 years all in paid employment. During the 2-year follow-up, the proportion of workers with paid employment is calculated for each following year, stratified by age and sex, as well as the proportion of workers who exit paid employment through possible exit routes such as work-related disability, unemployment, retirement, and becoming homemaker. Subsequently, the relative contribution to ill health to disability and unemployment can be calculated by the population attributable fraction of ill health. This analysis was conducted for one definition of ill health (less than good health), without taking into account possible additional effects of other measures of ill health, such as presence of chronic disease or limitations in activities in daily life. Figure 3.2 presents the potential impact of prevention of ill health on labour force participation among men. For women a similar pattern was observed. It is estimated that the average age of quitting paid employment could increase from 60.4 to 61.5 years (13.2 months) among men and from 59.2 to 60.5 years (16.2 months) among women. Thus, tackling ill health among workers may prolong WLE by at least 1 year [8]. This example illustrates that new metrics, such as working life expectancy and working years lost, may convey a powerful message to stakeholders, such as policymakers and health professionals, about the need to develop interventions and policies that support workers to remain in paid employment and delay unwanted health-related retirement.

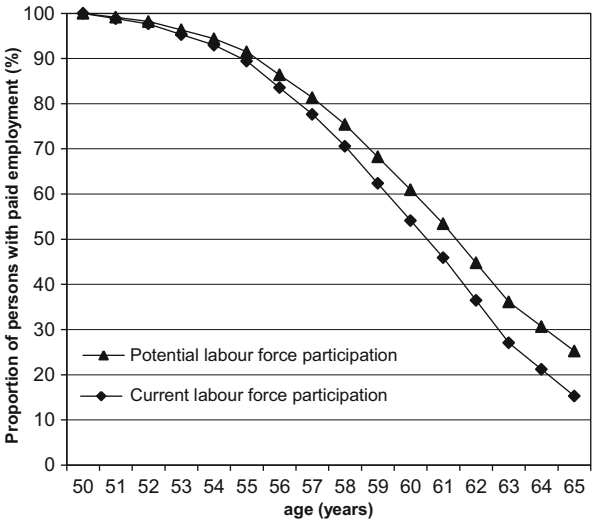

Fig. 3.2 Theoretical effect of elimination of health problems through preventive efforts aimed at important health determinants on the labour force participation among men who have paid employment at the age of 50 year (Based on Ref. [8])

3.3 Consequences of Chronic Disease for Optimal Participation at Work

An important consequence of having a chronic disease is disability, ranging from limitations in executing a simple task to restrictions in societal roles. As stated before, there is a growing interest in the influence of chronic disease on the performance of social roles, i.e. participation, and especially paid employment. Restriction in work participation strongly represents the indirect costs of illness, defined by productivity losses of a person due to sickness absence or less productivity at work because of health problems. This domain is not covered in the ICF, whereas it is very important in cost-effectiveness evaluations. Traditionally, studies among persons with chronic diseases have focused on work-related disability, but comparability across countries is hampered by the strong influence of legal and socio-economic determinants on eligibility for a disability benefit. In recent years, sickness absence has received more attention as a key parameter of restriction in work capacity, since sickness absence is regarded as an important source of productivity loss, which largely accounts for the indirect costs of illness. The latest development is the appreciation that persons with a chronic disease who do go to work may experience a decreased productivity due to their health problems. The phenomenon where workers turn up at work despite health problems is sometimes referred to as sickness presenteeism, but in economic terms, it is better described as productivity loss at work [9]. It has been hypothesised that being less productive at work is an alternative choice to sickness absence for workers with chronic diseases, with both acting as alternative choices for a worker. However, several studies have shown that both measures of reduced productivity are strongly associated, clearly suggesting that productivity loss at work may precede or follow a spell of sickness absence [10].

Taking rheumatoid arthritis (RA) patients as an example, several studies have demonstrated the considerable impact of RA on all measures of work participation. In a systematic review, several participation categories were selected from the Comprehensive Core Set for RA, resulting in 30 studies on remunerative employment, 17 studies on recreation and leisure, and 3 studies with combined measures of participation. RA patients had an increased risk of being without paid employment (odds ratios varied from 1.2 to 3.4). Restrictions in employment occurred already within the early phase of RA, but varied greatly among studies. Two years after diagnosis, in some European cohort studies, up to 30 % of the RA patients had already enrolled in the disability benefit system while being without paid employment [11].

While many studies have focused on permanent work disability among patients with established RA, there is emerging evidence that RA will also contribute to temporary absence from work due to illness and a reduced performance while at work due to illness. However, there is scarce information on the work-related factors that prompt workers with RA to take sickness absence or to have reduced productivity at work. Recently, a systematic review was conducted on the occurrence and magnitude of workplace productivity loss and sick leave in patients with inflammatory arthritis (IA), which encompasses primarily patients with early RA as well as established RA. In total,

47 original studies were identified with 44 studies reporting on sickness absence and 20 studies describing productivity loss at work. The occurrence of sickness absence varied from 3.7 % in the past 4 days to 84 % in the past 2.5 years and the total duration of sickness absence ranged from 0.1 to 11 days in the past month. The large variation in sickness absence across studies was also observed for productivity loss at work. About 17–88 % of patients experienced any workplace productivity loss, and productivity was reduced by 4.9 % to over 35 % in the past weeks. In general, increased levels of pain and decreased functional abilities were consistently associated with sickness absence and productivity loss at work. The evidence on the particular role of working conditions that hampered or supported patients with RA to remain productive was poorly developed. There were some indications that heavy physical work, frequent manual material handling, high time pressure, low job control, and poor social support were work-related risk factors for sickness absence [12].

These studies on RA patients clearly demonstrate that RA will impact quantity and quality of work activities performed, frequency and duration of sickness absence, and exit from paid employment through work-related disability. Similar conclusions can be drawn for different patient groups, emphasising the need to study the influence of chronic diseases and all measures of work participation. The systematic reviews on RA and work performance also point at a clear lack of insight into the interplay between working conditions and chronic diseases, which will hamper the development of effective rehabilitation programmes.

3.4 Interplay Between Work Conditions and Chronic Diseases

In interviews with patients with a chronic disease about facilitators and barriers for an optimal performance at work, often, specific work-related factors are mentioned. Among patients with chronic musculoskeletal pain, adjustment latitude and job control were mentioned as success factors for staying at work [13]. In a study among patients with RA and patients with diabetes mellitus, the main factors at work that enabled employees to continue working were adequate working conditions and support from management and colleagues [14]. These qualitative studies strongly suggest that work-related factors modify the effect of ill health on sickness absence, but interestingly there is little quantitative evidence in the scientific literature on how work-related factors interfere with disease.

In order to better understand the effect of work on the influence of ill health on sickness absence, a longitudinal study was conducted among employed persons aged 46–64 years as part of the ongoing Study on Transitions in Employment, Ability, and Motivation ($n = 8{,}984$) [15]. The presence of common chronic health problems and work-related factors was determined at baseline and self-reported sickness absence at 1-year follow-up by questionnaire. Multinomial multivariate logistic regression analyses were conducted to assess associations between presence of a chronic health

Table 3.1 Interaction effects of work-related factors and health on sick leave over 10 days in the follow-up period of 1 year, after adjustment for age, education, and sex, among 6,534 workers aged 45–65 years in the Netherlands (Based on Ref. [15])

Health problem	Work-related factor	*N*	Odds ratio	95 % confidence interval	Relative excess risk due to interaction	95 % confidence interval
Psychological complaints	*Job demands*				3.51	0.67–6.34
Not present	Low	3,232	1			
Not present	High	3,061	1.27	1.13–1.43		
Present	Low	111	3.27	2.22–4.80		
Present	High	130	7.04	4.84–10.21		
Psychological complaints	*Autonomy*				2.94	0.17–5.70
Not present	Low	3,320	1			
Not present	High	2,973	1.38	1.23–1.55		
Present	Low	105	3.53	2.38–5.24		
Present	High	136	6.85	4.78–9.82		
Musculoskeletal complaints	*Autonomy*				0.57	0.05–1.08
Not present	Low	2,446	1			
Not present	High	2,069	1.37	1.18–1.59		
Present	Low	979	2.19	1.84–2.60		
Present	High	1,040	3.12	2.65–3.69		
Circulatory disorders	*Autonomy*				0.82	0.01–1.63
Not present	Low	3,102	1			
Not present	High	2,806	1.39	1.23–1.57		
Present	Low	323	1.76	1.36–2.28		
Present	High	303	2.97	2.32–3.79		
Severe headaches	*Job demands*				1.35	0.45–2.25
Not present	Low	3,121	1			
Not present	High	2,942	1.25	1.11–1.41		
Present	Low	222	1.52	1.12–2.06		
Present	High	249	3.12	2.39–4.07		

problem and sickness absence and the effect modification of these associations by work-related factors. The effect modification was expressed by the relative excess risk due to interaction (RERI), whereby values above 0 indicate that an additive interaction is present. In Table 3.1, the core findings are reported for high cumulative sickness absence of 10 days or more per year.

All common health problems were related to follow-up sickness absence, and several work-related factors in the absence of these health problems also predicted sickness absence. Several work-related factors modified the influence of chronic disease of sickness absence. For example, for workers with psychological complaints, a strong effect modification was found for job demands, as expressed by a

RERI of 3.51 (95 % CI 0.67–6.34). Workers with psychological complaints in jobs with lower demands had a probability on sickness absence of odds ratio = 3.27, relative to workers with chronic health problems. However, workers with psychological complaints in jobs with high demands had an increased risk of odds ratio = 7.04, relative to those without chronic health problems. Thus, among workers with psychological complaints, high job demands increased the likelihood of high cumulative sickness absence by 115 %. Consistently, the work-related factors of importance were job autonomy and job demands. Lower autonomy at baseline increased the likelihood of high sickness absence at follow-up among those with musculoskeletal (RERI 0.57), circulatory (RERI 0.82), and psychological health problems (RERI 2.94) at baseline. Higher job demands at baseline increased the likelihood of high sickness absence among those with severe headaches (RERI 1.35) and psychological complaints (RERI 3.51). For work-related physical load, no effect modifications were observed.

The key practical implications of this study are that higher job demands and lower autonomy increase the risk of sickness absence among persons with common chronic health problems and thus that focus on these work-related factors should be central in the promotion of sustainable employability. It may be hypothesised that psychosocial work-related factors are important because they allow an individual to exert control over how his or her work is conducted and inherently how adjustments therein can be made. These aspects are crucial components of the illness flexibility model, which addresses conditions influencing whether persons attend work or not when they experience an illness [16]. Health management at work should not only focus on return to work of persons on sickness absence but also on how working conditions should be modified to prevent onset of sickness absence.

Working conditions may modify the risk of sickness absence due to a chronic disease. Workers with psychological problems have a 115 % higher likelihood of sickness absence in jobs with high work demands compared to jobs with low work demands. For most chronic diseases, lower demands and higher autonomy in the job will buffer the risk of sickness absence.

3.5 Recommendations for Research, Policy, and Practice

The importance of health for entering and maintaining paid employment demands considerably more attention within health care organisations. Treatment regimes should support sustainable employability of persons with temporary or chronic health problems. For stakeholders the following important challenges can be identified:

- Research: Develop an evidence-based approach whereby treatment and rehabilitation programmes are properly evaluated for their cost-effectiveness from both health care and labour market perspectives. In most cost-effectiveness studies, the indirect costs due to productivity loss at work, sickness absence, and work-related disability will substantially exceed the direct medical costs. Thus, the ICF network should promote inclusion of remunerative employment in each comprehensive ICF core set, as was recently proposed as part of the development of a brief ICF core set for vocational rehabilitation of patients with subacute and chronic musculoskeletal pain [17]. In addition, further development of instruments that capture all relevant aspects of work participation is needed. In addition, randomised controlled trials on treatment should include work participation as a key outcome measure.
- Policy: Implement legislation and support schemes to make the workplace more 'disability friendly'. Legislation and specific arrangements should empower workers with chronic health problems to remain in paid employment, contributing as best as possible to a productive workforce. In the current shift towards self-management of disease, health care professionals and policymakers alike must not forget that remaining engaged in paid employment is most often not an individual choice, but the result of facilitators and barriers in the social and physical environment, including workplace adaptations, health care system orientation and support, entitlement programmes, and social stigma [18].
- Practice: In vocational rehabilitation for persons with chronic health problems, integrate labour market support with required medical treatment and guidance. Programmes must address important barriers for optimal work participation and work closely together with other stakeholders, such as employers and employment service providers.

Study Questions

1. Life expectancy has increased with approximately 1.5 years per 10 years in the past six decades. Consider the consequences for the proportion of persons in society who perform paid employment, relative to the same statutory retirement age in the next 20 years and relative to an increase in the statutory retirement age from 65 to 68 years.

   Answer: With unchanged retirement age, the proportion of persons in a society that work will decrease rapidly. With increase in retirement age of 3 years, the expected increase in life expectancy is balanced, and most likely the proportion will remain stable.

2. Ill health is an important reason for elderly workers to be forced out of paid employment. Mention the most important routes out of paid employment. Discuss whether ill health is of similar importance at the societal level in different routes out of paid employment.

Answer: Work-related disability and unemployment are the most important routes out of paid employment. Disability is primarily due to ill health. For unemployment ill health will explain certainly less. However, if many more persons become unemployed than disabled, in the total population, health-based unemployment may be more important than disability.

3. Which aspect of optimal participation at work is not covered well in the current ICF? Why would this aspect be a very useful addition?

   Answer: Productivity loss at work (presenteeism) is not covered in the current ICF. It is certainly an addition since presenteeism is very important for the indirect costs of disease, and as such will have a large impact on the cost-effectiveness of medical and nonmedical interventions.

4. Which factors may buffer the negative impact of chronic disease on sickness absence? Explain how these factors my support a worker with chronic disease to be a productive worker.

   Answer: Work-related factors such as autonomy at work and low job demands may prevent workers with chronic disease to take sickness absence. The illness flexibility model explains why these factors may act as a buffer: Workers who can plan or adjust their own work activities to their health needs will be less productive when their health really hampers their work and will compensate their productivity when they are in better health.

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