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# Health and work environment among women in unskilled occupations

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# Contents

<b>Contents</b> .....	<b>2</b>
<b>Foreword</b> .....	<b>4</b>
<b>Acknowledgments</b> .....	<b>6</b>
<b>List of papers</b> .....	<b>8</b>
<b>Introduction</b> .....	<b>9</b>
Work environment .....	9
Work environment and musculoskeletal health .....	10
Work environment and mental health .....	13
Unskilled work and health .....	15
The cleaning occupation .....	17
Demography .....	17
Organisation .....	17
Ergonomics and psychosocial work environment.....	19
Chemical and organic agents .....	22
Health problems in cleaning .....	23
Musculoskeletal symptoms .....	23
Skin .....	24
Respiratory system and eyes .....	24
Cancer and the reproductive system .....	25
Infections.....	25
Functioning and work .....	26
Work ability .....	26
Sickness absence and disability pensioning.....	27
Healthy/Unhealthy Worker Effect .....	28
<b>Aims</b> .....	<b>30</b>
<b>Materials and methods</b> .....	<b>31</b>
Paper I.....	31
Paper II.....	32
Paper III .....	33
Paper IV .....	33
Statistical analyses .....	34
<b>Results</b> .....	<b>35</b>
Work related risk factors and musculoskeletal problems (Paper I) .....	35
Work duration and disability pensioning (Paper II).....	36
Psychosocial/organizational working conditions and mental health problems (Paper III).....	36
Work environment, physical and mental health in relation to work ability (Paper IV) .....	37
<b>Discussion</b> .....	<b>38</b>
Material and Methods .....	39
Measurements .....	39
Musculoskeletal complaints.....	40
Mental health.....	41
Work Ability .....	41
Discussion of results .....	42
Demographical variables.....	42
Musculoskeletal health.....	43
Mental health.....	43
Work Ability .....	44
Working exposure and healthy/unhealthy worker effect .....	45

**Conclusions and implications ..... 47**  
**References ..... 49**  
**Papers I-IV..... 65**

## Foreword

This thesis is a result of my interest in occupational medicine. My choice of occupational medicine as a specialty was not accidental. In my brief practice as a medical doctor after graduating from Vilnius University in 1993, I became curious why doctors and patients dedicated more time and effort to treatment instead of prevention. I also wondered why “occupational” patients often failed to contact a medical doctor during the initial stages of an illness despite a clear association between the illness and the workplace. Finally, I questioned the specific mechanisms involved in the development of “unhealth” at the workplace.

My clinical experiences working as a physician at the Occupational Medicine Department at the Vilnius University Hospital, in conjunction with my search for answers, prompted me to start a research career at the Occupational Medicine Centre, which is the primary research institution for the study of occupational medicine in Lithuania. My engagement increased in step with my level of knowledge in the field. I worked with my patients at the hospital during the daytime, whereas my evenings and weekends were spent working with the employees participating in the research project. I encountered another world of occupational medicine while visiting these various workplaces. I was surprised at the relative lack of attention to and poor understanding of the relationship between occupation and health among the employees. As a physician, I was confronted by the employees’ own perspectives and particularly, their markedly different understanding of pain, symptoms, and illness severity. Moreover, I became aware that for the employees, keeping their jobs overshadowed the potentially adverse consequences of exposures at work. I attended several courses in occupational musculoskeletal disorders under the auspices of the Nordic Institute for Advanced Training in Occupational Health (NIVA). Participation in these courses broadened my knowledge and helped me acquire an understanding of ergonomics from a Scandinavian perspective. Gaining this new knowledge motivated me to publish my first article.

I was fortunate to receive a 1-year scholarship from the Research Council of Norway. From the outset, my goal was to become familiar with research methods within occupational medicine in Norway and later apply them in my home country of Lithuania. However, this never happened. Instead, I started working as a scholar on the project “Why do cleaners become disability pensioned?” at the Section of Occupational and Social Insurance Medicine at the University of Oslo. The Confederation of Norwegian Enterprise (NHO) financed this

project. Our study aimed to identify reasons for the high disability rates among cleaners in Norway, and was subsequently published as a report [1]. My colleagues and I focused primarily on the effects of the physical work environment on health. Nevertheless, we wondered if there was also an explanatory role played by psychosocial factors and management style. In addition, we questioned whether other unskilled occupations shared the same risk of disability. As such, we were curious about the role of selection effects. This line of questioning provided a public health framework for my research. Waiting for data from two rounds of questionnaires inevitably took a long time. To spare valuable time for my PhD, I had to find other relevant databases to use for my research. As a result, my papers are based on different databases.

When my scholarship period was over, I worked both as an occupational physician and a manager for the Occupational Health and Safety Department in small and big enterprises. The experiences I've gained during these years have shown me that occupational risk is complex and deserves more than single, one-factor explanations. It confirmed my belief that simultaneous recognition and appreciation of biomechanical, psychosocial, and management aspects of the workplace provide an ideal framework for designing strategies to improve the environment, with the goal of preventing and reducing disease. I have enjoyed the opportunity to investigate this theory further in my current position as a researcher at the Work Research Institute in Oslo.

## Acknowledgments

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I would like to express my sincere gratitude to several people for their help and encouragement.

My tutor, Professor Dag Bruusgaard, has been an enormous source of strength and support throughout the entire process, through various up-and-downs, and periods of frustration. I am thankful for his comprehensive, broad approach and carefully conveyed experience in research and writing.

I owe a special note of gratitude to my main co-author, researcher Jan Nygård from the Cancer Registry of Norway, for his guidance, patience, and help with statistics.

My other co-authors deserve special thanks and recognition. I wish to thank Hein Stigum from the Norwegian Institute for Public Health, Inger Sandanger from Akershus University Hospital, Søren Brage from the Section of Occupational and Social Insurance Medicine at the University of Oslo, Morten Wærsted and Bjørn Lau from the National Institute for Occupational Health and Thor Bjerkedal from the National Insurance Administration.

My gratitude and appreciation is extended to entire milieu at the Section of Occupational and Social Insurance Medicine at the University of Oslo, where most of my co-authors and researcher Harald Reiso were working at the time of my study, and where Professor Bjørgulf Claussen and researcher Bård Natvig are still employed. I am thankful for their valuable, ongoing feedback and constructive criticism.

I also wish to thank professor Bjørg Åse Sørensen at the Work Research Institute for her helpful advice on the final version of the manuscript. I greatly appreciate the support of my present colleagues, Aslaug Hetle, Heidi Enehaug, and Hilde Holte at the Work Research Institute, who have shared my curiosity and stimulated my thinking.

Many thanks to Arild Steen, Director of Work Research Institute, for his patience and understanding of the challenges inherent in finishing a dissertation and a demanding work schedule at the Institute.

Finally, I would like to thank my parents for their unwavering support and ever-lasting advice to believe, "Where there's a will there's a way." And to my dearest Morten, for my breezy breaks from working on his beloved Harley Davidson. I am particularly thankful to my



son Lukas for his patience and for graciously affording me the time, space, and freedom to perform this study.

## List of papers

- I. Work related risk factors for musculoskeletal complaints in the spinning industry in Lithuania.  
Migle Gamperiene, Hein Stigum.  
Occupational and Environmental Medicine, 1999, 56:6, p 411-416.
  
- II. Duration of employment is not a predictor of disability of cleaners: a longitudinal study.  
Migle Gamperiene, Jan F. Nygård, Søren Brage, Tor Bjerkedal, Dag Bruusgaard.  
Scandinavian Journal of Public Health 2003; 31:63-68
  
- III. The impact of psychosocial and organizational working conditions on the mental health of female cleaning personnel in Norway.  
Migle Gamperiene, Jan F Nygård, Inger Sandanger, Morten Wærsted, Dag Bruusgaard.  
Journal of Occupational Medicine and Toxicology 2006, 1:24
  
- IV. Self-reported work ability of Norwegian women in relation to physical and mental health, and the work environment.  
Migle Gamperiene, Jan F Nygård, Inger Sandanger, Bjørn Lau, Dag Bruusgaard.  
Journal of Occupational Medicine and Toxicology. Submitted August 2007

# Introduction

## Work environment

The work environment of industrialised countries has transformed drastically. A variation in the employment structure has led to a decline in permanent jobs and new types of work organization, and technological changes continue to shape and redefine the workforce. Greater autonomy and responsibility are increasingly required of employees. Expanding employment opportunities in the service sector has led to changes in the demographic age structure of the workforce and increasing participation of women [2-4]. Two-thirds of women are currently in the labour force, and their participation is expected to grow by 15 % through 2010, while men's participation is projected to grow by about 9 % in the USA [5, 6].

Although women make tremendous contributions to the economy through their paid work, they still earn considerably less than men and often find themselves in low-status jobs with few benefits [7]. Moreover, as Davidson and Cooper point out: "Two-fifths of part-time female workers are in low-status, low skilled occupations which rarely lead to promotion or more responsible positions" [8]. In contrast to men, who experienced an increase in skilled work and decreased physical loads, the proportion of female unskilled workers has increased in the Swedish population over a 24-year period, and their physical loads have remained unchanged [9].

Statistics Norway (SSB) has performed repeated surveys of the working environment in Norway [10]. Results from 2003 showed several improvements in the working environment compared to 1996 results. A larger proportion of employees felt greater decision-making influence over their deadlines and work tempo. Additionally, a greater number had the opportunity for learning and professional career development. Notably, these improvements applied predominantly to women. Results from the SSB survey also indicated some deterioration of the work environment between 1996 and 2003. For example, findings related to performing monotonous work showed that a greater proportion of workers experienced strenuous work postures [10]. These negative changes have also mainly affected women.

There are continual changes in the distribution of the labour force between occupations and sectors. Additionally, changes have occurred within the labour market, work organisation and the health-related aspects of the work environment. The number of people exposed to occupational risks that potentially results in poor health varies across the different

occupations. Continuous changes in work environment produces continuous changes in the type and amount of occupational risk, thereby affecting occupational ill-health.

## Work environment and musculoskeletal health

Musculoskeletal health problems have received increasing attention in recent years and the prevalence of pain in the general population varies across studies [11].

Most population studies have focused on musculoskeletal pain from a specific area of the body, e.g. low back pain (LBP), neck pain, or knee pain [12-14]. Studies from the 1990's report that the life-time prevalence rates (having ever experienced) for LBP range between 58 and 84 %, the point prevalence for neck pain ranges 10 and 20 %, and the one-month prevalence for knee pain is about 18 % in the adult population [15-22].

The prevalence of musculoskeletal pain [17, 23, 24, 1998 #674, 25-27] and disease [28, 29] is higher among women than men. The prevalence of chronic widespread pain is particularly high, circa 22 % of women, according to a Norwegian report [30]. In Norway, the Survey of Living Conditions in 2000 studied the prevalence of self-reported health problems in the last month [31]. The prevalence of self-reported pain in neck, shoulders, or upper back in economically active persons between the ages of 30-45 years was 50 % in women and 37 % in men. The prevalence of low-back pain was 31 % in women and 27 % in men, and pain in arms, wrist, or hands was 29 % and 22 %, in women and men, respectively. Similar results were shown in other studies [32-34].

Significant costs are associated with musculoskeletal disorders, including absenteeism, early retirement, medical treatment, and rehabilitation [35-37]. These disorders cause 50 % of all sickness absence exceeding two weeks, and 33 % of disability pensions in Norway [25, 38]. In the Nordic countries, costs have been estimated to fall between 3 and 5 % percent of the gross national product. About 30 % of these costs can be attributed to work-related factors [39, 40].

In this thesis, the term "work-related disorders" is used to describe disorders and diseases with a proven or hypothetical work-related causal component [41]. There is no clear agreement in the literature regarding the extent to which musculoskeletal disorders are related to work, or if this amount is increasing. In a study of Oslo citizens, aged 30, 40, and 45 years, the most frequently self-reported work-related health problem was pain in the neck/shoulders (38 %), followed by low back pain (23 %), and pain in elbow, forearm, and hand (20 %) [39].

Type of occupation influences the prevalence of musculoskeletal pain [42-44], low back pain [45-47], and neck and shoulder pain [48-51]. The occupational physical stressors include: heavy workload, static postures, frequent bending and twisting, heavy lifting, pushing, pulling, carrying, and repetitive work [41, 42, 47]. Physically monotonous or repetitive work is associated with increased risk of shoulder, neck, and upper limb pain [40, 52-56]. Symptoms often appear early in life and after a relatively short exposure to adverse work environment conditions. In repetitive work, pain syndromes are often reported after only 6-12 months on the job [57]. Attempts have been made to establish threshold limit values for static load, e.g. thresholds of 2-5 % of maximal voluntary contraction have been suggested for shoulder muscles [58]. However, as Westgaard [59] concluded, even very low levels of activation might contribute to the development of chronic pain syndromes. Interventions in the workplace aimed at reducing symptoms have, so far, not been very successful [54, 60, 61].

Several authors have reported high prevalence of neck and upper limb disorders in industrial occupations [62] with the highest rates among women [63-65]. Heavy or moderate work was found to be a risk factor for locomotor discomfort in the shoulder, back, hip, and knee. Leino (1989) [66] found a higher prevalence of musculoskeletal morbidity, both symptoms and clinical findings, in blue-collar workers compared to white-collar staff in a Finish metal industry.

Sickness absence due to musculoskeletal pain is much higher in manufacturing or blue-collar work [67-69]. Workers at lower occupational levels more often report pain syndromes, even when the physical conditions are very similar. Aronsson et al, for example, demonstrated that the prevalence of neck and shoulder symptoms was twice as high among workers involved in data entry compared with that of programmers and system operators [70].

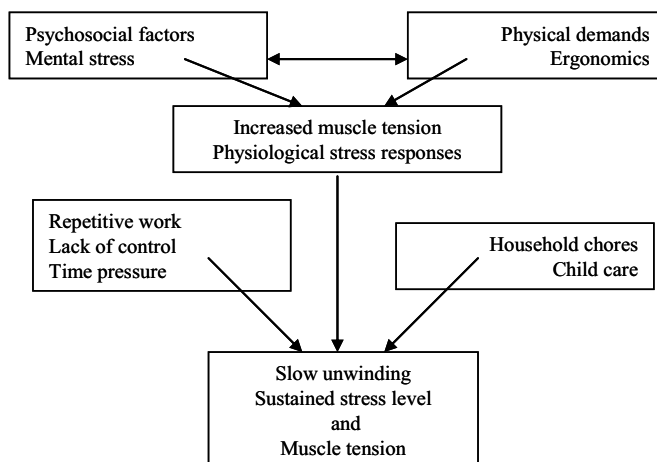
Recent studies also report a relationship between psychosocial factors at the workplace and musculoskeletal disorders [66, 71-78]. In a review article, Bongers et al concluded that monotonous work, perceived high workload and time pressure were related to musculoskeletal symptoms [72]. Low control over the job and lack of social support were also associated with musculoskeletal disease. The high prevalence of musculoskeletal disorders in psychologically stressful but light physical work, such as assembly work and data entry, indicates that mental stress also plays an important role. Experimental studies show that mental stress, even in the absence of physical demands, increases muscle tension [40, 79-84]. Thus, it is likely that stressful jobs may contribute to elevated risk for musculoskeletal disorders through muscular tension induced by psychological stress [40]. In addition, there are

several studies indicating that mental and physical demands may interact, increasing the risk of musculoskeletal disorders [52, 79].

Conditions typical of many low status jobs, such as monotonous and repetitive tasks, as well as a lack of influence and social support in the work situation, are often associated with a high risk for muscular problems [40, 72, 85-88]. Repetitive and monotonous blue-collar jobs with elevated psychophysiological stress levels are associated with a high prevalence of back pain problems [89, 90] and slower physiological unwinding after work [91-93]. It is possible that a negative psychosocial work environment may induce health problems independently of the physical situation, or, alternatively, a negative psychosocial work environment may exacerbate the effects of exposure to adverse physical conditions [89, 94].

A model for the development of musculoskeletal disorders is presented in Figure 1 [95]. According to this model, mental as well as physical load contributes to elevated muscle tension and physiological stress levels. However, conditions at work such as monotonous and repetitive tasks, lack of influence and control, and a fast work pace may influence one's well-being and physical state after work, causing sustained stress levels and muscle tension. Further, workload stemming from household chores and childcare may contribute to maintaining elevated stress levels and increased muscle tension after working hours, particularly among women [95].

Figure 1: A tentative model for musculoskeletal disorders (Melin and Lundberg)



## Work environment and mental health

According to the World Health Organization, much of the global burden of disease is attributable to the common non-psychotic mental disorders, such as depression and anxiety [96-100]. There is an extensive literature providing evidence for the social and economic costs of mental disorders. In particular, depression leads to great expenses related to sickness absence, work disability, and reduced productivity [35, 97-105]. In Norway, absenteeism due to mental disorders accounted for 16,8 % of the number of absences and 31,5 % of all refunded sick days in 1998 [106]. A study on sickness absence among 323 National Health Service Trust employees showed that psychological distress is an independent predictor of sickness absence [107]. Studies of government employees and employees working in the industrial sector produce similar results [107, 108].

Psychological distress and depression are health problems in the workforce with prevalence estimates ranging from 15 % to 20 % [109]. Reports from England estimate that one-third of employees who are not able to work suffer from mental health problems, and of those, 58 % are reported to be work related [110].

Several studies document the role of stressful working conditions on mental health [111-113]. Occupational stress is a pervasive problem among blue-collar workers, and female employees are especially vulnerable, yet this population is rarely addressed [111, 114-118]. For occupations such as factory line workers, social workers, health care personnel, teachers, cleaning personnel, and housekeepers, the prevalence of depression has been shown to be particularly high [119, 120]. Other studies have shown that occupational socio-economic status is linked to mental health problems [121-124].

Mental disorders, in particular depression and anxiety, can be affected by several work-related factors, such as greater demands, a limited ability to plan or control major changes at one's work, and deficient social support [4, 124, 125]. This may explain why unskilled workers in industry and service production are reported to have a higher risk of mental health disorders compared to white-collar workers [126]. Employees in the service sector, such as health care personnel, teacher's assistants, cleaning personnel, and housekeepers are especially prone to drop out of the workforce because of mental health problems [120]. Nordic research suggests that lack of job autonomy and low procedural justice (decision-making procedures) are independent risk factors for mental health problems in female employees [127].

Psychosocial stress at work includes human relations, leadership, and development aspects of the way the work is organized. These factors are important with respect to work ability and the psychological and social needs of workers. High work strain, combined with lack of social support, has been associated with elevated risk of, for example, coronary heart disease [128]. Psychological distress may be exacerbated by the worker feeling a sense of uncontrollability and unpredictability in the work environment (e.g., corporate downsizing and reorganization) [129]. Recent findings suggest that unfair managerial procedures, poor organizational climate, and organizational misbehaviour result in lowered subjective well-being and long sickness periods among unskilled women [130]. Findings in other studies suggest that the relationship between environmental factors and mental symptoms is most prominent in women [131, 132].

Several theoretical models for the study of the relationship between psychosocial environment and health have been proposed. One such model is the Person Environment Fit theory that was presented by the Michigan school of sociology [133]. This theory reported that the effects of organizational stresses and strain vary depending upon the personality of the individual. One kind of fit between an employee and their job environment is the degree to which their skills and abilities match the demands and requirements of the job. Another type of fit is the degree to which the needs of the employee are supplied in the job environment. Both forms of misfit will cause job dissatisfaction, depression, psychological strains, and other symptoms of poor mental health. Another established model is Cooper's comprehensive theory for describing the psychosocial aspects of white-collar work (Cooper and Marshall, 1976). His thesis is largely based on the concepts introduced by Karasek, although it does not exhaustively cover all the aspects of the psychosocial work environment. According to the model, there is an interaction between psychological demands and decision latitude. If demands are regarded as the x-axis and decision latitude as the y-axis in a two-dimensional system, four combinations are recognized. The high demand/low decision latitude combination is regarded as the most problematic [134].



## Unskilled work and health

Social and economic status is partly determined by type of employment, which in turn is closely associated with education. Unskilled work has many different descriptions in the literature, and has been referred to as blue-collar work, low paid work, low job status, etc. Some common features of unskilled work include no or low demand to education, low payment and status, and high physical demands. The Dictionary of Occupational Titles reports that if learning tasks/duties takes no longer than one month, the job falls within the “unskilled” category of the classification system [135]. This is a large and poorly defined group of occupations, characterized by limited research.

Numerous studies have provided evidence for the role of workplace factors in affecting health [136]. Health problems are consistently more common among blue-collar workers, whose work more often involves monotonous and repetitive tasks than among white-collar workers. White-collar workers typically have more stimulating and varied types of work tasks, in addition to greater influence over the content and pace of their work. Indeed, studies of repetitive and monotonous blue-collar jobs generally show that these workers have more elevated psycho physiological stress levels compared to employees in more stimulating and flexible jobs [137]. Thus, blue-collar workers seem to be exposed to greater stress loads at work in addition to elevated stress levels after work [91]. This pattern can only partly be explained by differences in exposure to adverse physical conditions and health-related behaviours.

The social gradient in health status is well documented and, in many countries there are indications that inequalities in health have increased during the last decades [138]. Relative socioeconomic status seems more decisive to health than the absolute standard of living [139]. The differences in lifestyle between different social groups can, to a large extent, be considered a consequence of environmental conditions. Under the influence of economic stress, low job satisfaction, unemployment or the threat of unemployment, and lack of influence and control over one’s life/work, the individual is more likely to adopt a passive and emotional coping style, involving denial, escapism, overeating, use of tobacco, alcohol, and other drugs [136, 140]. Negative emotional states associated with low-status jobs, combined with a lack of economic resources, are also likely to reduce the individual’s motivation to seek proper medical treatment and, thus, increase the risk that transient symptoms develop into chronic illness.

A great deal of knowledge has been collected on the effects of the physical work environment on the health and well-being of male employees, with a growing number of studies examining the effects of work on women's health [136]. Compared to men, women seem to be at particular risk due to the extra burden from unpaid work at home and the tendency to be employed in low-status jobs [137]. These considerations and risk factors may prove important for understanding women's greater health problems [141]. Research on employment factors and women's health has focused on different topics, such as workplace exposures and pregnancy [35, 142-149], and the ability to juggle the multiple roles of spouse, worker, homemaker, and parent [150-154]. Yet, few studies have specifically examined how the physical and psychosocial work environments are associated with women's health in unskilled occupations. Women working in unskilled occupations not only join the workforce at an early age but also drop out of the workforce at an early age due to health problems caused by the working environment [155]. Unskilled women are exposed to hard physical labour and this results in both musculoskeletal and mental health problems. Indeed, a relationship appears to exist between working conditions, income, job stability, and poor or limited career options.

The labour market generally restricts both autonomy and rewards for women, and provides the fewest opportunities for women working in the service sector [156, 157]. Pink-collar positions have spread rapidly as more and more women enter the workforce. The name, "pink-collar" originally derived from women working in 1950s offices. They usually wore bright shirts and pink was a popular colour [157]. The term originally arose to distinguish these jobs from white-collar jobs, and to distinguish women in these roles from other white-collar workers, because their work did not require as much professional training, nor did it carry equal pay or prestige. Additionally, these "pink-collar" jobs were traditionally low in status with limited benefits or chances for advancement, involving monotonous and unfulfilling work. Often kept out of traditional blue and white-collar jobs by physical requirements and prejudice, many women subsequently found ways to take their domestic skills into the world of paid work. Examples include teaching, nursing, clerical work, cleaning, elderly care, food preparation and food service, and childcare.

The European and Scandinavian labour market is still divided by gender [140, 158, 159]. This means not only that women and men perform different types of work, but also that they are exposed to different work environmental problems. Research within the broader field of women in unskilled occupations, work, and health is needed to improve our understanding

of the relationship between organizational and psychosocial aspects of the working environment and health.

## The cleaning occupation

### *Demography*

Professional cleaning is a basic service occupation. It is labour-intensive work, conducted by millions worldwide [160]. The UK alone, for example, operates with 800,000 employees in the cleaning profession [160]. In Norway, there are 57,000 persons employed in this type of occupation, 84 % of whom are women [161]. In Sweden, 78,800 persons work as cleaners (63,300 women) [162, 163]. In the European Union (EU), it is estimated that private enterprises, governments, and local authorities employ nearly three million full- and part-time cleaners and a clear majority are women (95 %) [164, 165]. According to U.S. Department of Labour, over 4 million people work as a cleaners in United States [166]. Cleaners are typically individuals with low educational status, often migrant workers [164, 165]. In most countries, neither basic education nor occupational training is required for cleaning jobs.

### *Organisation*

Professional cleaning is carried out in all types and sizes of organizations and work arrangements [167]. According to the Dictionary of Occupational Titles, this occupation falls within the “unskilled” category based on the length of training required for the job [135].

In Norway, 57 % of cleaning personnel work in private enterprises and 43 % are employed within government and local authorities [168]. In the public sector, most of the cleaners are employed on a full-time basis, whereas 80-90 % of private cleaners work part-time [168]. Almost 50 % work after ordinary working hours in both Norway and the UK [1, 160]. The job is done mostly alone, but sometimes performed in pairs or teams [1, 160, 169]. Job rotation, an approach where an individual is moved through a schedule of assignments designed to bolster job satisfaction through job variation, is not in operation in the UK [160]. A German project on health promotion among hospital cleaners found that approximately 90 % of employees assessed their jobs as heavy and over 60 % complained that inadequate time was allocated for proper completion of assigned tasks [170].

Wages of cleaners vary widely, but cleaning is generally considered to be a low-wage profession [10, 163]. For example, a report by Carley et al. [171], argues that wages for cleaners are low in comparison to most other occupations. More specifically, employment

statistics on jobs in the US showed that the median earnings of building cleaners was approximately one-half of the median income for all occupations [166].

High turn-over is characteristic for this occupation. Results from a 1996 Danish study, which included 1166 female cleaners, showed that 20 % of the cleaning staff quit during a two-year period and 47 %, reported that they would choose another job, if possible [172, 173]. Additionally, cleaning personnel were found to have an extra job three times more often than other types of employees in Norway (30,1 % vs 11,3 %) [1]. Nevertheless, 87 % of female employees in a Danish study were satisfied with their work and 75 % felt that the work was meaningful [172, 173].

A Norwegian study from 1999 observed a specific structure and distinct groupings among the cleaning personnel [1]. The first group included “stable” employees, described as having a life-long career within this occupation. The second group included individuals who were exiting the workforce due to health problems. These types of employees may have chosen the cleaning occupation because of the relative ease of acquiring a part-time position, and their views that cleaning is “easy.” The final group included individuals obtaining cleaning work as a temporary or alternative source of income, for example students. These individuals are healthy and younger employees, with a short duration of prior work experience.

In most cleaning companies, a supervisor is responsible for operative management at the worksite. Roles of the supervisor may include administration, maintenance of work, recruitment, training, and contact with customers. Generally 10-15 cleaners are under the leadership of one supervisor. It is not an exception if the supervisor performs actual cleaning tasks herself. Supervisors are often formerly unskilled workers who were promoted. In most countries, supervisors within the cleaning profession are predominately women [164].

However, substantial deficits in management are commonplace, which generates complaints about lack of support and inadequate information [170]. Such deficits decrease well-being at work and increase the risk for both poor mental and musculoskeletal health [160]. According to research results on psychosocial stress with respect to work organization in the cleaning profession, efforts to reduce strain have increased in the 1990s. In the Nordic countries, for example, some organizational schemas for cleaning work have been developed. The projects have differed but the main goals have remained the same. Namely, goals include 1) changing the organization of cleaning work to reduce physical and psychosocial strain, and 2) improving occupational skills through qualification programmes. The main element of organizational development has been team-based cleaning with varying degrees of self-

direction [169, 174]. Female supervisors seem to be particularly qualified for these types of tasks [175].

The few existing intervention studies suggest that the psychosocial stress of cleaners can be alleviated if the work organization and management culture are developed towards better leadership.

### *Ergonomics and psychosocial work environment*

Professional cleaners generally work in facilities planned for other work purposes and other types of employees. Thus, buildings and interior facilities are not designed to accommodate smooth and economic cleaning and to promote the optimal workload for cleaners [160]. Cleaning is a dynamic and static muscular work performed by using various manual equipment [169, 176, 177]. At workplaces in the UK, Sweden, Denmark, and Finland, the main observed postures of concern were static neck flexion, excessive wrist deviations, frequent arm abduction, back rotation, and flexion [160, 163, 164, 176].

During the past decades, technological advancements have been developed, which have affected cleaning methods. Nevertheless, according to Hopsu, about 80 % of the cleaning in offices, schools and institutes is mainly muscular work, especially in terms of bent and /or twisted postures for the back, and repetitive movements of the arms and hands with a high output of force. The relative proportion of tasks related to planning, preparation, and organization averages about 10 %. In the UK, 56 % of cleaners reported high workloads and working under time pressure, e.g. large school classrooms had to be thoroughly cleaned in 12-15 minutes [160].

In many EU countries, the public sector has developed standardized guidelines describing the size of the area to be cleaned per hour. In the 1990s, productivity expectations changed considerably and resulted in dramatically increased demands with respect to cleaning areas and work performance. If the equipment has poor ergonomic characteristics, it forces the cleaner to work with poor work postures and results in additional musculoskeletal strain or tension. The ergonomic shortcomings in the design of buildings and machines increase the workload of cleaners and the risk for negative health consequences. It also decreases productivity and the quality of work. Huth has developed training programmes for professional cleaners to improve the ergonomics and efficiency of cleaners' work [164]. The main aims of the programme were to improve movement patterns and ergonomic knowledge, to increase awareness, and to train instructors for worksites.

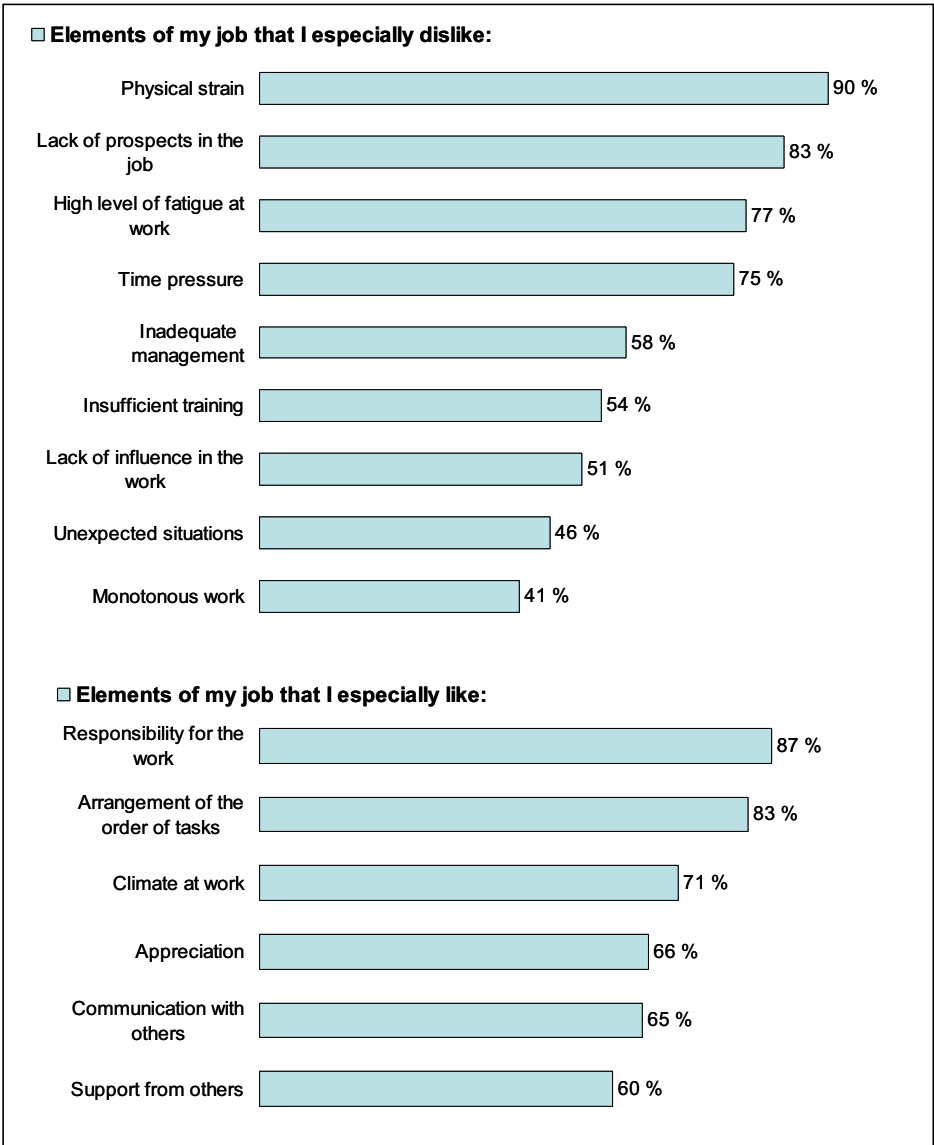
In the project by Huth et al. [170] in Hamburg, an attempt was made to improve the monotonous work structure of hospital cleaning. Organizational changes were undertaken to combine cleaning with other tasks on the ward, for example, serving meals and storing various materials. Other examples exist of these new types of combi-jobs, which extend traditional work tasks to provide new services and roles [178]. In a Swedish intervention, for example, a service job at a housing institution combined the primary tasks of repairing and caretaking with cleaning [174].

Given the size of this workforce, the physically demanding work, and the variety of environments in which cleaners operate (e.g. factories, hospitals, schools, offices), safeworking practices should be in place to enable workers to remain healthy and perform work to a satisfactory standard.

A few studies have been performed on psychosocial working conditions among cleaning personnel. Our knowledge is limited regarding conditions such as lack of control over work and breaks, high workload, and time pressure [160]. Questionnaire studies in Finland, Denmark and Germany have yielded comparable profiles of the psychosocial stress factors in professional cleaning [170, 173, 175]. Results indicate that 35-55 % responded that they had little or no possibility to influence their work arrangements, work pace, tools or machines, or choice of partner. Supervisors or cleaning managers decided when and what types of tasks were conducted. The majority of questionnaire respondents in the UK were able to decide how to work (55 %), but reported low control over what they did at work (53 %) or when they could take rest breaks (38 %) [160]. Lack of involvement in the design of the working day was also apparent at the workplaces.

Almost all of the cleaners in a Norwegian study (75-90 %) stated that they lacked opportunity for professional career development or to obtain any type of job-related advantages from their work [1]. A German study by Huth et al. [170] investigated the effects of a health promotion project focusing on organizational development and training. In this study, 101 hospital cleaners reported physical strain (90 %), lack of prospects in the job (83 %), time pressure (75 %) and inadequate management (58 %) (Figure 2). Among positive elements were responsibility for the work (87 %), agreement of the order of tasks (83 %), climate at work (71 %) and appreciation (66 %).

Figure 2. Results of a survey of 101 professional cleaners concerning work conditions (Huth et al. 1996)



In a Danish study [173], a few aspects of the working conditions were found to contribute to a high level of stress. Results indicated that time pressure, working alone, and shift work

decreased well-being at work and increased the risk of mental illness [164]. Other working conditions, such as receiving guidance and help from co-workers and supervisors, were found to compensate for negative stress.

Researchers in Denmark and Finland studied the association between psychosocial work factors and strain among cleaners based on the model of Karasek and Theorell [164]. The results showed that psychosocial work environment variables exerted high psychosocial demand. Team-based work and combi-jobs were the tasks with high decision latitude, while monotonous work, time pressure and working alone were the tasks characterized by low decision latitude and high psychosocial demands. These latest organizational forms were considered as the primary causes for psychosocial strain (figure 3) [160, 170, 173, 179-181].

Figure 3. The Karasek and Theorell stress model applied on cleaning

Decision latitude	Psychosocial demands	
	Low	High
High		<ul style="list-style-type: none"> <li>• Team-based cleaning</li> <li>• Combi-Jobs</li> </ul>
Low		<ul style="list-style-type: none"> <li>• Cleaning work monotonous work, time pressure, working alone</li> </ul>

*Chemical and organic agents*

Cleaning agents include a great variety of chemical substances, many of which are hazardous to human health or to the environment, and some are thought to deteriorate the indoor air quality (IAQ) [172]. Chemical agents are usually grouped into different product categories according to their technical functions and the purpose of their use (i.e. disinfecting agents and surface care products) [164]. These agents are typically composed of an active component or components depending on the technical function of the cleaning agent, additives, and usually water. Some of the main function groups are surfactants (detergents), acids and bases, complexing agents or water softeners, and disinfectants and solvents. Agents for surface care, for example oils, polishes, waxes, antistatic, and disinfectants can evaporate into the air as a gas or vapour (volatile substances) [182]. The most important fraction of the volatile



substances is the fraction of volatile organic compounds (VOC), which is defined as an organic compound with boiling points between 0 C and 400 C. During the cleaning process, the temporal increase can occur in the overall VOC level, and thus it can enhance the probability of increased short-term exposure of the cleaning personnel.

Dust on floors and other surfaces contain minerals, metals, and fibres from textiles, paper and insulation material, and particles from tobacco smoke, including polycyclic aromatic hydrocarbons, and organic compounds [183]. Materials from biological sources may also be present, including Gram-negative bacteria, animal allergens, fungi, and pollen [184]. Furthermore, because of unfavourable working hours (e.g. cleaning surgery rooms, laboratories or workshops before or after ordinary working hours), cleaning personnel often work when the air conditioning system, ventilation, or air exhausts are turned off. The foul air in the work areas may increase the exposure to chemical substances [182].

## Health problems in cleaning

Researchers have investigated a variety of health problems associated with the cleaning occupation. Many of them have logical and expected associations with the risk factors, e.g. musculoskeletal symptoms and physical/ergonomical exposure, or skin and respiratory system symptoms, and chemical exposure. Other relationships, for example between work environment and cancer, are more ambiguous, and can be better explained by genetics and lifestyle.

### *Musculoskeletal symptoms*

Studies in Europe, Australia, and Canada have indicated that cleaners have a high risk of developing musculoskeletal problems, which affect the back, neck, shoulders, elbows, and hands [160, 163]. Because of prolonged static and repetitive muscle work, the tasks that cleaners conduct (e.g. using buffing machines, mopping, moving furniture, carrying/emptying rubbish) were recognised as demanding for the cardiorespiratory and musculoskeletal systems [160, 163].

Of the cleaners surveyed in the UK, 74 % reported muscular aches, pain, and discomfort in the last year; 23 % had been absent from work as a result [160]. Results from several studies show that one-year prevalence rates vary from 36 % to 78 % for low back pain, from 49 % to 84 % for neck or upper back pain, from 27 % to 75 % for shoulder pain,

from 7 % to 27 % for pain of the wrist/hand or hips, and circa 39 % for knee and foot pain [160, 164]. On average, these prevalence rates are higher than in the general population [160]. A study of approximately 9000 hotel and office cleaners in Sweden found that during the period 1997-2001, approximately 51 % had pain and discomfort in the shoulders and hands on a weekly basis, 43 % had weekly pain and discomfort in the extremities, 46 % had weekly pain in the upper back, and 39 % had weekly pain in the lower back [162].

### *Skin*

A total of 81 % of cleaners reported having wet hands more than one-fourth of their working hours. A total of 46 % reported having at least one of four skin symptoms during a 1-year period, and of these employees, 70 % reported an improvement in symptoms during weekends and holidays [173, 182]. A positive correlation was found between hours per week with wet hands and skin symptoms. During a 2-year follow-up period, the risk of developing skin symptoms was higher in the group that remained in the cleaning profession than in the group that left their cleaning jobs. Traditionally, gloves are recommended to protect the skin from wet work. However, several studies show that both plastic and rubber gloves can be permeable for substances in cleaning agents. In addition, the use of gloves might in itself be a problem.

The occurrence of skin symptoms on the hands has been examined in a Danish questionnaire study among female cleaners [173]. Results indicate that skin symptoms often appear within the first year of work [185, 186]. Also, cleaners with skin symptoms were found to change jobs more often than other employees [187, 188].

Hand eczema is frequent in cleaning work. The proportion of irritative hand eczema ranges from 60 % to 93 %, whereas the prevalence of allergic hand eczema varies from 20 % to 30 % [164]. A Finnish study of cleaning staff in hospital with wet work shows that the prevalence of allergic contact eczema is 21 %. Nickel allergy and allergic reactions to perfume are the most frequent [189].

### *Respiratory system and eyes*

A positive correlation has been found between chemicals in the air and eye symptoms, and a correlation has also been demonstrated between dry air and symptoms of the eyes, nose, and throat. Cleaning toilets, bathrooms, and using sprays has been correlated with mucosal symptoms. In addition, some case reports describe accidents in which the inhalation of irritative gasses from acids, bases, or chlorines caused short or long-term respiratory problems, such as chronic bronchitis and chemical pneumonia [172]. Studies indicate that

cleaners have an increased risk for respiratory diseases. Occupational asthma due to exposure to substances in cleaning agents has been reported in Spain, England, and Singapore [190-192]. The induction of obstructive airway diseases is particularly known in connection with exposure to chlorine gas [193]. One case described a combined respiratory and cutaneous hypersensitivity syndrome [194]. An examination of hospital cleaners showed an increased risk for asthma due to latex powder [195].

### *Cancer and the reproductive system*

A number of studies have shown an association between professional cleaning and cancer, and risk to the reproductive system. In a Danish study, 36 of 461 chemicals found in cleaning agents were listed as agents that may produce cancer and reproductive hazards. A study in Sweden showed an association between employment in floor polishing or window cleaning and some excess risk of pancreatic cancer [196]. Specific occupations at high risk of liver cancer included private household workers and non-domestic cleaners among residents in Brooklyn, New York [197]. The occupations with the largest prevalence of squamous-cell cancer of the sinonasal cavity also included cleaners [198]. Maids and cleaners had an increased risk of cervical cancer and carcinoma in situ in USA (OR=4.4) [199]. The risk for non-Hodgkin's lymphoma was significantly increased among women cleaners in Sweden [200]. Also, the incidence of multiple myeloma was significantly increased among restaurant cleaning staff [200]. Increased risk for bladder cancer was found for house cleaners in USA [201]. High levels of lung cancer and respiratory diseases were observed among cleaners in England, USA, Germany, and Switzerland [191, 202-204].

Studies have also shown an increased risk of spontaneous abortion or pre-term delivery among cleaners [205]. Likewise, increased risk of having babies with a low weight [206] or of developing high blood pressure during pregnancy [207] was found. One study documented an association between infertility and heavy cleaning work in combination with unfavourable working hours [205]. Despite the documented risks, the specific biological model or exact pathway for exposure is often unknown.

### *Infections*

Only very limited information exists on the association between cleaning and infectious diseases. Needle pricks may be a risk factor for hepatitis B and C infection among hospital cleaning staff [208]. The overall decrease in blood borne infections can be explained by improved precautionary measures against HIV in society. Hepatitis A is probably not a risk

for hospital cleaning staff [209], but might be for cleaners in kindergartens and day nurseries because of fecal-oral transmission [210]. Tuberculosis has not been registered as an occupational disease among cleaners since 1988 in Germany. Before this time, there was an incidence of one or two cases of tuberculosis a year [164]. This rate can change if the proportion of patients with immune deficiency increases in hospitals [208].

## Functioning and work

### *Work ability*

In accordance with ICF terminology (International Classification of Functioning, Disability, and Health), the term *work ability* is used here.

According to Nordenfelt, the concept of ability should be specified and further, he notes that all abilities, however simple or basic, are related to a set of circumstances [211]. Work ability can be assessed in general, or with respect to the specific job, occupation, or the individual tasks performed. According to Ilmarinen, factors that affect work ability form a complex relationship between health, competence, values, work environment, and social relations [212]. “Work ability refers to individual and occupational factors that are essential to a persons ability to cope in worklife. Work ability is the result of the interaction between individual resources and work [212].”

Several studies have dealt with self-assessed work ability [213-224]. Haldorsen and colleagues looked at self-assessed work ability in patients with low back disorders [225]. They used five items to make a Graded Reduced Work Ability Scale. These five items measured: 1) reduced ability to carry out ordinary work, 2) reduced ability to do other work, 3) the number of activities and duties affected, 4) the consequences for well-being and health, and 5) the effects of these complaints on staying at the job [225]. Of these five items, reduced ability to perform ordinary work was most predictive of not returning to work.

Ilmarinen and colleagues from Finland have constructed the Work Ability Index. Among employees, this index is a strong predictor of future work ability, disability, and even mortality [212, 226]. The Work Ability Index is comprised of seven items [212, 213, 226, 227].

It should be noted that a person’s general level of functioning is different from his/her work ability in a remunerative job. The latter type of functioning is required to meet specific work demands and involves work-related social skills. People may have the ability to carry out activities at home or in their leisure time, but may not be able to perform a remunerative

job. The effects of particular work characteristics on work ability vary across occupations, rendering type of occupation an important factor to consider. For example, reduced work ability is more prevalent among blue-collar workers in both genders [224].

### *Sickness absence and disability pensioning*

Women have higher rates of sickness absence than men [24, 161, 228, 229]. In Norway, this gender difference has tended to increase over time, but in the last 10 years it has remained rather stable. Data from 2004 suggests that women are absent 40-50 % more often than men [230]. The same trend is documented in 2006, where sickness absence for women was 8,3 % compared to 5,6 % for men [231]. Even after adjusting for age, seniority, and education, women in unskilled occupations have significantly higher sickness absence than women in skilled occupations [232, 233]. Additionally, a poor organizational climate has been associated with a greater rate of short absence spells for women working in blue-collar jobs compared to white-collar jobs [234].

Sickness absence due to musculoskeletal diagnoses constituted 37,4 % of all cases in Norway in 2006 [161]. Women had a higher prevalence of musculoskeletal problems than men (20,1 % versus 17,0 %, respectively). Sickness absence due to mental health problems constituted 18 % of all cases in Norway in 2006.

Cleaning personnel was among those occupations with the highest sickness absence in Norway in 2006 (9,9 % vs 6,1 %) [231]. Sickness absence for female cleaning professionals whose employer was a member of the Confederation of Norwegian Enterprises was 12,1 % in 2006 [235]. Statistics provided by the health insurance authorities in Hamburg, Germany from 1995 showed an above-average sickness absence rate for cleaners of 8,6 %, compared to 7,3 % for all other occupations [164]. In a Danish study, 27 % of all cleaners had sickness absence due to musculoskeletal symptoms during a one-year period [173]. In Germany, the rate of absenteeism for cleaners due to musculoskeletal disorders was approximately 49 cases per 100 cleaners per year [164].

Women had higher rates of disability pensioning (12,6 %) than men (9,0 %) in Norway in 2006 [161]. The prevalence of musculoskeletal disorders was highest (33,2 %) among all primary diagnoses for disability pensioning in Norway in 2004 and women had a higher prevalence than men (39,2 % vs. 25,3 %, respectively) [161].

A Danish study comparing female unskilled workers to managers showed a higher risk for disability pensioning among the unskilled workers [236]. Similar results have been found

in other studies [237]. Data suggests that women with less education have a higher risk of disability pensioning compared to women with a university degree [231].

Women in service and cleaning industries in Norway have a higher disability pension rate than women in other occupations (IR 1.5; 95 % CI 1.5 – 1.7) [238]. Cleaning personnel had a musculoskeletal diagnosis 66 % more often than average among females with disability pensioning. Disability pensioning for cleaners with musculoskeletal diagnoses costs 600 mill NOK yearly [1]. Skin disorders (2,87 times than average) and arterial sclerotic heart disorders (1,95 times than average) are typical reasons for disability pensioning among cleaners compared with other occupations [239].

## Healthy/Unhealthy Worker Effect

The healthy worker effect was probably first described by Dr. W. Ogle in an appendix of the Registrar General's report on mortality in England and Wales in 1885. He found that "the more vigorous occupations had relatively lower mortality rate as compared with the death-rates in occupations of an easier character or the unemployed". Ogle identified two kinds of selection bias, one present at the time of hire, and the other present at the time of employment. The first selectively attracts or rejects new workers depending on physical demands of the job and health criteria, for instance, by occupational physicians. The second forces people to leave industry because their health is too impaired to perform the job. Ogle's description is more comprehensive than the commonly used definition by Last [240] who in 1995 defined the Healthy Worker Effect (HWE) as,

*"A phenomenon observed initially in studies of occupational diseases: workers usually exhibit lower overall death rates than the general population, because the severely ill and chronically disabled are ordinarily excluded from employment."*

Thus, the HWE has long been considered as a source of selection bias [241, 242]. It reflects that 1) an individual must be relatively healthy in order to be employable in the workforce, 2) both mortality and morbidity rates within the workforce are usually lower than in general population, and 3) the health status of the workers might even be better in "vigorous occupations" compared with "occupations of an easier character" [241, 242]. One important consequence of this effect is that occupational hazards are underestimated or even overlooked.

The term, “unhealthy worker effect” (UWE), has been used in some studies with different meanings and with no accepted definition [243-248]. In this thesis, the term, “unhealthy worker effect” is used to denote the opposite of HWE; namely, the selection of *unhealthy* persons or persons with an unhealthy lifestyle into the workforce.

All occupations are exposed to the selection out of unhealthy individuals. The proportion of unhealthy persons who must leave a workplace due to health problems, however, varies according to the physical demand present in any given occupation. Employees with reduced work ability may leave the work force and become disability pensioned, but others might be channelled into occupations with lower job demands. Unhealthy workers recruited into low demand jobs might “bring with them” occupational exposure from previous jobs or due to their general poor health status, they might be recruited directly into such low demand jobs.

Thus, these occupations will have higher morbidity rates than expected. Further, these occupations might gain a bad reputation, which is not necessarily deserved, and the occupational hazards of the job might be overestimated.

A Danish study illustrates the connection between HWE and UWE. Results demonstrated an inverse relationship between risk of lung cancer and the number of years employment as a bus driver, with decreasing cancer risk associated with longer employment. It was argued that lorry drivers, who endure significant exposure to diesel fuel, often become passenger (i.e., bus) drivers after becoming unable to perform hard physical labour [249].

We propose the following definition of unhealthy worker effect,

*“A phenomenon in which workers in jobs with low-entry demands or requirements exhibit high morbidity rates partly because of selection of unhealthy persons into employment.”*

Such jobs with few entrance demands are often low status jobs with low pay. The cleaning profession exhibits several characteristics of such a low-demand job. Specifically, cleaning represents an easy entryway to the workforce, with minimal educational and language requirements, flexible hours, and the possibility for part-time commitment.

## Aims

This dissertation aims to improve and strengthen the scientific knowledge for an area dominated by popular beliefs and only limited research. The main objectives were to examine the associations between the working environment and health among women employed in unskilled occupations.

In the four papers presented, we had the following aims:

- To describe the prevalence of self-reported musculoskeletal complaints in the back, arms or neck, and legs among workers in the spinning industry, and to investigate the relation between these complaints and work-related variables (Paper I);
- To analyze whether female cleaners have a higher risk of obtaining a disability pension than women in other unskilled occupations (Paper II);
- To analyze whether the length of employment in the cleaning occupation influences the risk of obtaining a disability pension (Paper II);
- To examine the association between psychosocial and organizational work conditions and mental health among women employed in the cleaning profession (Paper III);
- To examine the self-reported level of work ability among female employees and the relationship between work ability, physical and mental health, and various psychosocial and organizational work environment factors (Paper IV).



## Materials and methods

Four different data sources were used for the studies presented in this thesis.

### Paper I

To describe the prevalence of musculoskeletal complaints and their association with the work environment, two spinning factories in Lithuania were selected, considered representative of the textile industry. The factories produced thread and gobelin for exportation. Data were collected using a face-to-face interview. All factory departments involved in production were included in the study, consisting of 245 women employed as spinners, 25 female packers, and 40 women who performed other work tasks. Only men (N=49) were employed to maintain the weaving machines. Production was continuous and working time was organised into shift work (up to four shifts). The participation rate was 91 % (363/398). The majority of participants were women (85 %; 309/398). Only 35 individuals refused to participate or were absent from the workplace during the study period.

Musculoskeletal problems were used as the primary outcome variables. To measure prevalence of musculoskeletal complaints, 14 questions were selected from The Nordic Musculoskeletal Pain Questionnaire [250]. A "Pain Region Drawing" was used to supplement the questionnaire. The Musculoskeletal Pain Questionnaire assessed whether employees had experienced discomfort, aches, or pains during both the previous year and the past 7 days, and whether the pain had prevented them from performing their work tasks. "Pain" questions were based on a standardized form and assessed ten body areas, with a nominal yes-or-no response scale. Based on these assessments, three variables were constructed, 'arms or neck', 'back', and 'legs'. The 'arms or neck' variable consisted of five body regions: neck, shoulders/upper arms, elbows/lower arms, wrists and fingers. The 'back' variable was comprised of upper back and lower back regions. The 'legs' variable was made up of the following three variables: thigh/ knee, lower leg, and ankle/foot.

To measure ergonomical risk factors, all 16 questions from the PRIM study were used [251-255]. The PRIM study was a Danish project on research and intervention in monotonous work [256]. The workers reported their experiences with ergonomic risk factors while answering questions using a 5-category scale. Questions about working postures were illustrated with figures.

## Paper II

Paper II aimed to evaluate whether female professional cleaners had a higher risk of obtaining disability pension than women in other unskilled occupations, and whether the length of employment influences this risk.

The material was based on the National Census in 1980 and 1990 (Statistics Norway), and supplemented with disability pensioning data from the National Insurance Administration and the Population Registry.

The date of receiving disability benefits from the Disability Benefit Scheme was used as the outcome variable. Membership in the benefit scheme is compulsory for all individuals residing in Norway. Persons who are unable to work after one year of certified sickness absence may apply for rehabilitation benefits, and, if rehabilitation fails, one can apply for a disability pension.

From Census 1980 and 1990 data, we retrieved information on age, gender, education, working hours, occupation, and income.

Two samples were constructed. Sample I included women from the 1980 Census, aged 20-49 years, who reported working as a cleaner, nursing assistant, kitchen assistant, seamstress, or shop assistant (N=103 375). These four non-cleaning occupations were selected because they are common occupations dominated by unskilled women. Women were followed to 1990 or to the date of death or the date of obtaining disability pensioning. Incidence rates for disability among cleaners and non-cleaners were calculated.

Sample II included the 44 907 women from the 1990 Census, aged 30-59 who reported cleaning as their occupation. We constructed three cohorts defined by their occupational status in 1980:

- long-term cleaners (cleaning occupation both in 1990 and 1980);
- short-term cleaners (cleaning occupation in 1990 and other occupation in 1980);
- unknown duration (cleaning occupation in 1990, unknown employment in 1980).

All women were followed to the end of 1994 to examine the effects of employment duration.

The 1990 Census used stratified sampling. Therefore, to estimate the prevalence and incidence of disability pensioning, probability weighing was used to correct for the differential representation of the sampling scheme.

## Paper III

The aim in Paper III was to examine the associations between psychosocial and organizational work conditions and mental health among female cleaning personnel.

We used data from the project, “Disability Pensioning among Cleaning Professionals in Norway.” A self-report questionnaire was mailed to 661 cleaning staff from seven cleaning firms in seven different cities across Norway. The firms were organized under the NHO (Confederation of Norwegian Enterprise) and were considered to be representative of well-organized cleaning firms. The participation rate was 64 %, of which 374 (88 %) were women.

Degree of mental health problems was used as the outcome variable. The Hopkins Symptoms Checklist (HSCL-25) was used to assess mental health [257]. Twenty-five questions measuring the frequency and intensity of symptoms during the past week were scored on a scale from 1 (not bothered) to 4 (extremely bothered). The HSCL-25 score was calculated as the sum score of items divided by number of items answered. To be counted as valid and be included in the analyses, at least 13 items had to be answered. Respondents with a HSCL-25 score above or equal 1.75 were considered a “case” [258].

Characteristics of the psychosocial work environment were measured using 26 of 123 questions from the General Questionnaire for Psychological and Social Factors at Work (QPS Nordic) [110]. These questions represented dimensions about leadership, collaboration with co-workers and customers, control, information/knowledge, conflicts, and responsibilities at home.

Three additional questions were constructed to assess the work organization. These included 1) *working alone* versus *in a pair* versus *in a team*, 2) frequency of contact with colleagues, and 3) frequency of contact with manager at the workplace (*daily* versus *every week/minimum once a month* versus *more seldom/never*).

## Paper IV

Paper IV examined work ability and its relation to health, psychosocial work environment, and work organization among female employees.

The material was a part of a prospective, population-based study, which investigated issues related to mental health within two geographic areas in Norway [259]. Data from the

2001 study were used, and the response rate was 73 %. All women who reported, “I have paid employment” (N=597) were selected for the analyses. Data were collected using structured face-to-face interviews by trained interviewers.

Work ability was used as the outcome variable and was assessed by the question “How do you estimate your ability to carry out ordinary work today?” This question was selected from the Graded Reduced Work Ability Scale [225]. Responses were scored on a scale from 1 (extremely reduced) to 6 (not reduced at all).

The questionnaire included 7 work environment variables based on questions originally used in work/life household surveys in Norway [260], plus one question about physical health and well-being. The Hopkins Symptoms Checklist (HSCL-25) was used to assess mental health [257].

## Statistical analyses

Statistical analyses were performed in SPSS, version 7.0, and STATA versions 6.0 and 8.2. Analyses of differences in proportions were assessed by cross tables and statistical significance was tested by chi-square statistics with 95 % confidence interval (Papers I-IV).

Crude odds ratios (OR) were calculated with 95 % confidence intervals (CI) for the univariate associations between:

- the risk factors and discomfort in arms or neck, back, or legs in Paper I;
- the socio-demographic and work organizational variables, psychosocial work dimensions, and the risk of having elevated HSCL-25 scores in Paper III;

A Pearson’s correlation coefficient was used to measure the strength of the association’s between independent variables in Papers II, III and IV.

Probability weighting was used to correct for the differential representation of the sample in Paper II. The sampling weights used were reciprocal of the sample inclusion probabilities for the whole population [261].

Incidence rates (IR) were given per 1.000 person years (py) with 95 % CI in Paper II. The incidence rates ratio for disability pensioning and mortality was calculated for cleaners and non-cleaners over a 9-year period. IR were also calculated for groups with varying lengths of employment over a 4-year period (Paper II). IR with 95 % CI were estimated between the moderately and severely reduced work ability and independent variables (demographic, physical health and well being, mental health, and work environment). IR were calculated by the use of Poisson univariate regression.

Between-group comparisons of HSCL-25 symptom scores were performed using one-way analyses of variance in Paper III. To investigate the underlying factor structure of the 26 items on psychosocial working conditions, we conducted an exploratory factor analysis using the direct oblimin method with non-orthogonal rotation, based on the theoretical assumption that some correlations would exist among the factors [262] (Paper III).

In this thesis, multivariate logistic regression models were built to calculate OR with 95 % CI for the association between:

- risk factors and musculoskeletal complaints, with simultaneous adjustment for other variables in Paper I;
- psychosocial work environment dimensions and work organization variables, and mental health problems in Paper III;

Cox regression models were used to calculate the hazard ratio (HR) with 95 % CI for receipt of disability pension or death in Paper II. Poisson regression models were used to calculate rate ratios (RR) with 95 % CI for reporting moderately and severely reduced work ability in Paper IV.

## Results

### Work related risk factors and musculoskeletal problems (Paper I)

Musculoskeletal disorders are a common problem among workers in the textile industry. Approximately 80 % had experienced musculoskeletal symptoms during the past 12 months. Almost 25 % experienced musculoskeletal pain daily and 16 % reported constant pain during the last year. Only a few individuals reporting problems had sought medical care. Problems of the legs (61 %) and arms or neck (55 %) were the most frequently reported, followed by back problems (28 %). Almost 20 % had experienced pain from all three areas of the body.

Women comprised the vast majority for three of the four occupation groups: spinners, packers, and other work tasks. Two hundred and four (83.3 %) spinners and 22 (88.0 %) packers reported musculoskeletal disorders in at least one body area. Packers had the highest risk of arms or neck problems (OR=5.7; 95 % CI 1.8-18.5) whereas spinners had the highest risk of back (OR=2.5; 95 % CI 1.2-5.1) or leg problems (OR=3.1; 95 % CI 1.6-5.8) compared to maintainers. Gender was not included in the final statistical model because it was strongly correlated with type of occupation.

Working in a strained posture (bending, working with arms raised up above the shoulder level, and repetitive movements of the fingers) appears to lead to problems in all three-body sites among workers in the spinning industry.

## Work duration and disability pensioning (Paper II)

Based on prior studies, findings show that women employed in the cleaning occupation in Norway have higher disability pension rates than women in other occupations [238]. After adjusting for age, we found a significantly higher incidence rate of disability pension in cleaners, even when compared with women in other unskilled occupations (IR=1.40 95 % CI 1.35-1.46).

The incidence rate of disability pensions in the long-term cohort was 10.1 per 1 000 py (95 % CI 8.0-12.7) and 8.1 per 1 000 py (95 % CI 6.2-10.9) in the short-term cohort. The long-term cohort was older and had less education than the short-term cohort. The risk of obtaining disability pension was not significantly different between the groups, when controlling for age, education and working hours (HR=0.8; 95 % CI 0.6-1.2). Full-time work, however, had almost twice the risk of obtaining disability pensioning than part-time work (HR=1.8; 95 % CI 1.3-2.5).

## Psychosocial/organizational working conditions and mental health problems (Paper III)

A high prevalence of mental health problems was found among cleaning professionals. The proportion of women scoring equal to or above 1.75 on the HSCL-25 was 17.5 %, which was higher than the average prevalence of mental health problems among working Norwegian women (8.4 %) [260].

A factor analysis of the questions specific to the psychosocial work environment identified the following four underlying dimensions: leadership, co-workers, time pressure/control, and information/knowledge. Two of these, poor satisfaction with leadership (OR=3.6; 95 % CI 1.2-10.6) and poor satisfaction with co-workers (OR=2.3, 95 % CI 1.1-4.8), were significantly related to mental health. In addition, having contact with colleagues less than once a day (OR=2.4, 95 % CI 1.2-5.1) and not being ethnically Norwegian (OR=3.0, 95 % CI 1.4-6.4) increased the risk for mental health problems. The age group 50-59 years had the highest risk for mental health problems (OR=3.2; 95 % CI 1.2-8.5).

## Work environment, physical and mental health in relation to work ability (Paper IV)

Of 584 female employees who participated in our population-based study of mental health, almost 9 % reported severely reduced ability to work. Moderately reduced work ability increased with age and was associated with physical health and well being, as well as mental health. Severely reduced work ability was associated with employment in an unskilled occupation and strongly associated with physical health and well being.

Twenty-five percent of employees reported poor physical health and reduced well being and 21.9 % reported mental distress (equal or above 1.55 HSCL-25 cut-off). Increasing age significantly and negatively correlated with the proportion of women reporting a reduction in work ability. Both partial satisfaction and dissatisfaction with physical health and well-being were associated with both moderately reduced work ability (RR=1.6 and RR=1.7) and severely reduced work ability (RR=6.9 and RR=14.4). Mild and severe mental distress was also associated with both moderately (RR=1.4 and RR=1.9) and severely (RR=2.7 and RR=7.5) reduced work ability in the univariate analyses.

Of the eight work environment variables, only three yielded significant associations with reduced work ability. However, these associations disappeared after adjustment in the multivariate analysis. Women who reported moderately and severely reduced work ability showed few significant group differences. Both reported associations with the same health and work environment variables: utilization of abilities and satisfaction at work, and work environment in general.

## Discussion

This thesis focused on the association between working conditions and health among female employees working in unskilled professions. The primary research questions included investigations of 1) the ergonomic, organizational, and psychosocial working environment of women in unskilled occupations and their association to health and work ability (Papers I, III and IV), and 2) the impact of work duration and professional experience on disability (Paper II).

To date, research has predominately focused on physical and chemical models to explain health consequences in unskilled occupations. Therefore, a major challenge facing this thesis was to improve our knowledge of potential relationships between psychosocial and organizational work environment factors and health outcomes, including mental health, disability, and work ability among women in unskilled occupations (Paper II, III and IV).

Employees working in the textile and cleaning professions constituted the main industry branches. These branches represented female employees without a higher education (Paper I, II and III). However, the data material also included women working in other professions (Paper IV).

The following was observed:

- I. Musculoskeletal disorders were common problems among workers in the spinning industry. Working in the strained posture typical of spinning (i.e., bending, working with raised hands above the shoulder level, and performing repetitive movements with one's fingers) was a significant risk factor for developing musculoskeletal disorders in all three regions of the body.
- II. Disability pension rates were higher among cleaners than among women in other unskilled occupations. The duration of employment as a cleaner was not a risk factor for obtaining disability pension. However, full-time work yielded nearly twice the risk of obtaining disability pensioning than part-time work.
- III. A high prevalence of mental health problems was found among cleaning professionals. Poor mental health was associated with the quality of leadership and collaboration between colleagues. High quality collaboration appeared to be more important than the frequency of contact.
- IV. Poor self-reported physical health and unskilled work were the strongest factors associated with *severely* reduced work ability among female employees. Ageing, in



addition to severe mental problems, were the factors most strongly associated with *moderately* reduced work ability.

## Material and Methods

“Unskilled women” is a poorly defined concept. In our studies, we included women in the spinning industry (Paper I), cleaning industry and a select number of other professions in official registers (Paper II and III), as well as females employed in both skilled and unskilled occupations (Paper IV). Response rates in our questionnaire studies were very high from the textile factories (91 % in Paper I), but moderate in the cleaning institutions (64 % in Paper III). However, this rate is relatively high compared to similar studies conducted with cleaners (24 % to 55 %) [164]. Questionnaires designed for the textile workers were administered to employees who were present at work, and therefore did not reach those who were absent due to sickness, while all cleaning professionals on the payroll received a postal questionnaire.

Data was collected via self-report using a cross-sectional study design (Papers I, III and IV). The data were dependent upon the employee’s momentary health state and potentially affected by recall biases. Data collection for Papers I and IV were conducted in the presence of a trained investigator, which usually increases the quality of the answers.

Our study included female cleaning personnel from geographically diverse regions in Norway (Paper III). These participants were employed in well-organized firms of various sizes organized under the NHO (Confederation of Norwegian Enterprise) and are considered to be representative of well-organised cleaning firms. The majority of respondents were working full time, over 80 % were older than 30 years, and one-third had more than 15 years of experience. Thus, our sample may reflect a rather stable fraction of women employed in the cleaning profession (Paper III). Our findings may therefore provide more favourable results for working conditions and health than can be expected in the cleaning sector as a whole.

As for the selection in and out of the workforce see the chapter on “Healthy/Unhealthy Worker Effect” in the discussion.

## Measurements

The data in this dissertation were collected by structured questionnaires (Paper I, III, IV). Self-administered questionnaires on work-related health problems are widely used in the literature. Mehlum et al [39] showed that use of self-report assessments did not seem to

exaggerate work relatedness. Questionnaires are practical and easy to use, with satisfactory validity.

A great advantage of the standardised questionnaire is the ability to compare the collected data with those obtained in other studies. Nevertheless, standardised questionnaires have to be supplemented with questions that are specific to the worksite and the occupation that is under investigation [11]. We undertook a pragmatic approach to the choice of work environment variables. Questionnaires contained some items formulated by our research group, in addition to a few items which were adopted from existing Norwegian and international studies. We have used different work environment variables in the different papers. Our confidence in the inclusion of non-validated items designed for the specific study is based on reasonable face validity of the items, as well as direct observations of the physical work environment made by the primary investigator (Paper I and III). In addition, these items largely performed as expected, according to already established associations. For example, the question to assess contact with colleagues (social support) showed the expected association with mental health based on earlier studies [130].

The quality of the register data for disability pension dates, age, gender, profession, and income used in Paper II is considered to be high, as it is based on actual administrative records.

### *Musculoskeletal complaints*

Data reflect self-reported discomfort in the musculoskeletal system, not diagnostic information obtained by a medical professional. However, as pain is a subjective phenomenon with no valid reference standard measurement, it is best measured by self-report [263].

Employees were asked if they had experienced musculoskeletal complaints during the past year in Paper I. Response alternatives were yes or no. The severity of complaints might be monitored with questions regarding the intensity of complaint or pain, the duration of the complaint, and the consequences of the complaints, such as reduced functioning [264]. The different assessment methods for pain severity, such as visual analogue scales, numerical rating scales, or verbal rating scales yield approximately similar results [265]. No questions on unspecified musculoskeletal complaints have been properly validated in an international setting [266-268].

### *Mental health*

The HSCL has been found to be a psychometrically valid and reliable indicator of anxiety and depression symptomatology. Despite a strong correspondence between the HSCL and physicians' ratings of patients [269], there is limited evidence regarding its performance in population surveys. Dohrnwend has repeatedly drawn attention to this pitfall [270]. Although the HSCL-25 should not be used as a shortcut when diagnosing mental health problems, several studies argue it does provide valuable information [262, 271]. Scores on the Hopkins scale, for example, are more closely associated with several illness indicators such as medication, impairment, and help seeking, than the diagnoses.

The HSCL score can be regarded as a *severity measure*; the higher the score of HSCL-25, the more severe the problem. As a severity measure, we used it to compare groups by continuous scores (mean) in Paper IV. It can also be considered a *probability measure*; if the symptom score is above a certain limit, the individual is regarded as a potential "case" [259].

Two different HSCL-25 cut-offs were used: 1.75 (Paper III), and 1.55 & 1.75 (Paper IV). In Paper III HSCL was the outcome variable. We started analyses with the multinomial logistic regression where two categories for outcome variable were allowed: 1.55-1.74 (light mental health problems) and 1.75 > (severe mental health problems). We ended up with dichotomizing. A cut-off score of 1.75 provides results, which are more amenable to the analyses in Paper III. In Paper IV, HSCL was used as an independent variable with cut-offs 1.55 & 1.75 to assess the association between mental health and work ability.

### *Work Ability*

Disability pensioning was assessed with National survey data (Paper II). Disability pensions are obtained following a complex process. In addition to risk factors in current occupation, risk factors in previous occupations, constitutional causes, and factors independent of work play a role in developing disability. The level of benefits, situation in the job market, coping strategies, culture of sickness absence, and family situation also modify need for applying for disability benefits [272]. However, we argued that these individual, social, and environmental factors would not differentially affect groups. Moreover, the study was conducted within a population with relatively small differences in education and income, and thus, it was unlikely that social confounding accounted for our findings.

The work ability question was based on the experiences of Haldorsen and colleagues [225]. Their Graded Reduced Work Ability scale had an internal consistency of 0.71 (Cronbach alpha) for patient responses [225]. Self-reported work ability is found to correlate

significantly with clinically-determined musculoskeletal capacity in healthy women [273], which provides some support for its construct validity [274]. Of the five items on the Graded Reduced Work Ability scale, the question assessing one's self-perceived ability to perform ordinary work was most predictive of returning to work. This simple, non time-consuming instrument was included as an assessment instrument in Paper IV [259]. The question tapped the employee's ordinary, remunerative work at the time of the study. Thus, the face validity of the question is considered good [274].

## Discussion of results

### *Demographical variables*

Arm or neck complaints increased with age in our study (Paper I). In contrast to results from nursing studies [275], however, back or leg problems were not significantly related to age. However, no clear conclusions regarding the role of aging in relation to low back pain can be drawn from other studies. Some studies from the nursing profession have reported a positive association [276, 277], whereas other studies report no association between aging and low back pain [278, 279].

We found that cleaners aged 50-59 years had a higher risk of mental health problems than younger and older age groups (Paper III). This age trend is consistent with findings from a national survey of working women in Norway [260].

In Paper IV, women over the age 50 years were the most likely to report reduced work ability compared to younger women. Age was also associated with a higher risk of obtaining disability pension among cleaners (Paper II). An 11-year follow-up study in Finland found that women over the age of 51 years had the highest annual declining rate in work ability [213]. For women, the physiological and mental changes associated with menopause, in addition to a general decline in stress coping abilities associated with older adulthood may partially account for these results [213].

Marital status was not consistently associated with health outcomes in our studies. Unmarried or single women did not report more depressive or anxiety symptoms, nor a greater reduction in work ability compared to married women (Papers III and IV). In contrast to our findings, prior studies on women's employment and health, and women's multiple roles and health, have found that being married is associated with better health [280].

We found that being an immigrant was a significant risk factor for mental health problems among female cleaning staff (Paper III). Cultural norms and sanctions operate at the

national, local, and individual level, which undoubtedly influence women's roles both in the household and workplace. Studies on migration have shown that the stress of adaptation and settlement, as well as language barriers, may negatively affect a person's mental health and contribute to the development of depression [281].

### *Musculoskeletal health*

Approximately 80 % of textile workers reported some form of musculoskeletal discomfort during the previous year (Paper I). A higher prevalence of musculoskeletal morbidity, both symptoms and clinical findings, has been found among blue-collar workers compared with white-collar workers [67-69, 282, 283]. A high prevalence was previously reported among nurses (57 %) and nurse's aides (88.6 %) [275, 284, 285]. Complaints about pain, discomfort, or aches in the legs were most common in our study. Women reported spending a substantial amount of time walking and standing in strained posture. Results showed they had about twice the risk of developing musculoskeletal discomfort in all three regions of the body compared to male maintenance workers. Thus, similar to research within the nursing profession [275], we observed a high prevalence of musculoskeletal problems of the legs, neck, and arms. Textile workers had complaints in all three sites (arm or neck, back and leg). For all three outcomes, male maintenance workers reported the fewest problems, whereas spinners and packers reported the most complaints. The Occupational Information Network has defined the physical job demands involved in cleaning for the US Department of Labor. The work of a cleaner is physically demanding and often requires the use of awkward postures [286]. Frequent strained postures among cleaners have also been described in other studies [160, Krüger, 1997 #393]. Individuals with limited functioning may have difficulty performing cleaning tasks within scheduled time limit [163]. Most women will experience temporary or permanent musculoskeletal health problems at some point in their careers, not the least in physical demanding jobs such as cleaning. Moreover, the lack of education of unskilled women means that few alternative occupations are open to those with musculoskeletal impairments [163].

### *Mental health*

Approximately 18 percent of our cleaners reported mental health problems (Paper III). Factors associated with mental health were quality of leadership, as well as unsatisfactory collaboration with colleagues. These results are consistent with results from a Swedish and Japanese population study, which demonstrated similar findings for other types of professions

[287, 288]. In addition, infrequent contact with colleagues (less than every day) was also associated with mental health problems. Dissatisfaction with the quality of social contacts has been associated with an increased risk for impaired psychological well-being in women, and has been introduced as an independent predictor of distress [289, 290]. However, other researchers have shown different results for social support for mental health. One study demonstrated a significant relationship only for workers with specific and multiple job stressors [291]. In a community sample [292], the support of a supervisor reduced the risk of depression over one year, while support from a colleague did not. Conflicting views remain regarding the role of social support. Namely, debate exists regarding whether social support is best considered an independent risk factor for morbidity, or whether it simply moderates the relationship between stressors and psychological morbidity. To date, the evidence base provides greater support for the former [293].

Working together in a well-managed team can boost employees' motivation, thereby improving productivity [294]. Teamwork can successfully manage difficult problems and produce good solutions. However, a team can have a tendency to hide its own problems, unwisely spend time on meaningless meetings, or even succumb to harassment or cruelty and hence result in poor productivity. The success of teamwork often depends on the amount of resources that are invested in competence building, team development, support, and above all, the quality of leadership [294]. In contrast to other studies, however, we did not find any significant effect of teamwork versus working alone for employees' mental health status.

### *Work Ability*

Almost 9 % of the employed women reported severely reduced work ability (Paper IV). Ageing and poor physical health/well-being demonstrated the strongest association with reduced work ability. These results were consistent with findings from Illmarinen et al [295, 296], which documented that changes in employee health status yielded the strongest impact on work ability [214].

Owing to the association between unskilled work and physically strenuous work, coupled with established findings on the effects of physical demanding work and disability [295], we expected women in unskilled occupations to report more reduced work ability than skilled employees. Unskilled work, however, was only associated with *severely* reduced work ability. Even though we found a significant correlation between unskilled occupations and physically strenuous work ( $r=0.23$ ), the relation between physical strain and work ability was not significant. Studies have demonstrated that the work environment for women continues to

be physically demanding, whereas physical loads for men have become lighter [9, 297]. It is possible that employment in unskilled occupations involves other risk factors than physically strenuous work. We have shown previously that good collaboration between unskilled staff and their leaders is important (Paper III).

Women in unskilled occupations often lack alternative job opportunities for physically lighter and less demanding work [1]. Therefore, a likely outcome for individuals with reduced work ability in unskilled occupations is sickness absence, followed by disability pensioning (Paper II).

Having the opportunity to utilize one's skills and abilities, in addition to job satisfaction, were positively associated with work ability in the univariate analysis. However, these associations lost significance after controlling for the effects of age, occupation, and health and work environment variables in the multivariate analysis. The relationships between the ability to utilize one's skills, job satisfaction, and work ability have been established in earlier studies [222, 223]. The total score for the work environment variables had a strong association with reduced work ability in the univariate analysis, but even this score lost its significance in the final model. Although weaker than expected, results pertaining to work environment were comparable to prior research by Lindberg [298]. Improved work ability seems to be more dependent on psychosocial factors.

Somewhat unexpectedly, and in contrast to other studies [221, 223, 298, 299], we found no associations between work ability and several of the individually-based work organization variables, including job stress, control over decision-making, and job security (Paper IV).

### *Working exposure and healthy/unhealthy worker effect*

We observed a higher incidence of disability pensioning among cleaning personnel than in other unskilled occupations (Paper II). Also observed was a higher prevalence of mental health problems compared with other working Norwegian women (Paper III). In addition, duration of employment did not predict disability pensioning (Paper II) and working time was not associated with mental health problems in cleaning (Paper III).

Part-time work is common in Norway, and perhaps more common in female sectors and unskilled work compared to skilled work [231, 296]. It is reasonable to assume that female part-time workers would demonstrate better health than full-time workers, due to less exposure to hazards at work. On the other hand, part-time work might be viewed as desirable

due to health problems. In our study, full-time work increased the risk of disability pensioning (Paper II), but did not increase the risk of mental health problems (Paper III) among cleaners. In addition, we observed that full-time work did not increase the risk of reduced work ability among Norwegian working women (Paper IV).

High sickness absence and high disability pensioning in unskilled occupations has previously been viewed as an effect of working conditions, especially due to the physical demands of the job. Women in unskilled occupations reported greater reductions in work ability than women in skilled occupations. This effect remained significant even after adjusting for physical and mental stress at the workplace, as well as the overall work environment (Paper IV). Two explanatory mechanisms may exist to account for these observations. First, the work environment itself may have led to the development of health problems. Second, an “unhealthy worker effect” might exist, i.e. selection of unhealthy persons into unskilled occupations.

We explored the hypothesis that an unhealthy worker effect, or the selection of unhealthy individuals into the cleaning profession, may contribute both to mental health problems (as indicated by a high HSCL-25 score) (Paper III) and the high disability pensioning rates among cleaners, even when compared to other unskilled occupations (Paper II).

The probability of obtaining a disability benefit did not increase with duration of employment as a cleaner. This result suggests that employment as a cleaner does not independently and uniquely contribute to the risk of receiving disability pension. An alternative explanation might involve the influence of selection bias, or the “healthy worker effect.” In this case, the selection of less healthy persons out of the workforce may have occurred [241, 245]. Differences in health status between employees with long versus short duration of employment in the cleaning occupation were not significant based on differences in mortality rates (Paper II). On the other hand, full-time work produced almost double the risk of obtaining disability pension compared to part-time work.

An unhealthy worker effect may explain some of the health problems prevalent among cleaning staff. The low job-entry requirements for education, work experience, and language skills, coupled with good opportunities for part-time work, evening work, and independent work, may attract less healthy and socially disadvantaged individuals to choose this occupation.



## Conclusions and implications

Our findings demonstrate that in addition to the “classic” and expected associations between the physical work requirement and health among unskilled women (Paper I), significant associations existed between health and the psychosocial and organizational aspects of the workplace (Paper III and IV). Associations between the psychosocial work environment and health are traditionally considered most important among skilled occupations, rather than unskilled occupations. Modern labour society is undergoing rapid changes, both in terms of social organization and individual behaviour. Dissatisfaction with the quality of social contact at work was associated with an increased risk for impaired psychological well-being in women. This finding suggests that workers in unskilled occupations are also dependent on satisfactory collaboration with their managers and colleagues to remain occupationally active and to prevent work-related health complaints.

If assumptions regarding the presence of an unhealthy selection into the cleaning profession are correct, attempts to modify cleaning tasks to better match the capacity of the employees may help them remain in the workforce. To successfully achieve ‘inclusion in work’ goals and to meet Health, Environment and Security (HMS) requirements, it is important that supervisors are well-informed regarding the health of their employees’. Unhealthy employees, as well as employees switching jobs from other unskilled occupations, may require special accommodations to meet their needs within the work environment. These accommodations can vary from ergonomic solutions to the organization of work.

The cleaning occupation, however, has made efforts to minimize high turnover and health problems by becoming increasingly professional, as indicated by the adoption of modern work models and a broader scope of job tasks. For example, cleaning jobs increasingly require greater full-time and daytime work, offering less flexible working time. Modern cleaning companies are interested in employing younger individuals with greater resources, better vocational education, and good language skills. From the perspective of the cleaning agencies, higher job-entry requirements lead to a better reputation, thereby attracting more educated workers, which is considered a desirable outcome by the profession. In other words, these developments contribute to the prestige and renown associated with cleaning, thereby reducing the trend that workers with fewer skills apply for jobs as cleaners.

For the “marginal workforce” and society as a whole, however, these developments are problematic given the reduction in job opportunities, which are flexible and have a lower

threshold for job entry. Workplaces, which were formerly open to less educated individuals with fewer resources, may disappear. For some persons, such workplaces may represent the primary, or in some cases, the *only* opportunity to join the workforce. This trend is evidenced by the increasing theoretical education requirements for employment, even in unskilled occupations.

There is a clear contradiction between the National Inclusion to Work Program (IA), which aims to include and retain more people in the workforce over a longer period, and the increasing trend to raise requirements for entrance into the workforce, even in jobs considered “unskilled”.

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