Occupational burnout and health

In today’s demanding and continuously changing work-life, work stress-related problems of individual employees often manifest themselves as burnout. Occupational burnout is a syndrome of exhaustion, cynicism, and diminished professional efficacy. It is caused when high demands and low resources at work are combined with insufficient ways of coping. So far, research on burnout has concentrated primarily on the process of burning out, and less is known about the consequences of burnout for individuals and society.

This population-based study examines the associations between burnout and health according to gender and discusses aspects such as common mental disorders, musculoskeletal disorders, cardiovascular diseases, and long sickness absences. In addition, the socio-demographic correlates of burnout are determined, as well as the status of burnout in the arena of occupational health.
Occupational burnout and health

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Kirsi Ahola
ABSTRACT

Occupational burnout is assumed to be a negative consequence of chronic work stress. In this study, it was explored in the framework of occupational health psychology, which focuses on psychologically mediated processes between work and health. The objectives were to examine the overlap between burnout and ill health in relation to mental disorders, musculoskeletal disorders, and cardiovascular diseases, which are the three commonest disease groups causing work disability in Finland; to study whether burnout can be distinguished from ill health by its relation to work characteristics and work disability; and to determine the socio-demographic correlates of burnout at the population level.

A nationally representative sample of the Finnish working population aged 30 to 64 years (n = 3151–3424) from the multidisciplinary epidemiological Health 2000 Study was used. Burnout was measured with the Maslach Burnout Inventory – General Survey. The diagnoses of common mental disorders were based on the standardized mental health interview (the Composite International Diagnostic Interview), and physical illnesses were determined in a comprehensive clinical health examination by a research physician. Medically certified sickness absences exceeding 9 work days during a 2-year period were extracted from a register of The Social Insurance Institution of Finland. Work stress was operationalized according to the job strain model. Gender, age, education, occupational status, and marital status were recorded as socio-demographic factors.

Occupational burnout was related to an increased prevalence of depressive and anxiety disorders and alcohol dependence among the men and women. Burnout was also related to musculoskeletal disorders among
the women and cardiovascular diseases among the men independently of socio-demographic factors, physical strenuousness of work, health behaviour, and depressive symptoms.

The odds of having at least one long, medically-certified sickness absence were higher for employees with burnout than for their colleagues without burnout. For severe burnout, this association was independent of co-occurring common mental disorders and physical illnesses for both genders, as was also the case for mild burnout among the women. In a subgroup of the men with absences, severe burnout was related to a greater number of absence days than among the women with absences.

High job strain was associated with a higher occurrence of burnout and depressive disorders than low job strain was. Of these, the association between job strain and burnout was stronger, and it persisted after control for socio-demographic factors, health behaviour, physical illnesses, and various indicators of mental health. In contrast, job strain was not related to depressive disorders after burnout was accounted for.

Among the working population over 30 years of age, burnout was positively associated with age. There was also a tendency towards higher levels of burnout among the women with low educational attainment and occupational status and among the unmarried men.

In conclusion, a considerable overlap was found between burnout, mental disorders, and physical illnesses. Still, burnout did not seem to be totally redundant with respect to ill health. Burnout may be more strongly related to stressful work characteristics than depressive disorders are. In addition, burnout seems to be an independent risk factor for work disability, and it could possibly be used as a marker of health-impairing work stress. However, burnout may represent a different kind of health risk for men and women, and this possibility needs to be taken into account in the promotion of occupational health.
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sairauksiin miehillä näiden sairausryhmien tavallisten riskitekijöiden ohella. Vakava-asteinen työuupumus oli itsenäisesti yhteydessä pitkiin sairauspoissaoloihin, vaikka samanaikaisesti esiintyneet työssäkäyvillä yleiset mielenterveyden häiriöt ja somaattiset sairaudet otettiin huomioon. Miehillä, joilla oli ollut vähintään yksi pitkä sairauspoissaolojako, vakavaa työuupumukseen liittyi enemmän poissaolopäiviä kahden vuoden aikana kuin vastavassa tilanteessa olleilla naisilla. Naisilla myös lievä työuupumus oli yhteydessä pitkiin sairauspoissaoloihin.

Kuormittavaa työtä tekevillä oli useammin työuupumusta tai masennushäiriöä kuin vähän kuormittavaa työtä tekevillä. Merkitsevä yhteys työkuormituksen ja työuupumukseen väliillä säilyi, vaikka työntekijöiden masennusreiluja ja mielenterveyden häiriöt otettiin huomioon. Sen sijaan työkuormituksen ja masennushäiriön välillä ei ollut suoria yhteyttä, jos samanaikainen työuupumus huomioitiin.

Työuupumus oli 30 vuotta täyttäneiden työssäkäyvien joukossa yleisempi ikääntyneillä työntekijöillä nuorempin verrattuna. Lisäksi vaikutti siltä, että työuupumus olisi muinakin verrattuna hieman yleisempi erityisesti vähän koulutetuilla ja matalassa ammattiasemassa työskentelevillä naisilla sekä naimattomilla miehillä.

Väikä työuupumus oli selvästi yhteydessä mielenterveyden häiriöihin ja somaattisiin sairauksiin, se ei ollut aivan samalla tavalla yhteydessä työkuormitukseen eikä työkykyttömyyteen kuin nämä sairaudet. Työuupumus näyttää liittyvän vahvemmin työkuormitukseen kuin masennushäiriöt ja vaikuttaa olevan samanaikaisista yleisistä sairauksista houlimatta itsenäinen riskitekijä pitkille sairauspoissaoloille. Työuupumusta voitaisiinkin pitää terveyttä vaaran antavan työstressin hälytysmerkkinä. Se näyttää muodostavan osin erilaisen riskin miesten ja naisten terveydelle, mikä on tarpeen ottaa huomioon työterveyttä edistettäessä.
LIST OF ORIGINAL PUBLICATIONS

This review is based on the following original publications, which are referred to with Roman numerals I–VI. The original articles have been re-published in this report with the permission of Springer-Verlag Germany (I), Lippincott, Williams & Wilkins (II), Elsevier (III, V, VI), and Blackwell Publishing (IV).


LIST OF ORIGINAL PUBLICATIONS


In addition, some unpublished data have been included in this thesis.
1. INTRODUCTION

The psychosocial characteristics of work have changed during the past few decades in response to trends in the global economy and increasing demands in worklife (Maslach & Leiter 1997, Allvin & Aronson 2001, Landbergis 2003, Allvin et al. 2006, Sennett 2006). Although both positive and negative changes have occurred in the quality of work (Lehto & Sutela 2005, Green 2006), concerns have been raised. For example, it has been argued that competitive pressure in the manufacturing industry, growing demands of consumers in the service industry, and the fast development of the high technology industry increasingly tax employees’ resources via demands for excessive work hours and flexibility, the responsibility for work processes, the need for continuous learning and re-orientation, job insecurity, and the blurring of the line separating work and private life (Allvin & Aronson 2001, Sparks et al. 2001, Shirom 2003).

In the context of occupational health, the problems of individual employees related to work stress are often encountered as burnout. One of the Oxford English language dictionaries (Hornby 1982) defines burnout as "to ruin one’s health by overwork". Scientific interest in occupational burnout started approximately three decades ago, after Herbert Freudenberger (1974), a psychiatrist, described a negative phenomenon among dedicated volunteers working in a clinic for drug addicts. "Burn-out" meant that a staff member became gradually exhausted from excessive demands on energy, strength, or resources about a year after he or she began work and showed various physical, behavioural, and mental symptoms. At the same time, Christina Maslach (1976), a researcher in social psychology, reported how professionals in health and social services can lose all their emotional feelings and concern for their
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clients after months of listening to their problems and how this change correlates with other damaging indices of stress, for example, alcoholism, mental illness, and suicide. These observations on burnout were made in human service work in which contacts with other people constitute the major part of the task and can become a source of stress (Maslach & Jackson 1981, Zapf 2002, Schaufeli 2006). Later it was discovered that burnout can evolve in a wide range of occupations (Leiter & Schaufeli 1996, Demerouti et al. 2001, Toppinen-Tanner et al. 2002) and can be conceptualized generally as a crisis in one’s relationship with work instead of with clients (Schaufeli et al. 1996).

The fact that occupational burnout tends to show considerable stability over time indicates the chronic nature of the problem (McKnight & Glass 1995, Bakker et al. 2000b, Taris et al. 2005). The estimated prevalence of severe burnout has been around 6–7% in Finnish and Swedish working populations (Kalimo & Toppinen 1997, Hallsten et al. 2002). However, because burnout has mainly been studied in non-random vocational and organizational samples, population-based evidence on the distribution of burnout by socio-demographic factors is scarce. Compared with the large quantity of research on the developmental process of burnout, much less is known of the consequences of burnout for individuals and society. Observed correlations between burnout and depressive symptoms have raised questions about the conceptual redundancy of burnout and depression, but it is unclear to what extent burnout is related to mental disorders and physical illnesses and whether it has any independent status in relation to ill health.

1.1 Concept of occupational burnout

Occupational burnout refers to a negative consequence of chronic work stress (Shirom 1989, Schaufeli & Enzmann 1998, Maslach et al. 2001). There are several theoretical models on the origins of burnout, ranging from individual and interpersonal explanations to organizational and societal approaches. Many of these models share a basic assumption of some kind of a chronic discrepancy between the expectations of a motivated employee and the reality in unfavourable work conditions, which develops towards burnout via dysfunctional ways of coping (Schaufeli &
1. INTRODUCTION

Enzmann 1998). Regarding unfavourable work conditions, occupational burnout has been presented to result especially from a combination of high demands and low resources at work (Demerouti et al. 2001, Schaufeli & Bakker 2004). Job demands refer to the physical, psychological, social, and organizational aspects of the job that require sustained effort and are therefore associated with physiological and psychological costs for the individual. Job resources refer to those corresponding aspects of the job that are functional in achieving work goals, reducing the associated costs, and stimulating learning and professional development. It has been proposed that individual factors concerning personality, for example, alexithymia, low sense of coherence, un-hardiness, and neuroticism, influence vulnerability to burnout (Nowack 1986, McCranie & Brandsma 1988, Zellars et al. 2000, Kalimo et al. 2003, Mattila et al. 2007), which may then interact with the situational factors that are conducive to the development of burnout (Maslach & Leiter 1997, Schaufeli & Enzmann 1998, Shirom 2003, Hakanen 2004).

Based on the utilization of the concept in peer-reviewed publications, burnout is generally (e.g. Schaufeli & Enzmann 1998) defined as a three-dimensional psychological syndrome of emotional exhaustion, depersonalization, and diminished personal accomplishment that may occur in human service work (Maslach & Jackson 1996). In a general form, not restricted to any particular kind of work, the dimensions of burnout are labelled exhaustion, cynicism, and diminished professional efficacy (Schaufeli et al. 1996). 

Exhaustion is considered to result from long-term involvement in an over-demanding work situation (Shirom 1989, Maslach & Jackson 1996, Schaufeli et al. 1996) and to lead to changes in attitudes towards work and oneself as a worker. Cynicism develops as a dysfunctional way of coping in exhausting situations, which further reduce the possibilities to find creative solutions at work and build professional efficacy (Leiter & Schaufeli 1996, Schaufeli et al. 1996). This developmental sequence
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between the dimensions of burnout has gained the most consistent support (Leiter & Maslach 1988, Bakker et al. 2000b, Toppinen-Tanner et al. 2002, Taris et al. 2005), although other sequences have also been presented (Golembiewski et al. 1983, 1996, Lee & Ashforth 1993, Bakker et al. 2000b, Demerouti et al. 2001, van Dierendonck et al. 2001).

Some researchers have proposed that exhaustion and cynicism would be the primary dimensions of burnout, while diminished professional efficacy would be a separate but related entity (Leiter 1993, Lee & Ashforth 1993, Halbesleben & Demerouti 2005). Supporting this suggestion, professional efficacy has loaded on a different factor than exhaustion and cynicism in structural equation modelling (Schaufeli & Bakker 2004). However, this occurrence could also reflect a statistical artefact because, in contrast to the positively worded items of the exhaustion and cynicism dimensions, the items of professional efficacy are worded negatively (Schaufeli & Taris 2005).

Because the associations between the three burnout dimensions and between the dimensions and the characteristics of employees and work have been found to be complex, the Maslach Burnout Inventory Manual recommends the use of separate scores for the dimensions rather than the construction of a single burnout score (Maslach & Jackson 1996), a recommendation also supported by statistical arguments (Taris et al. 1999). On the other hand, because burnout is, by definition, a single construct, a specific work-related syndrome, the use of a single score has been considered appropriate when the main interest is in the burnout syndrome and when the study design is complex (Taris et al. 1999, Brenninkmeijer & van Yperen 2003). Single scores for burnout have been constructed relative to the distribution of the dimensional scores in a population (Schaufeli et al. 2001, Brenninkmeijer & van Yperen 2003, Roelofs et al. 2005) or as a sum score of the dimensional scores (Buunk et al. 2001, Kalimo et al. 2006). The phase model for burnout (Golembiewski et al. 1983, 1996) can also be regarded as means of forming a single burnout score. In this model, the burnout process is divided into eight phases that are defined in terms of the different combinations of the dimensional scores above or below the median.

The dimensional definition of burnout, which is based on observations on burnt out employees, has been criticized especially for lacking theoretical arguments for grouping different concepts together in a
cluster of heterogeneous symptoms (Shirom 2003, Kristensen et al. 2005). Therefore, in the alternative definitions of burnout, the exhaustion dimension alone is considered to constitute the burnout syndrome (Shirom 1989, Hallsten 1993, Pines 1993, Kristensen et al. 2005). Burnout is defined as a state of physical fatigue and mental exhaustion (Pines 1993, Kristensen et al. 2005), and of cognitive weariness (Shirom 1989). Exhaustion has also been complemented with performance-based self-esteem to take into account another line of criticism concerning the inclusion of persons without high initial motivation (Hallsten et al. 2005). In these alternative definitions, exhaustion is either considered generic or is attributed to specific domains, for example, the work context. At present, there is no universal consensus on the definition of burnout (Cox et al. 2005). In this dissertation, the term “burnout” is used to refer to the dimensional burnout concept, and the term “exhaustion” refers to the exhaustion-based burnout concept.

1.2 Socio-demographic factors and occupational burnout

Socio-demographic associations can be the most reliably studied in representative population-based samples that are free from any selection in the sample formation. However, population studies on burnout are scarce. One Swedish study (Lindblom et al. 2006) and one Finnish study (Kalimo & Toppinen 1997, Kalimo 2000) have examined burnout, and another Swedish study has examined exhaustion (Hallsten et al. 2002). The main findings from these studies are summarized in Table 1.

Burnout and exhaustion were commoner among women in all three population studies than among men (Kalimo & Toppinen 1997, Hallsten et al. 2002, Lindblom et al. 2006). Among the working population of one Swedish county, employees with a high level of burnout were older, more often over 50 years of age, than those with a moderate level of burnout but not older than those with a low level of burnout (Lindblom et al. 2006). Among the Finnish working population, the level of burnout was higher among employees over 55 years of age than among the younger employees (Kalimo & Toppinen 1997, Kalimo 2000). However, in an earlier study among the Swedish working population, an opposite trend
Table 1. Review of the population-based studies on socio-demographic factors and burnout

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalimo &amp; Toppinen 1997*, Kalimo 2000</td>
<td>Finland</td>
<td>Cross-sectional survey (66%)</td>
<td>Working population</td>
<td>2300</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>Burnout was commoner among the women and those over 55 years of age. Severe burnout was commonest among those with little vocational education.</td>
</tr>
<tr>
<td>Hallsten et al. 2002*</td>
<td>Sweden</td>
<td>Cross-sectional survey (71%)</td>
<td>Working population</td>
<td>3502</td>
<td>Exhaustion with achievement-based self-esteem (BM and a self-constructed scale)</td>
<td>Exhaustion was commoner among the women, employees younger than 50 years of age, upper grade non-manual workers, and the married versus other groups.</td>
</tr>
<tr>
<td>Lindblom et al. 2006</td>
<td>Sweden</td>
<td>Cross-sectional survey (61%)</td>
<td>Working population of one county</td>
<td>1812</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>A high level of burnout was commoner among the women and the over-50-year-old employees than among the other groups. Marital status and education were not related to burnout.</td>
</tr>
</tbody>
</table>

* not peer-reviewed, MBI-GS = Maslach Burnout Inventory - General Survey, BM = Burnout Measure
1. INTRODUCTION

was detected for exhaustion when it was combined with performance-based self-esteem; it was lower among employees older than 50 years of age than among those younger (Hallsten et al. 2002).

The level of exhaustion has been found to be higher among upper-grade non-manual workers (Hallsten et al. 2002), while the results regarding the association between burnout and education were mixed (Kalimo & Töppinen 1997, Lindblom et al. 2006). Results on the relationship between burnout and marital status are not consistent either. A recent Swedish population-based study failed to establish an association between marital status and burnout (Lindblom et al. 2006), although, in a previous study, exhaustion was found to be higher among those not married than among those married when it was combined with performance-based self-esteem (Hallsten et al. 2002).

Most of the knowledge concerning the relative prevalence of burnout in various population subgroups is based on indirect evidence, because very few studies have been primarily set up to study the relationship between socio-demographic factors and burnout. Usually these associations have been reported as a part of the sample description and then adjusted for. In the few published representative studies, burnout was related to gender, age, education, and occupational and marital status (Table 1), but the differences according to these factors were small and, to some extent, inconsistent. The only peer-reviewed population study (Lindblom et al. 2006) was not nationally representative and did not include gender-stratified analyses on the associations of burnout.

1.3 Job strain and occupational burnout


The job strain model characterizes jobs according to two main aspects, the psychological demands of the work situation and the control
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available to the worker facing these demands in making decisions on his or her work activity and to use his or her skills (Karasek 1979). The combination of high demands and low control, referred to as high job strain, is hypothesized to produce the highest risk of health impairment, while active work involving high demands and high control is proposed to promote learning, growth, and satisfaction and to predict only an average amount of psychological strain (Karasek & Theorell 1990). The job strain model of work stress resembles the work demands and resources model of burnout (Schaufeli & Bakker 2004), which includes a general representation of demands and resources at work.

Job strain has been found to be associated with burnout and exhaustion (Table 2). High job demands and low control showed a positive interaction effect on burnout among German software professionals (Sonnentag et al. 1994) and on exhaustion among Dutch human service workers (de Jonge et al. 2000). In these studies, job control moderated the associations between job demands and burnout or exhaustion, as originally proposed by Karasek (1979). High job strain compared with low job strain was positively associated with exhaustion in a cross-sectional population-based study among Finnish wage earners (Kauppinen-Toropainen et al. 1983) and in several human service samples (Rafferty 1987, Landsbergis 1988, Melamed et al. 1991, Bourbonnais et al. 1998, 1999). Active and passive work has also to some extent been shown to be associated with an increased level of exhaustion (Kauppinen-Toropainen et al. 1983, Landsbergis 1988, Bourbonnais et al. 1998, 1999). In addition, most studies that have explored the correlates of burnout have supported independent positive associations between high work load and low autonomy at work on one hand and a high level of burnout (Lee & Ashforth 1996, Schreurs & Taris 1998, Kalimo et al. 2003, Schaufeli & Bakker 2004, Lindblom et al. 2006) or exhaustion (Borritz et al. 2005) on the other.

Similar associations of job strain with burnout and exhaustion and with problems of mental health have raised the question of whether burnout is conceptually redundant with respect to low mental health and especially to depression. As a difference between the two, it has been proposed that burnout would be work-related, whereas depression is expected to be context-free or multi-factorial in origin (Warr 1987, Maslach et al. 2001). This assumption has not, however, been
Table 2. Review of the literature on job strain and burnout

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kauppinen-Toropainen et al. 1983</td>
<td>Finland</td>
<td>Cross-sectional survey (93%)</td>
<td>Wage earning population</td>
<td>5471</td>
<td>Work-related exhaustion (self-construed scale)</td>
<td>The joint effect of time pressure and low self-determination was related to increased work-related exhaustion. Passive jobs were related to exhaustion among women.</td>
</tr>
<tr>
<td>Rafferty 1987&lt;sup&gt;a&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross-sectional survey</td>
<td>Human service workers</td>
<td>188</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>High job strain compared with low job strain was positively associated with emotional exhaustion.</td>
</tr>
<tr>
<td>Landsbergis 1988</td>
<td>USA</td>
<td>Cross-sectional survey (38%)</td>
<td>Nursing staff in several units</td>
<td>289</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion was higher in high strain work and passive work than in low strain work.</td>
</tr>
<tr>
<td>Melamed et al. 1991</td>
<td>Israel</td>
<td>Cross-sectional survey (76%)</td>
<td>Female social workers in one organization</td>
<td>267</td>
<td>Exhaustion (BM)</td>
<td>The lowest level of exhaustion was found under conditions of low demands, high perceived control, and high social support.</td>
</tr>
<tr>
<td>Sonnentag et al. 1994</td>
<td>Germany</td>
<td>Cross-sectional survey (90%)</td>
<td>Software professionals in several organizations</td>
<td>180</td>
<td>Two-dimensional syndrome (self-construed scale)</td>
<td>The effect of stressors at work on burnout was modified by control at work.</td>
</tr>
<tr>
<td>Bourbonnais et al. 1998</td>
<td>Canada</td>
<td>Cross-sectional survey (62%)</td>
<td>Nurses in one district</td>
<td>1891</td>
<td>Emotional exhaustion (MBI)</td>
<td>High job strain, active work, and passive work were positively associated with emotional exhaustion.</td>
</tr>
<tr>
<td>Bourbonnais et al. 1999</td>
<td>Canada</td>
<td>Cross-sectional survey (79%)</td>
<td>Nurses in one district</td>
<td>1378</td>
<td>Emotional exhaustion (MBI)</td>
<td>High job strain, active work, and passive work were positively associated with emotional exhaustion.</td>
</tr>
<tr>
<td>de Jonge et al. 2000</td>
<td>Nether-</td>
<td>Cross-sectional survey</td>
<td>Human service workers in five sectors</td>
<td>2485</td>
<td>Emotional exhaustion (MBI)</td>
<td>Focussed job demands and job control showed an interaction effect on exhaustion in specific occupational groups.</td>
</tr>
</tbody>
</table>

<sup>a</sup> not peer-reviewed; MBI = Maslach Burnout Inventory; BM = Burnout Measure
definitely confirmed. Only one study has explored burnout and depressive symptoms in relation to different contexts (Bakker et al. 2000a). In this cross-sectional study among Dutch teachers, a lack of reciprocity in work context was associated with a high level of burnout, whereas a lack of reciprocity in private life was associated with depressive symptoms indicating support for the work-relatedness of burnout and the absence of such relatedness concerning depression. However, the evidence was based on a rather small sample of one vocational group, and it covered only a single aspect of the psychosocial work environment, which is not included in the leading model of work-related health (Karasek & Theorell 1990). The associations between job strain, burnout, and depression have not been previously analysed in the same study.

1.4 Occupational burnout and health problems

There is strong evidence indicating that continuous work stress, when operationalized by demanding psychosocial work characteristics and especially by job strain, is detrimental to health (Leino & Hänninen 1995, National Research Council and the Institute of Medicine 2001, Hagen et al. 2002, Kivimäki et al. 2006b, Stansfeldt & Candy 2006). Therefore, it is highly plausible that occupational burnout, defined as a consequence of chronic work stress, would also be associated with ill health.

There are several conceivable mechanisms to account for the adverse health effects of long-term work stress (McEwen & Stellar 1993, Maier & Watkins 1998, Kiecolt-Glaser et al. 2002, Siegrist 2002, Epel et al. 2004, 2006, Chandola et al. 2006). The autonomic nervous system and the hypothalamus-pituitary-adrenal cortex axis, which are partly responsible for an individual’s potential to adapt to stressful challenges, can, if overly activated, also result in harmful allostatic load (Frankenhauser 1989, Brunner 1997, McEwen 1998b). Adverse stress processes may become pronounced in some persons because innate temperamental aspects of personality (Cloninger et al. 1993) have been shown to affect a person’s emotional experiences and physiological activation in challenging situations (Keltikangas-Järvinen & Heponiemi 2004, Ravaja et al. 2006, Puttonen et al. 2005, Tyrka et al. 2006). These kinds of mechanisms
may also account for the possible associations between burnout and ill health (Shirom et al. 2005, Toker et al. 2005, Melamed et al. 2006). In addition to direct effects, work stress, as well as burnout, may also influence health through health behaviour (i.e., health-related habits and behavioural decisions of employees) (Siegrist & Rödel 2006, Kouvonen et al. 2007). However, the connection between burnout and health could also operate in a reverse direction. If suffering from a disease results in the lowering of work ability, it could also hinder the attainment of the work goals, which, in turn, could activate the process of burnout (Hallman et al. 2003, de Lange et al. 2005, Donders et al. 2007).

Among the Finnish work force, the three most prominent disease groups related to work disability are mental disorders, musculoskeletal disorders, and cardiovascular diseases (The Social Insurance Institution of Finland 2005). In 2000, these diseases accounted for 75% of all causes of disability pensions and for 62% of the causes of compensated sickness absences (The Social Insurance Institution of Finland 2000). Together these diseases cover 43% of the global disease burden in European countries, indicated by disability-adjusted life years (World Health Organization 2002).

**Mental health problems**

Psychiatric classifications are categorical systems that divide mental disorders into types based on sets of descriptive criteria. The classifications currently in use are the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization 1992) and the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association 1994). Among the work force, depressive disorders, alcohol use disorders, and anxiety disorders are common mental disorders and relevant in terms of work disability (Raitasalo & Maaniemi 2006, Sanderson & Andrews 2006, Honkonen et al. 2007, Raitasalo & Maaniemi 2007). In the classification systems, burnout can be coded as a factor that influences health status (Z73.0 burnout) (World Health Organization 1992) or as a condition that may require clinical attention (V62.2 occupational problem) (American Psychiatric Association 1994).
1. INTRODUCTION

Summaries of the existing publications on burnout and mental health problems are presented in Table 3 (depression), Table 4 (anxiety), and Table 5 (alcohol problems) in chronological order. Most of the research conducted on the relationship between burnout and mental health problems concerns depression. Only two studies have investigated depressive disorders, but they did not use structured psychiatric diagnostic methods. Among Finnish participants in occupational rehabilitation, a depressive disorder, based on a medical examination in the beginning of the rehabilitation programme, was almost always (90%) present among those who suffered from severe burnout (Kinnunen et al. 2004). Self-reported physician-diagnosed depression was more prevalent also among burnout teachers than among their colleagues without burnout in a cross-sectional North American survey (Belcastro & Hayes 1984). Most of these teachers with depression reported that they had developed depression after becoming a teacher.

Four studies have investigated burnout and depressive symptoms in a longitudinal design. In a 1-year follow-up among Canadian teachers, high scores on the exhaustion and depersonalization dimensions of burnout predicted depressive symptoms among women, while high scores on exhaustion and diminished personal accomplishment predicted depressive symptoms among men (Greenglass & Burke 1990). Among North American medical residents, patient-related but not job-related exhaustion predicted mood disturbance during 1-year of follow-up (Hillhouse et al. 2000). On the other hand, depressive symptoms at baseline correlated positively with exhaustion 20 years later among North American physicians (McCrane & Brandsma 1988). However, a 2-year longitudinal study among North American nurses failed to provide support for a temporal relation between burnout and depression (McKnight & Glass 1995).

In cross-sectional designs, burnout and depressive symptoms have been found to correlate positively in various study samples: among the Swedish working population (Lindblom et al. 2006), in human service work (Meier 1984, Firth et al. 1986, Landsbergs 1988, Seidman & Zager 1991, Glass et al. 1993, McKnight & Glass 1995, Baba et al. 1999, Sears et al. 2000, Korkela et al. 2003), and among patients (Roe-lofs et al. 2005). Corresponding correlations were found also between exhaustion and depressive symptoms in human service work (Firth et
1. INTRODUCTION

al. 1987, Jayaratne et al. 1986, Lemkau et al. 1988, Martin et al. 1997, Tselebnis et al. 2001) and heterogeneous occupations (Toker et al. 2005, Middeldorp et al. 2006). Among Greek hospital staff, the lower the scores on personal accomplishment, the closer the relationship between the attitudes towards work and the emotional tone of the participants (Iacovides et al. 1999).

Despite a significant positive association between burnout and depressive symptoms, burnout and depression have been statistically differentiated from each other. Confirmatory factor analyses on cross-sectional data from four different studies on human service work showed that the items of a burnout inventory and a depression scale did not load on the same factor. Instead, a model with two second-order factors of burnout and depression was preferred over one second-order factor of negative affectivity (Glass et al. 1993, Leiter & Durup 1994, Iacovides et al. 1999, Bakker et al. 2000a). When the measures of burnout and depression were completed with a self-constructed scale of professional depression, many items of the work-related scales (emotional exhaustion and professional depression) loaded on the same factor in contrast to the non-contextual scale of depressive symptoms (Firth et al. 1987).

Differences have also have been noted in the associations between burnout and depression. In a cross-sectional study among Dutch teachers, a reduced sense of superiority was more characteristic of depression than of burnout (Brenninkmeijer et al. 2001); depressive symptoms were related to burnout when the teachers experienced low superiority. In another cross-sectional Dutch study among teachers, burnout was related to a lack of reciprocity with students, while depression was related to a lack of reciprocity with one’s spouse (Bakker et al. 2000a). In addition, burnout and depression were related differently to some demographic and work characteristics in a random sample of French health care professionals (Martin et al. 1997). Burnout was commoner among women with unconventional work hours and employees who were young or had instrumental work motivation, while depression was positively related to seniority at work and a lack of social support. Differences were also found between exhaustion and depression at the neurobiological level; they related differently to inflammation biomarkers among Israeli employees and the relationships were dependent on gender (Toker et al. 2005). Among women, a high level of exhaustion, unlike depression,
### Table 3. Review of the literature on burnout and depression

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belcatsro &amp; Hays 1984</td>
<td>USA</td>
<td>Cross-sectional survey (58%)</td>
<td>Teachers in one district</td>
<td>265</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Teachers with burnout more often reported physician-diagnosed depression than teachers with no burnout.</td>
</tr>
<tr>
<td>Meier 1984</td>
<td>USA</td>
<td>Cross-sectional survey (61%)</td>
<td>Teaching faculty members of one university</td>
<td>320</td>
<td>Three dimensional syndrome (MBI)</td>
<td>Burnout correlated positively with depression (Costello-Comrey Depression Scale, MMPI, self-rating).</td>
</tr>
<tr>
<td>Firth et al. 1986</td>
<td>USA</td>
<td>Cross-sectional survey (41%)</td>
<td>Nurses in one district</td>
<td>200</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with depression (BDI).</td>
</tr>
<tr>
<td>Jayaratne et al. 1986</td>
<td>USA</td>
<td>Cross-sectional survey (85%)</td>
<td>Female welfare workers</td>
<td>75</td>
<td>Three-dimensional syndrome (modified MBI)</td>
<td>Employees high on emotional exhaustion and low on personal accomplishment had higher levels of depression (6 items).</td>
</tr>
<tr>
<td>Firth et al. 1987</td>
<td>UK</td>
<td>Cross-sectional survey (40%)</td>
<td>Nursing staff in several hospitals</td>
<td>200</td>
<td>Emotional exhaustion (MBI)</td>
<td>Several items of exhaustion and professional depression scales (modified Beck Depression Inventory) loaded on the same factor. Exhaustion correlated positively with professional depression.</td>
</tr>
<tr>
<td>Landsbergis 1988</td>
<td>USA</td>
<td>Cross-sectional survey (38%)</td>
<td>Nursing staff in several units</td>
<td>289</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with depression (Job Content Survey).</td>
</tr>
<tr>
<td>Lemkau et al. 1988</td>
<td>USA</td>
<td>Cross-sectional survey (94%)</td>
<td>Medical residents</td>
<td>67</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion correlated positively with psychotic depression (Millon Clinical Multiaxial Inventory).</td>
</tr>
<tr>
<td>McCranie &amp; Brandsma 1988</td>
<td>USA</td>
<td>20-year longitudinal survey (72% at time 2)</td>
<td>Physicians from eight classes in one medical college</td>
<td>440</td>
<td>Syndrome of exhaustion (Tedium scale)</td>
<td>Depression (MMPI at time 1) correlated positively with exhaustion (time 2) over two decades.</td>
</tr>
</tbody>
</table>

Table 3. continues...
1. INTRODUCTION

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>Sample</th>
<th>Measure</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenglass &amp; Burke 1990</td>
<td>Canada</td>
<td>1-year longitudinal survey (57% at time 2)</td>
<td>Teachers and principals on one school board</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion and depersonalization predicted depression (Hopkins Symptom Checklist) among women. Emotional exhaustion and diminished personal accomplishment predicted depression among men.</td>
</tr>
<tr>
<td>Seidman &amp; Zager 1991</td>
<td>USA</td>
<td>Cross-sectional survey</td>
<td>Teachers in one district</td>
<td>Pattern of responding (Teacher Burnout Scale)</td>
<td>Burnout subscales correlated positively with depression (self-report).</td>
</tr>
<tr>
<td>Glass et al. 1993</td>
<td>USA</td>
<td>Cross-sectional survey (28%)</td>
<td>Random sample of nurses in one hospital</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with depression (BDI). The items of the burnout and depression scales loaded on different factors.</td>
</tr>
<tr>
<td>Leiter &amp; Durup 1994</td>
<td>Canada</td>
<td>Cross-sectional survey</td>
<td>Health care workers in one hospital</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>A model with two primary factors (burnout and depression; BDI) was preferred over a model with one primary factor (negative affectivity).</td>
</tr>
<tr>
<td>McKnight &amp; Glass 1995</td>
<td>USA</td>
<td>2-year longitudinal survey (85% at time 1, attrition 20%)</td>
<td>Nurses</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with depression (BDI) at time 1 and at time 2. The exhaustion and depression scores changed concurrently.</td>
</tr>
<tr>
<td>Martin et al. 1997</td>
<td>France</td>
<td>Cross-sectional survey (86%)</td>
<td>Random sample of health care professionals in one hospital</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion and depersonalization were related to depression (CES-D). Burnout and depression related differently to the demographic factors and work characteristics.</td>
</tr>
<tr>
<td>Baba et al. 1999</td>
<td>Caribbean</td>
<td>Cross-sectional survey (48%)</td>
<td>Nurses from several units</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Burnout correlated positively with and was related to depression (CES-D).</td>
</tr>
</tbody>
</table>

Table 3. continues...
<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Study Design</th>
<th>Sample Group</th>
<th>Sample Size</th>
<th>Measure of Burnout Syndrome</th>
<th>Measure of Depression</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iacovides et al. 1999</td>
<td>Greece</td>
<td>Cross-sectional survey (100%)</td>
<td>Nursing staff in one hospital</td>
<td>368</td>
<td>Modified three-dimensional syndrome (MBI)</td>
<td>Not all of the employees with the burnout syndrome had depression (Zung Self-Rating Depression Scale). Items of the burnout and depression scales clustered separately. The lower the personal accomplishment, the more the symptoms resembled depression.</td>
<td></td>
</tr>
<tr>
<td>Bakker et al. 2000a</td>
<td>Netherlands</td>
<td>Cross-sectional survey (83%)</td>
<td>Teachers in several schools</td>
<td>154</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>A lack of reciprocity in the relationship with students was related to burnout but not to depression (CES-D). A lack of reciprocity in the relationship with one’s spouse was related to depression but not to burnout.</td>
<td></td>
</tr>
<tr>
<td>Hillhouse et al. 2000</td>
<td>USA</td>
<td>1-year longitudinal survey (85%)</td>
<td>Medical residents</td>
<td>46</td>
<td>Syndrome of exhaustion (SBS-HP)</td>
<td>Patient-related exhaustion at time 3 predicted mood disturbance (POMS) at time 4. Job-related exhaustion was not related to mood disturbance in time.</td>
<td></td>
</tr>
<tr>
<td>Sears et al. 2000</td>
<td>USA</td>
<td>Cross-sectional survey (88%)</td>
<td>Extension agents in one organization</td>
<td>264</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with depression (CES-D).</td>
<td></td>
</tr>
<tr>
<td>Brennink-meijer et al. 2001</td>
<td>Netherlands</td>
<td>Cross-sectional survey</td>
<td>Teachers</td>
<td>190</td>
<td>Three-dimensional syndrome (MBI-ES)</td>
<td>A reduced sense of superiority was more characteristic for depression (CES-D) than for burnout. Depression was related to burnout when low superiority was experienced.</td>
<td></td>
</tr>
<tr>
<td>Tselebis et al. 2001</td>
<td>Greece</td>
<td>Cross-sectional survey</td>
<td>Nurses in one hospital</td>
<td>79</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion and diminished personal accomplishment correlated positively with depression (BDI).</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. continues...
<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Country</th>
<th>Method</th>
<th>Participants</th>
<th>Three-dimensional Syndrome</th>
<th>Burnout</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korkela et al. 2003</td>
<td>Finland</td>
<td>Cross-sectional survey (74%)</td>
<td>Random sample of physicians in psychiatry</td>
<td>218</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Burnout correlated positively with self-reported depression.</td>
</tr>
<tr>
<td>Kinnunen et al. 2004</td>
<td>Finland</td>
<td>Cross-sectional medical examination (94%)</td>
<td>Participants in occupational rehabilitation</td>
<td>154</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>Depressive disorder was commoner among the rehabilitants with severe burnout than among the others.</td>
</tr>
<tr>
<td>Roelofs et al. 2005</td>
<td>Netherlands</td>
<td>Cross-sectional survey (100%)</td>
<td>Consecutive patients with clinical burnout and with another diagnosis</td>
<td>95+73</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>The burnout dimensions correlated positively with depression (Symptom Checklist SCL-90) among those with burnout and among those with no burnout.</td>
</tr>
<tr>
<td>Toker et al. 2005</td>
<td>Israel</td>
<td>Cross-sectional medical examination (91%)</td>
<td>Employed clients of one medical centre</td>
<td>1563</td>
<td>Syndrome of exhaustion (SMBM)</td>
<td>Exhaustion correlated with depression (Personal Health Questionnaire). Exhaustion and depression were differently associated with the inflammation biomarkers (C-reactive protein, fibrinogen).</td>
</tr>
<tr>
<td>Lindblom et al. 2006</td>
<td>Sweden</td>
<td>Cross-sectional survey (61%)</td>
<td>Working population of one county</td>
<td>1812</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>The burnout dimensions correlated positively with depression (the Hospital Anxiety and Depression Scale). A high level of burnout was related to depression.</td>
</tr>
<tr>
<td>Middeldorp et al. 2006</td>
<td>Netherlands</td>
<td>Cross-sectional survey</td>
<td>Twins and their siblings</td>
<td>4309 +1008</td>
<td>Exhaustion (MBI-GS)</td>
<td>Exhaustion correlated positively with anxious depression (Young Adult Self Report). The association between exhaustion and depression was explained by shared genetic and individual-specific environmental factors.</td>
</tr>
</tbody>
</table>

*not peer-reviewed; MBI = Maslach Burnout Inventory; MBI-GS = Maslach Burnout Inventory - General Survey; MBI-ES = Maslach Burnout Inventory - Educators Survey; MMPI= Minnesota Multiphasic Personality Inventory; BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale, SBS-HP = Staff Burnout Scale for Health Professionals, POMS = Profile of Mood States, SMBM = Shirom-Melamed Burnout Measure
Table 4. Review of the literature on burnout and anxiety

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jayaratne et al. 1986</td>
<td>USA</td>
<td>Cross-sectional survey (85%)</td>
<td>Female welfare workers</td>
<td>75</td>
<td>Three-dimensional syndrome (modified MBI)</td>
<td>Employees high on emotional exhaustion and low on personal accomplishment had a higher level of anxiety (4 items).</td>
</tr>
<tr>
<td>Lemkau et al. 1988</td>
<td>USA</td>
<td>Cross-sectional survey (94%)</td>
<td>Medical residents</td>
<td>67</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Emotional exhaustion correlated positively with anxiety (Millon Clinical Multiaxial Inventory).</td>
</tr>
<tr>
<td>Richardsen et al. 1992</td>
<td>Norway</td>
<td>Cross-sectional survey (28%)</td>
<td>Health care workers in one hospital</td>
<td>212</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions were positively related to trait anxiety (STAI).</td>
</tr>
<tr>
<td>Corrigan et al. 1995</td>
<td>USA</td>
<td>Cross-sectional survey (83%)</td>
<td>Nursing staff in one hospital</td>
<td>47</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>Burnout correlated positively with trait anxiety (STAI).</td>
</tr>
<tr>
<td>Turnipseed 1998</td>
<td>USA</td>
<td>Cross-sectional survey (85%)</td>
<td>Female nurses in one hospital</td>
<td>117</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>The burnout dimensions correlated positively with trait and state anxiety (STAI).</td>
</tr>
<tr>
<td>Roelofs et al. 2005</td>
<td>Netherlands</td>
<td>Cross-sectional survey (100%)</td>
<td>Consecutive patients with clinical burnout and with another diagnosis</td>
<td>95+73</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>The burnout dimensions correlated positively with anxiety (Symptom Checklist-90) among patients with and without burnout.</td>
</tr>
<tr>
<td>Toker et al. 2005</td>
<td>Israel</td>
<td>Cross-sectional medical examination (91%)</td>
<td>Employed clients of one medical centre</td>
<td>1563</td>
<td>Syndrome of exhaustion (SMBM)</td>
<td>Exhaustion correlated positively with anxiety (adapted questionnaire).</td>
</tr>
<tr>
<td>Lindblom et al. 2006</td>
<td>Sweden</td>
<td>Cross-sectional survey (61%)</td>
<td>Working population of one county</td>
<td>1812</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>The burnout dimensions correlated positively with anxiety (the Hospital Anxiety and Depression Scale).</td>
</tr>
</tbody>
</table>

MBI=Maslach Burnout Inventory; MBI-GS=Maslach Burnout Inventory-General Survey; STAI=State-Trait Anxiety Inventory; SMBM=Shirom-Melamed Burnout Measure
### Table 5. Review of the literature on burnout and alcohol problems

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cunradi et al. 2003</td>
<td>USA</td>
<td>Cross-sectional medical examination (78%)</td>
<td>Transit operators in one organization</td>
<td>993</td>
<td>emotional exhaustion</td>
<td>Exhaustion was associated with an elevated risk for alcohol dependence (CAGE).</td>
</tr>
<tr>
<td>Winwood et al. 2003</td>
<td>Australia</td>
<td>Cross-sectional survey (64%)</td>
<td>Random sample of dentists</td>
<td>312</td>
<td>work-related exhaustion</td>
<td>Work-related exhaustion correlated positively with the risk for alcohol dependence (AUDIT).</td>
</tr>
</tbody>
</table>

MBI = Maslach Burnout Inventory, CBI = Copenhagen Burnout Inventory, CAGE = A screening instrument to identify those with a high risk for alcohol dependence (Cut-down, Annoyed, Guilty, Eye-opener), AUDIT = Alcohol Use Disorder Indicator Test

### Table 6. Review of the literature on burnout and musculoskeletal problems

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soares &amp; Jablonska 2004</td>
<td>Sweden</td>
<td>Cross-sectional survey (85% and 68%)</td>
<td>Patients with physician-diagnosed pain and without self-reported pain</td>
<td>838+135</td>
<td>Syndrome of tension, anxiety, withdrawal and isolation (self-constructed scale)</td>
<td>Patients with pain had a higher level of burnout than patients without pain.</td>
</tr>
<tr>
<td>Miranda et al. 2005</td>
<td>Finland</td>
<td>Cross-sectional medical examination (69%)</td>
<td>30 to 64-year-old working population</td>
<td>3378</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>Burnout was the strongest correlate for non-specific shoulder pain.</td>
</tr>
</tbody>
</table>

MBI-GS = Maslach Burnout Inventory-General Survey
was associated with increased concentrations of C-reactive protein and fibrinogen.

Compared with depression, anxiety and alcohol problems have been studied much less in relation to burnout. In cross-sectional designs, significant positive correlations were found between burnout and state and trait anxiety among a working population (Lindblom et al. 2006), human service workers (Richardsen et al. 1992, Corrigan et al. 1995, Turnipseed 1998), and patients (Roelofs et al. 2005), and also between exhaustion and anxiety in human service work (Jayaratne et al. 1986, Lemkau et al. 1988) and heterogeneous occupations (Toker et al. 2005). There was also cross-sectional evidence of a positive association between exhaustion and a risk for alcohol dependence in a random sample of Australian dentists (Winwood et al. 2003) and among North American transit operators (Cunradi et al. 2003).

Musculoskeletal problems

Compared with mental health, physical health has been studied to a much less degree in relation to burnout. Two studies have explored the relationship between burnout and musculoskeletal pain (Table 6). In the cross-sectional population-based Finnish Health 2000 Study, a positive association was found between burnout and non-specific shoulder pain (Miranda et al. 2005). Among Swedish pain patients, a positive association emerged between burnout and heterogeneous musculoskeletal pain (Soares & Jablonska 2004).

Cardiovascular diseases

The three research publications on burnout and cardiovascular diseases are reviewed in Table 7. In a longitudinal setting among male employees who took part in a medical examination, self-reported burnout predicted physician-diagnosed myocardial infarctions in a 4-year follow-up (Appels & Shouten 1991). In a cross-sectional study among North American teachers, burnout was associated with self-reported physician-diagnosed cardiovascular disease (Belcastro 1982). None of the teachers reported having a cardiovascular disease before they had begun teaching. In another cross-sectional study, women with coronary heart disease reported
### Table 7. Review of the literature on burnout and cardiovascular diseases

<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belcastro 1982</td>
<td>USA</td>
<td>Cross-sectional survey (79%)</td>
<td>Teachers</td>
<td>181</td>
<td>Three-dimensional syndrome (MBI)</td>
<td>High scores on the burnout dimensions were related to self-reported physician-diagnosed cardiovascular disorders.</td>
</tr>
<tr>
<td>Appels &amp; Shouten 1991</td>
<td>Netherlands</td>
<td>4-year longitudinal medical examination</td>
<td>Male employees aged 39-45 years or 54-65 years</td>
<td>3877</td>
<td>Uni-dimensional (self-report, single-item)</td>
<td>Burnout was related to an increased risk of myocardial infarction.</td>
</tr>
<tr>
<td>Hallman et al. 2003</td>
<td>Sweden</td>
<td>Cross-sectional survey (100%)</td>
<td>Consecutive female patients with CHD and healthy controls</td>
<td>97+97</td>
<td>Exhaustion (self-construed index)</td>
<td>Women with CHD reported higher level of exhaustion than matched healthy controls.</td>
</tr>
</tbody>
</table>

MBI = Maslach Burnout Inventory, CHD = cardiovascular disease
1. INTRODUCTION

higher levels of exhaustion than their matched healthy controls (Hallman et al. 2003).

Summary and limitations of previous research

All studies published on burnout and mental health problems support a positive association between burnout or exhaustion on one hand and depression, anxiety, or alcohol problems on the other. In addition to significant positive correlations, qualitative differences have been found between burnout and depression. Burnout and depressive symptoms have differed according to statistical considerations, on a neurobiological level, and to their associations with other factors.

The studies on burnout and mental health problems have relied on self-reports or screening instruments in the assessment of mental health. For assessing mental health, this approach may be inadequate because the duration and clinical validity of the symptoms remain unknown. Self-report measures, especially in cross-sectional designs, may also exaggerate the observed relationships between burnout and mental health problems due to common method variance (i.e., shared variance in measurement that is attributed to instrumentation rather than to the association between the constructs) (Lindell & Whitney 2001). There are no studies on burnout and mental health in which validated diagnostic methods have been used. Therefore, it is not known how occupational burnout is related to depressive and other mental disorders fulfilling the standardized diagnostic criteria.

The few studies conducted on burnout and musculoskeletal problems or cardiovascular diseases support a positive association also between burnout and physical ill health. However, some of the studies concerning cardiovascular diseases were conducted only among men or women. Very few of the studies on burnout and health have analysed this relationship according to gender. Because the work-related correlates of health have been found to vary to some degree between the genders due to, for example, gender segregation in worklife, differences in work conditions, differential vulnerability to stressors, and different help-seeking behaviour among men and women (Punnet & Herbert 2000, Taylor et al. 2000, Väänänen et al. 2003, Oliver et al. 2005, Rugulies et al. 2006), a gender perspective may be justified when the associations between burnout and health are studied.
1. INTRODUCTION

From an epidemiological point of view, there are serious limitations in the studies on burnout and health problems. Most studies have used vocational or organizational samples, primarily of human service work, which were rarely randomly sampled. The scarcity of population-based studies is problematic regarding health, because employed samples generally include persons with a good level of functioning. This so-called "healthy worker effect" (i.e., those employed are healthier than those who are not employed) may dilute any association with health in occupational samples. Furthermore, most studies have had a modest sample size, and some of the surveys have been vulnerable to self-selection bias due to a rather low response rate. Therefore, currently it is not reliably known to what extent people suffering from burnout fulfil the diagnostic criteria for mental disorders, musculoskeletal disorders, or cardiovascular diseases, and whether the associations between burnout and health are similar for men and women.

1.5 Occupational burnout and sickness absence

Medically certified sickness absences are hypothesized to serve as a global measure of health that is tuned to the requirements in each employee's occupational setting (Marmot et al. 1995, Kivimäki et al. 2003). They are often distinguished from short and self-certified absences that can also be viewed as a coping strategy in a difficult situation or as an indicator of low motivation (Marmot et al. 1995, Borritz et al. 2006). Especially long sickness absences have been found to predict future disability pensioning (Kivimäki et al. 2004, Lund et al. 2007). Therefore, they can also be used as a proxy measure for work disability.

A summary of the research publications on the relationship between burnout and sickness absence is presented in Table 8. Burnout predicted sickness absences in two longitudinal studies. A higher level of burnout was related to a greater number of medically certified spells of absence during a 3-year follow-up in a multi-national forest industry organization (Toppinen-Tanner et al. 2005) and to longer company-registered absence duration during a 1-year follow-up in a nutrition production organization (Bakker et al. 2003). In the former study, burnout increased
Table 8. Review of the literature on burnout and sickness absence

<table>
<thead>
<tr>
<th>Author and date</th>
<th>Country</th>
<th>Study design (response rate)</th>
<th>Sample</th>
<th>N</th>
<th>Burnout measure</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakker et al. 2003</td>
<td>Netherlands</td>
<td>1-year longitudinal survey (65%) linked to absence registers</td>
<td>Production employees in one organization</td>
<td>214</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>Burnout was positively related to the duration of company-registered sickness absences.</td>
</tr>
<tr>
<td>Hallsten et al. 2002</td>
<td>Sweden</td>
<td>Cross-sectional survey (71%)</td>
<td>Working population</td>
<td>3502</td>
<td>Exhaustion with achievement-based self-esteem (BM and a self-construed scale)</td>
<td>Burnout was positively related to the amount of self-reported long stress-related sickness absences during the past year.</td>
</tr>
<tr>
<td>Cunradi et al. 2005</td>
<td>USA</td>
<td>Cross-sectional medical examination (73%)</td>
<td>Transit operators in one organization</td>
<td>1446</td>
<td>Emotional exhaustion (MBI)</td>
<td>Exhaustion was positively related to self-reported short-term absences among male employees.</td>
</tr>
<tr>
<td>Toppinen-Tanner et al. 2005</td>
<td>Finland</td>
<td>3-year longitudinal survey (64%) linked to absence registers</td>
<td>Employees in one multinational organization</td>
<td>3895</td>
<td>Three-dimensional syndrome (MBI-GS)</td>
<td>Burnout was positively associated with future medically certified absences.</td>
</tr>
<tr>
<td>Borritz et al. 2006</td>
<td>Denmark</td>
<td>3-year longitudinal survey (80% at time 1, 75% at time 2)</td>
<td>Human service workers in several organizations</td>
<td>1561 (time 1), 824 (time 2)</td>
<td>Work-related exhaustion (CBI)</td>
<td>Work-related exhaustion was positively associated with self-reported sickness absence days and spells in a cross-sectional and a prospective setting.</td>
</tr>
</tbody>
</table>

* not peer-reviewed; MBI-GS = Maslach Burnout Inventory-General Survey, BM = Burnout Measure, MBI = Maslach Burnout Inventory; CBI = Copenhagen Burnout Inventory
future absences granted for mental disorders and diseases of the musculoskeletal and circulatory systems (Toppinen-Tanner et al. 2005). A prospective association was also registered between a high level of work-related exhaustion and the number of self-certified sickness absences and days during a 3-year follow-up among Danish human service workers (Borritz et al. 2006).

In a cross-sectional setting, long self-reported stress-related absences were commoner among those who had high levels of exhaustion combined with performance-based self-esteem in the Swedish working population (Hallsten et al. 2002). A cross-sectional association between work-related exhaustion and self-reported absences was also found among Danish human service workers (Borritz et al. 2006) and North American transit operators (Cunradi et al. 2005).

Population-based evidence on the association between burnout and sickness absence is based on exhaustion and self-reported absence (Hallsten et al. 2002). Prospective evidence concerning the relationship between burnout and medically certified sickness absence covers only one occupational branch (Toppinen-Tanner et al. 2005). On the basis of this evidence, it can be concluded that burnout is related to sickness absence, and this relationship further supports the association between burnout and health problems.

However, because burnout and exhaustion are associated with health problems (Shirom et al. 2005), the observed relationship between burnout and sickness absence could be fully explained by the co-existing disorders and illnesses. None of the previous studies on burnout and sickness absence have controlled for co-occurring mental disorders or physical illnesses. Therefore, it is not known whether burnout has any independent contribution to sickness absence or whether the observed associations mainly reflect the relationship between burnout and ill health.
2. PRESENT STUDY

2.1 Framework of the study

This study was conducted in the framework of occupational health psychology, a specialty in psychology that aims at promoting healthy workplaces (Quick 1999). A workplace is assumed to be healthy when it supports efficient and high-quality work production as well as the motivation, job satisfaction, and well-being of the employees. Research in occupational health psychology focusses on psychologically mediated processes between the psychosocial work environment and health (Sauter et al. 1999). Although health is widely understood as complete physical, mental, and social well-being (World Health Organization 1946), a traditional medical disease model of ill-health has mostly been applied in research to date (Schaufeli 2004).

A discrepancy of some kind between the individual and his or her environment is a common moderator of outcomes in psychology (Tinsley 2000). Relevant external or internal demands that are estimated to exceed the resources available to cope with them are assumed to activate the stress process in an individual (Lazarus & Folkman 1986, Lazarus 1991). Work-related and social aspects of the perceived environment are related to employees’ physiological, psychological, and behavioural processes (Caplan et al. 1975). The perception of the environment is thought to always include individual appraisal (Lazarus 1991).

Individual processes may, when prolonged or extremely strong, accumulate as strain and affect the health status of an employee. The interactions between the environment and health are complex (see Figure 1). Every association can be interpreted in both directions, from the environment to health and from health to the environment. In addition
to the characteristics of the work environment, also individual factors affect the stress process (Caplan et al. 1975, Lindström et al. 2005).

The theoretical stress process can be viewed as resembling the generalized adaptation syndrome (GAS) which is presented in psychophysical terms (Selye 1956). In GAS, excessive demands first induce an alarm reaction and the mobilization of energetic resources, then resistance, and finally exhaustion as the capacity for adjustment is depleted, if resistance fails.

The core elements in the theories of psychosocial stress (i.e., the personal meaning of the demands, the discrepancy between the individual and his or her environment, and the coping strategies used) are included also in the meta-theory of occupational burnout (Schaufeli & Enzmann 1998), but the status of burnout in the arena of occupational health psychology is not clearly defined. Even though burnout is more or less unanimously defined as a consequence of chronic work-related stress, it has sometimes been considered a process causing illnesses and sometimes more of an illness or adverse outcome of stress in itself (Maslach 2001, Maslach et al. 2001).

Due to the variability of theoretical models and practical operationalizations in psychology, the empirical results are always to some extent dependent on the chosen definitions and measures. In the present study, burnout has been regarded as a three-dimensional work-related syndrome of exhaustion, cynicism, and diminished professional efficacy (Schaufeli et al. 1996, Maslach et al. 2001). This psychological definition encompasses the process of energy depletion at work instead of reducing burnout to a state of fatigue (Schaufeli & Taris 2005), and it therefore suits the purposes of the present study in the occupational health psychology framework. Due to its wide usage, the qualities and shortcomings of the dimensional burnout concept are well-known, and the results are also comparable with many other national and international burnout studies. Because the exhaustion dimension of burnout is regarded as the core of the syndrome in the dimensional models (Brenninkmeijer & van Yperen 2003, Roelofs et al. 2005, Schaufeli & Taris 2005), it is unlikely that exhaustion-based and dimensional operationalizations of burnout would yield essentially different results.
2.2 Aims of the study

The principal aim of the present study was to clarify the status of burnout in the arena of occupational health psychology. With the use of a nationally representative sample, it is possible to avoid the shortcomings of previous studies in which non-random samples were used. More specifically, the objective was to determine the extent to which burnout co-occurs with common health problems, that is mental disorders, musculoskeletal disorders, and cardiovascular diseases. The examination of health in this study was restricted to these diseases due to their vast impact on work disability. Furthermore, whether burnout has any independent status in relation to ill health was explored with respect to its associations with work characteristics and work disability. An additional aim was to establish the role of some individual factors in the level and prevalence of burnout in an adult working population aged 30 years or over. Most of the analyses were stratified by gender because many health-related...
2. PRESENT STUDY

aspects of work have been recently found to be gender-related. The variables examined in this study are presented in the framework of the hypothesized associations between the psychosocial work environment and health in occupational health psychology in Figure 1.

The specific study questions were:
1. How is burnout related to gender, age, education, occupational grade, and marital status in a working population (I, II)?
2. How is job strain related to burnout and depressive disorders (II)?
3. How is burnout related to depressive disorders, anxiety disorders, alcohol dependence, musculoskeletal disorders, and cardiovascular diseases among men and women, and what is the overall co-occurrence of burnout with mental disorders and physical illnesses (III, IV, V)?
4. How does burnout contribute to long medically certified sickness absence among men and women (VI)?
3. METHODS

3.1 Procedure

A multidisciplinary epidemiological health study, the Health 2000 Study, was carried out in Finland during August 2000 and June 2001 to obtain up-to-date information on the most important national public health problems, including their causes and treatment, as well as the functional capacity and work ability of the population (Aromaa & Koskinen 2004). Due to a financial imperative to set priorities, this health-oriented study focussed on persons over 30 years of age, among whom illnesses are, on average, commoner.

The two-stage stratified cluster sample represented the population living on the Finnish mainland and included 8028 persons aged 30 years or over. The five Finnish university hospital districts were used for stratification and sampling, each serving about one million inhabitants and differing in geography, economic structure, health services, and the socio-demographic characteristics of the population. From each of the five strata, 16 health care districts were sampled as clusters, adding up to 80 districts in the whole country. Firstly, the 15 largest health care districts were included with a probability of one. Next, the other 65 health care districts were included in the sample with a probability proportional to the population size. Finally, from each of these 80 areas, a random sample was drawn from the National Population Register so that the total number of persons drawn from each stratum was proportional to the population size. (Aromaa & Koskinen 2004)

The participants were first interviewed at home by trained interviewers of Statistics Finland, the Finnish National Bureau for Statistics. The structured interview lasted about 90 minutes and covered information
3. METHODS

on socio-demographic factors, health and illnesses, use of medication and health services, living habits including smoking, type of work, work capacity, and the need for health services. Then the participants were given a questionnaire that covered information on their functional capacity, leisure-time activities, physical activity, alcohol consumption, job strain, burnout, and depressive symptoms. The questionnaire was to be returned at the time of the clinical health examination, which included a structured interview on mental health, approximately 4 weeks later. Information on sickness absence was extracted from a register of The Social Insurance Institute of Finland. It was linked to the other data by means of each participant’s personal identification number, which is given to all Finns at birth and used for all contacts in health care.

During the first interview, the respondents received an information leaflet on the study and gave their written consent to participate. The Health 2000 Study was approved in 2000 by the ethics committee for epidemiology and public health in the hospital district of Helsinki and Uusimaa in Finland.

3.2 Participants

Of the total sample (n=8028), 7419 persons participated in at least one phase of the study. The participants accounted for 93% of the 7977 persons alive on the day the study began. Of the 558 non-participants, 416 refused, 110 were not located, and 32 were abroad. Of the total sample, 5871 persons were of working age (30 to 64 years). Of this base population for studies I–V, 88% was interviewed, 84% returned the questionnaire, 82% participated in the clinical health examination, and 80% participated in the mental health interview. At the time of the first interview, 95 participants were on sick leave, and 34 were on leave of absence. In study VI, the 30- to 60-year-olds were used as the base population (n=5380).

The participants were excluded if they were not currently employed according to their main activity, were on maternity or parental leave, had more than one missing value per dimension on the burnout inventory, or had missing data on the relevant health variables. A maximum of one missing value per dimension in the burnout inventory was replaced.
### Table 9. Descriptive characteristics of the studies I-VI

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study I</th>
<th>Study II</th>
<th>Study III</th>
<th>Study IV</th>
<th>Study V</th>
<th>Study VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base population (n)</td>
<td>5871</td>
<td>5871</td>
<td>5871</td>
<td>5871</td>
<td>5871</td>
<td>5380</td>
</tr>
<tr>
<td>Participation (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>87</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>Health examination</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>82</td>
<td>83</td>
</tr>
<tr>
<td>Mental health interview</td>
<td>-</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td>Sickness absence register</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Study population (n):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working participants</td>
<td>3637</td>
<td>3387</td>
<td>3387</td>
<td>3387</td>
<td>3473</td>
<td>3307</td>
</tr>
<tr>
<td>Final study sample</td>
<td>3424</td>
<td>3270</td>
<td>3270</td>
<td>3251</td>
<td>3368</td>
<td>3151</td>
</tr>
<tr>
<td>Study design:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burnout in relation to</td>
<td>Socio-demographic factors</td>
<td>Job strain</td>
<td>Depressive disorders</td>
<td>Alcohol dependence</td>
<td>Physical illnesses</td>
<td>Medically certified sickness absence</td>
</tr>
<tr>
<td>Age of the participants</td>
<td>30 - 64 years</td>
<td>30 - 64 years</td>
<td>30 - 64 years</td>
<td>30 - 64 years</td>
<td>30 - 64 years</td>
<td>30 - 60 years</td>
</tr>
<tr>
<td>Burnout variable</td>
<td>Dimensional scores, as continuous</td>
<td>Sum score, as dichotomized</td>
<td>Sum score, as categorized</td>
<td>Sum score, as continuous</td>
<td>Sum score, as categorized and continuous</td>
<td>Sum score, as categorized</td>
</tr>
<tr>
<td>Statistical analysis</td>
<td>Multivariate analyses of variance and covariance</td>
<td>Logistic regression analysis</td>
<td>Cross-tabulations, risk ratios$^a$</td>
<td>Logistic regression analysis</td>
<td>Cross-tabulations, logistic regression analysis</td>
<td>Logistic regression analysis, analysis of variance</td>
</tr>
<tr>
<td>Results by gender</td>
<td>Yes</td>
<td>No</td>
<td>Partly</td>
<td>Yes</td>
<td>Partly</td>
<td>Yes</td>
</tr>
</tbody>
</table>

$^a$ In the summary of the results, logistic regression analysis was used to calculate the odds ratios
3. METHODS

by the mean of the existing values of the respondent on the particular dimension. The size of the final study population ranged from 3151 to 3424 persons in the studies I–VI (Table 9).

The weighted gender and age distribution of the participants was crudely similar to the corresponding distribution of the total Finnish work force (Statistics Finland 2000). The weighted percentage of women was 48%, and the mean age of the participants was 44 years. Of the participants, 78% was married or cohabiting, and 30% was manual workers. The participants represented different occupational branches (Ahola et al. 2004).

Table 10 contains a detailed description of the participants by gender. The men and women differed statistically significantly with respect to most of the socio-demographic and clinical characteristics examined. Compared with the men, the women were a little older, had a higher level of education, were more often unmarried, worked more often part time, and were more often in lower-level non-manual work, in passive or high-strain work, and in physically non-strenuous work. Furthermore, the women had less risky health behaviour than men. However, there was no gender difference in the level of burnout. Instead, the women had a higher prevalence of depressive and anxiety disorders and depressive symptoms, but a lower prevalence of alcohol dependence, and more long sickness absences than the men.

3.3 Measures

Occupational burnout

Occupational burnout was measured with the Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli et al. 1996, Kalimo et al. 2006). The MBI-GS consists of the following three subscales: exhaustion (five items, Cronbach’s $\alpha = 0.91$), cynicism (five items, $\alpha = 0.79$), and (diminished) professional efficacy (six items, $\alpha = 0.82$). The items were scored on a 7-point frequency rating scale ranging from 0 (never) to 6 (daily). High scores on exhaustion and cynicism and low scores on professional efficacy were indicative of burnout. The items of professional efficacy were reversed (diminished professional efficacy).
Table 10. Socio-demographic and clinical characteristics of the study population by gender

<table>
<thead>
<tr>
<th></th>
<th>All n (weighted %)</th>
<th>Men n (weighted %)</th>
<th>Women n (weighted %)</th>
<th>Difference</th>
<th>( \chi^2(2) = 3.60, p = 0.166 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burnout (N=3424)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2475 (72.2)</td>
<td>1249 (72.8)</td>
<td>1226 (71.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>867 (25.4)</td>
<td>434 (25.3)</td>
<td>433 (25.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>82 (2.4)</td>
<td>33 (1.9)</td>
<td>49 (2.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-demographic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>characteristics (N=3424)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-34 years</td>
<td>546 (15.6)</td>
<td>287 (16.6)</td>
<td>259 (14.4)</td>
<td></td>
<td>( \chi^2(3) = 10.88, p = 0.013 )</td>
</tr>
<tr>
<td>35-44 years</td>
<td>1165 (33.5)</td>
<td>601 (34.9)</td>
<td>564 (31.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54 years</td>
<td>1288 (38.3)</td>
<td>626 (36.8)</td>
<td>662 (39.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-64 years</td>
<td>425 (12.7)</td>
<td>202 (11.7)</td>
<td>223 (13.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 9 years</td>
<td>1206 (35.9)</td>
<td>688 (40.2)</td>
<td>518 (31.2)</td>
<td></td>
<td>( \chi^2(2) = 56.26, p &lt; 0.001 )</td>
</tr>
<tr>
<td>9-11 years</td>
<td>1108 (32.3)</td>
<td>576 (33.6)</td>
<td>532 (30.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 years</td>
<td>1108 (31.8)</td>
<td>452 (26.2)</td>
<td>656 (37.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or a course</td>
<td>851 (25.2)</td>
<td>445 (26.0)</td>
<td>406 (24.3)</td>
<td></td>
<td>( \chi^2(3) = 92.12, p &lt; 0.001 )</td>
</tr>
<tr>
<td>School</td>
<td>1202 (35.3)</td>
<td>709 (41.4)</td>
<td>493 (28.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute</td>
<td>854 (24.5)</td>
<td>321 (18.7)</td>
<td>533 (30.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher education</td>
<td>517 (15.0)</td>
<td>241 (14.0)</td>
<td>276 (16.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper non-manual</td>
<td>943 (27.4)</td>
<td>458 (26.6)</td>
<td>485 (28.2)</td>
<td></td>
<td>( \chi^2(3) = 261.2, p &lt; 0.001 )</td>
</tr>
<tr>
<td>Lower non-manual</td>
<td>940 (26.9)</td>
<td>267 (15.6)</td>
<td>673 (39.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>1018 (30.2)</td>
<td>655 (38.3)</td>
<td>363 (21.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>519 (15.4)</td>
<td>333 (19.5)</td>
<td>186 (11.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>2670 (78.0)</td>
<td>1379 (80.3)</td>
<td>1291 (75.5)</td>
<td></td>
<td>( \chi^2(1) = 12.91, p &lt; 0.001 )</td>
</tr>
</tbody>
</table>

Table 10. continues...
Table 10. continues...

### Clinical characteristics, mental-related (N=3270)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Chi-square (df)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive disorder</td>
<td>204 (6.1)</td>
<td>64 (3.9)</td>
<td>140 (8.5)</td>
<td>23.52 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Anxiety disorder</td>
<td>125 (3.8)</td>
<td>46 (2.8)</td>
<td>79 (4.9)</td>
<td>11.00 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>136 (4.3)</td>
<td>112 (6.9)</td>
<td>24 (1.5)</td>
<td>56.22 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lifetime mental disorder</td>
<td>306 (9.3)</td>
<td>122 (7.4)</td>
<td>184 (11.4)</td>
<td>15.03 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>616 (18.7)</td>
<td>229 (14.0)</td>
<td>387 (23.9)</td>
<td>53.17 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Job strain</td>
<td></td>
<td></td>
<td></td>
<td>36.08 (3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Low-strain work</td>
<td>838 (26.5)</td>
<td>472 (29.5)</td>
<td>366 (23.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active work</td>
<td>700 (22.1)</td>
<td>389 (24.3)</td>
<td>311 (19.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive work</td>
<td>910 (28.4)</td>
<td>409 (25.5)</td>
<td>501 (31.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-strain work</td>
<td>732 (23.0)</td>
<td>331 (20.6)</td>
<td>401 (25.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time work</td>
<td>3034 (92.9)</td>
<td>1577 (96.3)</td>
<td>1457 (89.2)</td>
<td>64.25 (1)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Clinical characteristics, physical-related (N=3368)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Chi-square (df)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal disorder</td>
<td>1003 (30.2)</td>
<td>503 (30.1)</td>
<td>500 (30.2)</td>
<td>0.004 (1)</td>
<td>0.947</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>525 (15.9)</td>
<td>275 (16.5)</td>
<td>250 (15.4)</td>
<td>0.64 (1)</td>
<td>0.423</td>
</tr>
<tr>
<td>Physical strenuousness of work</td>
<td></td>
<td></td>
<td></td>
<td>87.29 (3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sedentary work</td>
<td>1336 (40.0)</td>
<td>660 (39.6)</td>
<td>676 (40.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some walking</td>
<td>882 (26.2)</td>
<td>382 (22.9)</td>
<td>500 (29.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A lot of walking</td>
<td>782 (23.5)</td>
<td>378 (22.8)</td>
<td>404 (24.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very strenuous</td>
<td>332 (10.2)</td>
<td>245 (14.8)</td>
<td>87 (5.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily smoking</td>
<td>846 (25.3)</td>
<td>481 (28.7)</td>
<td>365 (21.5)</td>
<td>19.46 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td>20.23 (2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt; 2 times a week</td>
<td>1474 (44.1)</td>
<td>784 (46.7)</td>
<td>690 (41.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3 times a week</td>
<td>1181 (35.1)</td>
<td>590 (35.0)</td>
<td>591 (35.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 3 times a week</td>
<td>706 (20.9)</td>
<td>308 (18.3)</td>
<td>398 (23.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body mass index, kg/m² mean; SE</td>
<td>26.4; 0.07</td>
<td>26.9; 0.10</td>
<td>25.9; 0.11</td>
<td>F(1,3365)= 45.79</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Alcohol consumption, drinks/month</td>
<td>26.3; 0.73</td>
<td>38.2; 1.17</td>
<td>13.0; 0.57</td>
<td>F(1,3276)= 403.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sickness absence (N=3211)</td>
<td>654 (20.3)</td>
<td>263 (16.4)</td>
<td>391 (24.6)</td>
<td>36.90 (1)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

a Data missing for 1 person;
b Data missing for 90 persons;
For the assessment of the level of burnout, a weighted sum score of the dimensional sum scores was calculated (II–VI) (Kalimo et al. 2006). Exhaustion, cynicism, and diminished professional efficacy had different weights in the syndrome (Kalimo et al. 2003). This syndrome indicator had been constructed with the help of a discriminant function analysis, in which various health-related indicators were used as dependent variables (Kalimo & Toppinen 1997). The coefficients were formed by weighting each dimension so that the scores corresponded to the original response scale \(0.4 \times \text{exhaustion} + 0.3 \times \text{cynicism} + 0.3 \times \text{diminished professional efficacy}\). Burnout and the dimensional scores were categorized as follows (Kalimo et al. 2003, 2006): no symptoms (sum score 0–1.49), mild symptoms (sum score 1.5–3.49), and severe symptoms (sum score 3.5–6). According to this categorization, symptoms that were experienced approximately daily or weekly were severe, they occurred monthly when mild, and they were experienced only a few times a year or never in cases of no burnout (III, VI). In study II, burnout was dichotomized as no burnout versus burnout (mild or severe).

**Mental disorders**

The assessment of the 12-month prevalence of mental disorders was based on the Composite International Diagnostic Interview (CIDI, version 2.1) (Andrews & Peters 1998, Wittchen et al. 1998), which is a fully standardized diagnostic interview for the assessment of mental disorders for research purposes. A Finnish translation of the German, computerized version of the CIDI was used (M-CIDI). The CIDI questions were designed to elucidate symptoms and behaviour that map on each diagnostic criterion for mental disorders according to the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV) (American Psychiatric Association 1994) in addition to information about their onset, recency, and associated impairments (Andrews & Peters 1998). In approximately 75 minutes, the CIDI allows the estimation of DSM-IV diagnoses for major mental disorders (i.e., mental disorders due to general medical conditions, substance-related, psychotic, mood, anxiety, somatoform and dissociative, and eating disorders), while the assessment of personality disorders was not included (Wittchen et al. 1998). However, in the CIDI interview in the Health 2000 Study,
3. METHODS

mental disorders due to general medical conditions, special phobias, obsessive-compulsive and post-traumatic stress disorders, somatoform and dissociative disorders, and eating disorders were not assessed because the time allocated for the mental health interview was set at 30 minutes (Aromaa & Koskinen 2004).

The 21 interviewers were health care professionals trained for 3–4 days in the use of CIDI interview by physicians who had themselves been trained by an authorized trainer of the World Health Organization. In a separate analysis, the CIDI interviewers examined, pairwise and independently, a consecutive series of 49 visitors to occupational health services to test the test-retest reliability of the CIDI depressive disorders section. The Kappa values for the two interviews were 0.88 (95% CI 0.64–1.00, observer agreement 94%) for major depressive disorder and 0.88 (95% CI 0.64–1.00, observer agreement 98%) for dysthymic disorder (Pirkola et al. 2005).

Depressive disorders included major depressive disorder and dysthymic disorder in studies II and VI. In study III, also minor depressive disorder was included in the depressive disorders. Minor depressive disorder comprises current sub-clinical depression (i.e., 2–4 symptoms of depression). The anxiety disorders (unpublished data) included panic disorder with or without agoraphobia, generalized anxiety disorder, social phobia, phobia not otherwise specified, and agoraphobia without panic disorder. The alcohol use disorders included alcohol dependence and alcohol abuse. A participant was identified as having a mental disorder (VI) if he or she fulfilled the criteria for a depressive (major depressive and dysthymic disorder), anxiety, or alcohol use disorder. Lifetime mental disorders (II) were assessed with a single-item question in the home interview asking whether a physician had ever confirmed a psychiatric illness or a mental disorder for the participant.

Depressive symptoms

The original Beck Depression Inventory (Beck et al. 1961, 1988) was used to assess depressive symptoms as an indicator of mental health (II, V). The inventory consisted of 21 items scored from 0 to 3. An acceptable answer was expected for at least 14 items. Missing values (7 at the most) were replaced by the mean of the existing values of the respondent. A sum
score was then calculated for the depressive symptoms (II, V). Depressive symptoms were dichotomized (II) as no depressive symptoms (0–9 points) or depressive symptoms (10–63 points) (Beck et al. 1988).

**Physical illnesses**

The clinical health examination began with a symptom interview covering musculoskeletal, cardiovascular and respiratory symptoms, atopy, and allergies. Then the participants were given an additional questionnaire about infections and vaccinations to be filled out during the health examination. Next, the research physician took a medical history and performed a standard 30-minute clinical examination including tests related to the functioning and movements of the joints. The health examination also included the measurement of height and weight, body circumference, electrocardiogram, blood pressure, spirometry, bioimpedance, heel bone density, and orthopantomography.

The diagnostic criteria of the physical illnesses were based on current clinical practice. The separate diagnoses were divided into the following four main groups: musculoskeletal disorders (V), cardiovascular diseases (V), respiratory diseases, and other physical illnesses including, for example, diabetes, metabolic disorders, skin disorders, and allergies. The participant was identified as having a physical illness (VI) if he or she fulfilled any diagnostic criteria of a musculoskeletal disorder, cardiovascular disease, respiratory disease, or other physical illness.

**Sickness absence**

In Finland, the national sickness insurance scheme covers the entire population and reimburses the loss of income due to a sickness absence on the basis of a medical certificate and a period of more than 9 consecutive work days. The number of compensated sickness absence days in 2000 and 2001 was extracted from the register of The Social Insurance Institution of Finland. Variables of at least one long sickness absence (no/yes) and the number of compensated days were formed for those with at least one absence during the 2-year period (VI).
3. METHODS

**Job strain**

Job strain (II) was measured with the Job Content Questionnaire (Karasek et al. 1998). The scale of job demands comprised five items (Cronbach’s $\alpha = 0.79$), and the scale for job control comprised nine items ($\alpha = 0.85$). Responses were given on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). To create an indicator of job strain, the job demand and job control scales were dichotomized at their median (Landbergis et al. 1994), and the following four subgroups were formed for work (Karasek 1979, Karasek & Theorell 1990): low-strain work (low demands with high control), active work (high demands with high control), passive work (low demands with low control), and high-strain work (high demands with low control).

**Socio-demographic factors**

Information on the socio-demographic factors was collected during the first interview at home. Age was categorized in different ways in studies I–VI. Marital status was dichotomized as married or co-habiting (married) and the rest (unmarried). Basic education was categorized as less than comprehensive schooling (< 9 years), comprehensive schooling (9–11 years), and secondary schooling (12 years). Vocational education was categorized as a course or less, school level, institute level, or higher vocational education. Occupational status was formed on the basis of occupation and the type of business: upper grade non-manual, lower grade non-manual, manual, and self-employment (Statistics Finland 1999). In study VI, the groups of upper and lower grade non-manual work were combined as non-manual work.

**Confounding factors**

In addition to socio-demographic factors, health behaviour and the physical strenuousness of the work were used as confounding factors in the analyses concerning physical illnesses, and work hours and health behaviour were used in the analyses for job strain. The physical strenuousness of work was assessed with a questionnaire using a single question with a following 4-point scale: mostly sedentary work, work including a
fair amount of walking, work including a lot of walking, climbing stairs or carrying heavy loads, or very strenuous work. Daily smoking (no/yes) was inquired about in the home interview. Habitual alcohol consumption and health-enhancing physical activity were assessed with the questionnaire. The participant’s report of the frequency and amount of consumed beer, wine, and spirits was transformed into drinks per month. Health-enhancing physical activity included exercise causing at least slight shortness of breath and sweating for a minimum of 30 minutes at a time. It was classified as once a week or less, two to three times a week, and at least four times a week. Body mass index (kg/m²) was calculated on the basis of the participants’ height and weight, which were measured in the clinical health examination. Work hours were inquired about in the home interview and classified as full-time or part-time.

3.4 Statistical analyses

Cross-tabulations and chi-square tests were used to describe the participants according to gender and to analyse the association between burnout and depressive disorders (III), musculoskeletal disorders (V), and cardiovascular diseases (V). In addition, cross-tabulations were used to summarize the overall co-occurrence of burnout, mental disorders, and physical illnesses (unpublished data).

A 2x5 multivariate analysis of variance was used to analyse the relation of gender and age to burnout using continuous variables of exhaustion, cynicism, and lack of professional efficacy as dependent variables at the same time to take into account the multi-dimensional nature of burnout (I). When the multivariate effect was significant, univariate analyses of variance were conducted for each burnout dimension separately. The focus was on the variables that had a statistically significant effect on every burnout dimension. The differences between the categories of the independent variables were analysed with 95% confidence intervals of the means. The relation of basic and vocational education, occupational grade, and marital status to the continuous burnout variable was analysed with multivariate analyses of covariance separately for the men and women using the categorical factors as independent variables one at a time and age as a continuous variable as a covariate.
3. METHODS

Logistic regression analysis was used to investigate the relationship between the socio-demographic factors and burnout (II), between job strain and burnout and depressive disorders (II), and between burnout and depressive disorders (III), alcohol dependence (IV), anxiety disorders (unpublished data), musculoskeletal disorders (V), cardiovascular diseases (V), and sickness absence (VI). The models, except in study III, were adjusted for potential confounding factors. In the models of job strain, an interaction term was applied to test whether the association was dependent on gender (II). In studies III–VI, the analyses were conducted according to gender. The analyses of sickness absence were repeated for the employees with mental or physical disorders to examine whether burnout increased the odds for sickness absence also in an unhealthy population.

A univariate analysis of variance was used for the employees with sickness absences to calculate the mean difference and its significance in the logarithmically transformed number of sickness absence days separately according to burnout, mental disorders, and physical illness (VI). These analyses were adjusted for socio-demographic factors, and the analyses for burnout were adjusted further for mental disorders and physical illnesses.

Sampling parameters and weighting adjustment were used in all of the analyses to account for the survey design complexities, including clustering in a stratified sample, and the loss of participants (Lehtonen et al. 2003, Aromaa & Koskinen 2004). The data were analysed using the SAS (I) and SUDAAN (II–VI) statistical program packages. The SUDAAN has been specifically designed to analyse cluster-correlated data in complex sample surveys.
4. RESULTS

The results are presented in accordance with study questions 1–4. Firstly, the associations between socio-demographic factors (i.e., gender, age, marital status, basic and vocational education, and occupational grade) and burnout are presented (I, II). Secondly, the relationship of job strain to burnout and to depressive disorders is compared (II). Thirdly, the associations between burnout and mental disorders (i.e., depressive disorders, anxiety disorders, and alcohol dependence), musculoskeletal disorders, and cardiovascular diseases are shown (III–V, and unpublished data). Finally, the contribution of burnout to long medically certified sickness absences is investigated (VI).

4.1 Association between socio-demographic factors and occupational burnout

Gender, age and burnout

The odds of having burnout did not differ by gender when burnout comprised both mild and severe symptoms (Table 11) (II). When burnout was analysed as a continuous variable, gender did have a significant multivariate main effect on burnout (F=24.7, df=3, p< 0.001). However, the univariate effects of gender were significant only for the dimensions of exhaustion and cynicism. The level of exhaustion was higher among the women than among the men. The difference in the means of cynicism for the men and women was in the opposite direction, but it was not statistically significant (Table 12) (I).

Having burnout was more probable among the 55- to 64-year-old employees than in the younger age groups (Table 11) (II). Age had a
4. RESULTS

Table 11. Odds ratios for burnout by gender and age, and gender- and age-adjusted odds ratios for burnout by occupational grade and marital status

<table>
<thead>
<tr>
<th>Burnout</th>
<th>Factor</th>
<th>N</th>
<th>Cases</th>
<th>Odds ratio (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>1637</td>
<td>441</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>1633</td>
<td>459</td>
<td>1.07 (0.92-1.25)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30-34</td>
<td>517</td>
<td>130</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>1116</td>
<td>265</td>
<td>0.91 (0.73-1.14)</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>1236</td>
<td>347</td>
<td>1.15 (0.92-1.45)</td>
</tr>
<tr>
<td></td>
<td>55-64</td>
<td>401</td>
<td>158</td>
<td>1.89 (1.44-2.49)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Burnout</th>
<th>Factor</th>
<th>N</th>
<th>Cases</th>
<th>Adjustedb odds ratio (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper non-manual</td>
<td>922</td>
<td>230</td>
<td>1.00 (0.68-1.04)</td>
</tr>
<tr>
<td></td>
<td>Lower non-manual</td>
<td>896</td>
<td>200</td>
<td>0.84 (1.36-2.10)</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>958</td>
<td>335</td>
<td>1.69 (1.36-2.10)</td>
</tr>
<tr>
<td></td>
<td>Self-employed</td>
<td>490</td>
<td>135</td>
<td>1.14 (0.89-1.46)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>2558</td>
<td>670</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>712</td>
<td>230</td>
<td>1.33 (1.10-1.61)</td>
</tr>
</tbody>
</table>

*a CI indicates confidence interval

*b Adjusted for gender and age

Significant multivariate main effect on burnout when it was treated as a continuous variable (F=6.4, df=12, p< 0.001), and this effect was significant for all of the burnout dimensions. The level of exhaustion was higher in the age group of 53–64 years than among the 30- to 41-year-olds, and the level of cynicism was higher in the age group of 53–64 years than among the 36- to 52-year-olds. In addition, professional efficacy was lower among the 53- to 64-year-olds than among the 42- to 47-year-olds, among whom it was lower than among the 30- to 35-year-olds. Furthermore, professional efficacy was lower in the age group of 48–52 years than in the age group of 36–41 years. The interaction effect between gender and age was not statistically significant.
### Table 12. Level of the burnout dimensions according to the socio-demographic factors among the men and women: weighted means and their 95% confidence intervals

<table>
<thead>
<tr>
<th>Factor</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Exhaustion</td>
</tr>
<tr>
<td>All</td>
<td>1716</td>
<td>1.00 (0.95-1.05)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-35</td>
<td>343</td>
<td>0.98 (0.88-1.08)</td>
</tr>
<tr>
<td>36-41</td>
<td>350</td>
<td>0.90 (0.78-1.02)</td>
</tr>
<tr>
<td>42-47</td>
<td>373</td>
<td>1.05 (0.94-1.16)</td>
</tr>
<tr>
<td>48-52</td>
<td>332</td>
<td>1.00 (0.87-1.14)</td>
</tr>
<tr>
<td>53-64</td>
<td>318</td>
<td>1.07 (0.95-1.20)</td>
</tr>
<tr>
<td>Basic education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 9 years</td>
<td>688</td>
<td>1.02 (0.93-1.11)</td>
</tr>
<tr>
<td>9–11 years</td>
<td>576</td>
<td>0.99 (0.91-1.07)</td>
</tr>
<tr>
<td>12 years</td>
<td>452</td>
<td>0.98 (0.89-1.07)</td>
</tr>
<tr>
<td>Vocational education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or a course</td>
<td>445</td>
<td>1.03 (0.92-1.15)</td>
</tr>
<tr>
<td>School</td>
<td>709</td>
<td>1.01 (0.93-1.09)</td>
</tr>
<tr>
<td>Institute</td>
<td>321</td>
<td>0.96 (0.84-1.08)</td>
</tr>
<tr>
<td>Higher education</td>
<td>241</td>
<td>0.95 (0.84-1.07)</td>
</tr>
<tr>
<td>Occupational grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper non-manual</td>
<td>458</td>
<td>1.00 (0.91-1.09)</td>
</tr>
<tr>
<td>Lower non-manual</td>
<td>267</td>
<td>0.87 (0.76-0.97)</td>
</tr>
<tr>
<td>Manual</td>
<td>655</td>
<td>1.03 (0.94-1.13)</td>
</tr>
<tr>
<td>Self-employed</td>
<td>333</td>
<td>1.05 (0.94-1.17)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>1379</td>
<td>0.97 (0.91-1.03)</td>
</tr>
<tr>
<td>Unmarried</td>
<td>337</td>
<td>1.12 (0.99-1.25)</td>
</tr>
</tbody>
</table>

*a PE indicates professional efficacy*
4. RESULTS

**Education, occupational grade and burnout**

Both basic and vocational education had a significant multivariate main effect on burnout when age was adjusted for (F=3.5, df=9, p< 0.001, and F=4.5, df=11, p< 0.001 for the women; F=3.9, df=9, p< 0.001, and F=4.0, df=11, p< 0.001 for the men), but the univariate effects of these variables were statistically significant only for the women. The level of burnout was a little higher among the women who had not finished comprehensive school than among those who had (Table 12) (I). The women who had little vocational education scored somewhat higher on exhaustion and diminished professional efficacy than the women with school- and institute-level education and higher on cynicism than the women with a school-level education. Among the men, education had a statistically significant univariate effect only on diminished professional efficacy (Table 12) (I).

Mild-to-severe burnout was more prevalent among the manual workers than among the non-manual workers or the self-employed when gender and age were adjusted for (Table 11) (II). Occupational grade also had a significant multivariate effect on burnout when age was adjusted for (F=5.1, df=11, p< 0.001 for the women; F=7.1, df=11, p< 0.001 for the men), but the univariate effects of occupational grade were significant only for the women. The female manual workers scored higher on exhaustion than the self-employed and the lower-level non-manual female workers and higher on cynicism and diminished professional efficacy than the non-manual female workers (Table 12) (I). As for the men, occupational grade had a statistically significant univariate effect on exhaustion and lack of professional efficacy.

**Marital status and burnout**

As a dichotomy, burnout was more prevalent among those unmarried than among those married when gender and age were adjusted for (Table 11) (II). When the analyses for the continuous burnout variable were stratified by gender, marital status had a significant multivariate main effect on burnout only for the men, when age was adjusted for (F=5.0, df=5, p< 0.001). The univariate effect of marital status among the men was significant for every burnout dimension. The level of burnout was
4. RESULTS

higher among the unmarried men, but the difference was statistically significant only for the cynicism dimension of burnout (Table 12) (I). The effect of marital status on burnout was not significant among the women.

Brief summary

As a summary of the results concerning the first study question on the associations between socio-demographic factors and burnout, it can be concluded that the level of burnout was unrelated to gender. Instead, burnout was more likely among employees who were over 55 years of age, in manual work or unmarried. The associations of burnout partly differed between the genders. The results indicated a negative relationship between burnout and the level of education and occupational status especially among the women and an association between burnout and being unmarried especially among the men.

4.2 Job strain in relation to occupational burnout and depressive disorders

The odds ratios of job strain for burnout are presented in Table 13 (II). The employees with high-strain work, passive work, and active work had higher odds ratios for burnout than their counterparts with low-strain work. The association was the strongest for high-strain work. The associations persisted after adjustment for socio-demographic factors, health behaviour, physical illnesses, and the indicators of mental health. There was no significant attenuation in the strength of the association between job strain and burnout after adjustment for depressive symptoms and depressive disorders.

The odds ratios for depressive disorders in relation to job strain are presented in Table 14 (II). High-strain work and active work were associated with depressive disorders before, but not after, adjustment for burnout. No statistically significant interaction between job strain and gender was evident in the models for burnout and depressive disorders (p> 0.07).
4. RESULTS

Table 13. Odds ratios for burnout in relation to job strain

<table>
<thead>
<tr>
<th>Work</th>
<th>N</th>
<th>Cases</th>
<th>Adjusted(^a) odds ratio (95% CI(^a))</th>
<th>Adjusted(^b) odds ratio (95% CI(^b))</th>
<th>Adjusted(^c) odds ratio (95% CI(^c))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low strain</td>
<td>820</td>
<td>95</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Active</td>
<td>688</td>
<td>161</td>
<td>2.34 (1.75-3.12)</td>
<td>2.31 (1.72-3.11)</td>
<td>1.90 (1.39-2.60)</td>
</tr>
<tr>
<td>Passive</td>
<td>880</td>
<td>240</td>
<td>2.94 (2.24-3.86)</td>
<td>3.16 (2.38-4.19)</td>
<td>3.05 (2.25-4.13)</td>
</tr>
<tr>
<td>High strain</td>
<td>702</td>
<td>342</td>
<td>7.36 (5.62-9.65)</td>
<td>7.86 (5.99-10.3)</td>
<td>6.69 (5.06-8.82)</td>
</tr>
</tbody>
</table>

\(^a\) Adjusted for gender and age
\(^b\) Adjusted for gender, age, marital status, occupational grade, work hours, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, physical illnesses, and lifetime mental disorders
\(^c\) Adjusted for gender, age, marital status, occupational grade, work hours, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, physical illnesses, lifetime mental disorders, depressive symptoms, and depressive disorders

CI indicates confidence interval

Table 14. Odds ratios for depressive disorders in relation to job strain

<table>
<thead>
<tr>
<th>Work</th>
<th>N</th>
<th>Cases</th>
<th>Adjusted(^a) odds ratio (95% CI(^a))</th>
<th>Adjusted(^b) odds ratio (95% CI(^b))</th>
<th>Adjusted(^c) odds ratio (95% CI(^c))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low strain</td>
<td>820</td>
<td>37</td>
<td>1.00 (ref.)</td>
<td>1.00 (ref.)</td>
<td>1.00 (ref.)</td>
</tr>
<tr>
<td>Active</td>
<td>688</td>
<td>49</td>
<td>1.57 (1.03-2.38)</td>
<td>1.58 (1.01-2.49)</td>
<td>1.20 (0.76-1.91)</td>
</tr>
<tr>
<td>Passive</td>
<td>880</td>
<td>45</td>
<td>1.06 (0.69-1.63)</td>
<td>1.03 (0.63-1.66)</td>
<td>0.68 (0.41-1.13)</td>
</tr>
<tr>
<td>High strain</td>
<td>702</td>
<td>55</td>
<td>1.69 (1.11-2.58)</td>
<td>1.66 (1.03-2.66)</td>
<td>0.83 (0.52-1.34)</td>
</tr>
</tbody>
</table>

\(^a\) Adjusted for gender and age
\(^b\) Adjusted for gender, age, marital status, occupational grade, work hours, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, physical illnesses, and lifetime mental disorders
\(^c\) Adjusted for gender, age, marital status, occupational grade, work hours, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, physical illnesses, lifetime mental disorders, and burnout

CI indicates confidence interval
In conclusion, high job strain was related to burnout and to depressive disorders, but the association was stronger for burnout.

4.3 Association between occupational burnout and disorders and illnesses

Burnout and mental disorders

Of the employees with severe burnout, 45% had major depressive disorder or dysthymic disorder. The gender- and age-adjusted odds of having major depressive disorder or dysthymic disorder accompanied with mild-to-severe burnout was 5.0-fold (95% CI 3.9–6.6; II). When the depressive disorders also included minor depressive disorder, a depressive disorder was present in 53% of the participants with severe burnout, in 20% of the participants with mild burnout, and in 7% of the participants with no burnout. The weighted prevalence and odds ratios for depressive disorders are presented according to the level of burnout in Table 15 (III). Compared with the persons without burnout, those with a depressive disorder had a crude odds ratio that was 14-fold when severe burnout was present and 3.2-fold when mild burnout was present.

Burnout was related to major depressive disorder among both the men and the women, as was also severe burnout to dysthymic disorder. Mild but not severe burnout was related to minor depressive disorder among the men and women. Severe burnout was related to a substantial probability for major depressive disorder when compared with the situation with no burnout. For the men, the odds of severe burnout in relation to major depressive disorder were 44-fold, and for the women they were 18-fold. However, the gender difference was not statistically significant. Moreover among the men, mild burnout was also related to dysthymic disorder. Also the odds of mild burnout versus the situation of no burnout in relation to any depressive disorder were higher among the men than among the women (Table 15) (III).

The weighted prevalence and odds ratios for depressive disorders in relation to the separate dimensions of burnout are presented in Table 16 (III). A depressive disorder was diagnosed for 35% of those who had severe exhaustion, for 33% of those who had severe cynicism, and for
Table 15. Weighted prevalence (%) and odds ratios for depressive disorders in relation to the level of burnout according to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Any DD(^a) (391 cases)</th>
<th>Major DD(^a) (173 cases)</th>
<th>Dysthymic disorder(^b) (40 cases)</th>
<th>Minor DD(^a) (187 cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>prevalence</td>
<td>OR (95% CI)(^c)</td>
<td>N</td>
</tr>
<tr>
<td>Men and Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No burnout</td>
<td>2370</td>
<td>7.4</td>
<td>1.00</td>
<td>2.7</td>
</tr>
<tr>
<td>Mild burnout</td>
<td>822</td>
<td>20.3</td>
<td>3.20 (2.55-4.03)</td>
<td>9.0</td>
</tr>
<tr>
<td>Severe burnout</td>
<td>78</td>
<td>52.9</td>
<td>14.1 (9.22-21.7)</td>
<td>40.2</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No burnout</td>
<td>1196</td>
<td>4.3</td>
<td>1.00</td>
<td>1.2</td>
</tr>
<tr>
<td>Mild burnout</td>
<td>409</td>
<td>17.9</td>
<td>4.83 (3.34-6.98)</td>
<td>6.9</td>
</tr>
<tr>
<td>Severe burnout</td>
<td>32</td>
<td>46.1</td>
<td>19.0 (9.03-40.1)</td>
<td>34.1</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No burnout</td>
<td>1174</td>
<td>10.8</td>
<td>1.00</td>
<td>4.4</td>
</tr>
<tr>
<td>Mild burnout</td>
<td>413</td>
<td>23.0</td>
<td>2.46 (1.86-3.26)</td>
<td>11.2</td>
</tr>
<tr>
<td>Severe burnout</td>
<td>46</td>
<td>58.0</td>
<td>11.4 (6.21-20.9)</td>
<td>44.8</td>
</tr>
</tbody>
</table>

\(^a\) DD indicates depressive disorder
\(^b\) Of the participants with dysthymic disorder, 9 had a concurrent major depressive disorder and 10 had a concurrent minor depressive disorder
\(^c\) OR indicates odds ratio; CI indicates confidence interval; in the original publication (study III), risk ratios were used
### Table 16: Weighted prevalence (%) and odds ratios for depressive disorders in relation to the level of burnout dimensions

<table>
<thead>
<tr>
<th>Level of dimension</th>
<th></th>
<th>Any DD(^a) (391 cases)</th>
<th></th>
<th>Major DD(^a) (173 cases)</th>
<th></th>
<th>Dysthymic disorder(^b) (40 cases)</th>
<th></th>
<th>Minor DD(^a) (187 cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td>Prevalence OR (95% CI)(^c)</td>
<td></td>
</tr>
<tr>
<td>No exhaustion</td>
<td>2500</td>
<td>8.0 1.00</td>
<td>2.8 1.00</td>
<td>0.7 1.00</td>
<td>4.7 1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild exhaustion</td>
<td>602</td>
<td>20.5 2.96 (2.32-3.78)</td>
<td>9.9 3.82 (2.71-5.40)</td>
<td>2.3 3.50 (1.72-7.13)</td>
<td>8.8 1.95 (1.43-2.65)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe exhaustion</td>
<td>174</td>
<td>35.1 6.21 (4.43-8.70)</td>
<td>22.8 10.3 (6.84-15.4)</td>
<td>5.3 8.54 (3.69-19.7)</td>
<td>8.1 1.79 (1.01-3.16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No cynicism</td>
<td>2414</td>
<td>8.3 1.00</td>
<td>3.2 1.00</td>
<td>0.9 1.00</td>
<td>4.4 1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild cynicism</td>
<td>692</td>
<td>18.4 2.48 (1.94-3.17)</td>
<td>8.0 2.61 (1.90-3.59)</td>
<td>1.3 1.45 (0.63-3.34)</td>
<td>9.2 2.20 (1.60-3.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe cynicism</td>
<td>170</td>
<td>32.9 5.42 (3.86-7.62)</td>
<td>21.1 8.07 (5.33-12.2)</td>
<td>5.3 6.38 (2.76-14.5)</td>
<td>8.1 1.93 (1.08-3.45)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No lack of PE(^d)</td>
<td>2150</td>
<td>8.5 1.00</td>
<td>3.6 1.00</td>
<td>0.9 1.00</td>
<td>4.2 1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild lack of PE(^d)</td>
<td>922</td>
<td>16.7 2.17 (1.75-2.69)</td>
<td>6.9 1.97 (1.41-2.76)</td>
<td>1.7 2.08 (1.13-3.83)</td>
<td>8.2 2.04 (1.51-2.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe lack of PE(^d)</td>
<td>204</td>
<td>23.6 3.35 (2.33-4.80)</td>
<td>13.4 4.08 (2.60-6.41)</td>
<td>2.4 2.85 (1.06-7.70)</td>
<td>8.8 2.21 (1.36-3.59)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) DD indicates depressive disorder  
\(^b\) Of participants with dysthymic disorder, 9 had a concurrent major depressive disorder and 10 a concurrent minor depressive disorder  
\(^c\) OR indicates odds ratio; CI indicates confidence interval; in the original publication, risk ratios were used  
\(^d\) PE indicates professional efficacy
24% of those who had severely diminished professional efficacy. All of the dimensions of burnout, at both severe and mild levels, were significantly related to the occurrence of a depressive disorder. Concerning different depressive disorders, only the association between mild cynicism and dysthmic disorder was not statistically significant.

An anxiety disorder was present among 21% of the employees with severe burnout, among 8% with mild burnout, and among 2% with no burnout. The odds ratios for burnout in relation to anxiety disorders according to gender are presented in Table 17 (unpublished data). Burnout was a significant correlate of anxiety disorders for both genders. For the anxiety disorders, each 1-point increase in the burnout sum score was associated with a 129% increase in the odds for anxiety disorders among the men and a 105% increase among the women. These associations did not attenuate after adjustment for socio-demographic factors.

Table 17. Odds ratios of burnout for anxiety disorders according to gender

<table>
<thead>
<tr>
<th>Anxiety disorders</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>N</td>
<td>Cases</td>
<td>Odds ratio (95% CI)</td>
<td>Adjusteda odds ratio (95% CI)</td>
</tr>
<tr>
<td>Men</td>
<td>1608</td>
<td>46</td>
<td>2.29 (1.83-2.85)</td>
<td>2.30 (1.81-2.93)</td>
</tr>
<tr>
<td>Women</td>
<td>1601</td>
<td>79</td>
<td>2.05 (1.71-2.47)</td>
<td>2.08 (1.72-2.51)</td>
</tr>
</tbody>
</table>

* Adjusted for age, marital status, and basic education

b CI indicates confidence interval

Table 18. Odds ratios of burnout for alcohol dependence according to gender

<table>
<thead>
<tr>
<th>Alcohol dependence</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>N</td>
<td>Cases</td>
<td>Odds ratio (95% CI)</td>
<td>Adjusteda odds ratio (95% CI)</td>
</tr>
<tr>
<td>Men</td>
<td>1622</td>
<td>112</td>
<td>1.51 (1.27-1.78)</td>
<td>1.51 (1.28-1.79)</td>
</tr>
<tr>
<td>Women</td>
<td>1629</td>
<td>25</td>
<td>1.80 (1.35-2.40)</td>
<td>2.06 (1.52-2.81)</td>
</tr>
</tbody>
</table>

* Adjusted for age, marital status, and basic education

b CI indicates confidence interval
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Alcohol dependence was present among 10% of all the employees with severe burnout, among 7% of those with mild burnout, and among 3% of those with no burnout. Burnout was a significant correlate of alcohol dependence for both genders. The odds ratios for burnout in relation to alcohol dependence are presented in Table 18 (IV) according to gender. For alcohol dependence, each 1-point increase in the burnout sum score was associated with an 80% increase in the odds for alcohol dependence among the women and a 51% increase among the men. The associations remained significant after adjustment for socio-demographic factors.

**Burnout and musculoskeletal disorders**

Of the persons with severe burnout, 47% had a musculoskeletal disorder compared with 36% of those with mild burnout and with 28% of those with no burnout. The weighted prevalence of musculoskeletal disorders increased with the level of burnout for both genders (Table 19) (V). The prevalence of musculoskeletal disorders increased also with the level of all three dimensions of burnout in the whole study population (Table 20) (V).

The odds ratios for musculoskeletal disorders in relation to burnout are presented in Table 21 (V) according to gender. Among the women, burnout was significantly related to musculoskeletal disorders even when socio-demographic factors, the physical strenuousness of work, health behaviour, and depressive symptoms were adjusted for. After these ad-

<table>
<thead>
<tr>
<th>Burnout</th>
<th>All</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Prevalence</td>
<td>N</td>
<td>Prevalence</td>
</tr>
<tr>
<td>No</td>
<td>2438</td>
<td>27.6</td>
<td>1228</td>
<td>28.3</td>
</tr>
<tr>
<td>Mild</td>
<td>849</td>
<td>36.1</td>
<td>422</td>
<td>33.9</td>
</tr>
<tr>
<td>Severe</td>
<td>81</td>
<td>46.7</td>
<td>33</td>
<td>51.1</td>
</tr>
</tbody>
</table>

$X^2$ (df), p 32.5 (2), <.001 11.3 (2), <.01 24.5 (2), <.001
4. RESULTS

justments, each 1-point increase in burnout score was related to a 22% increase in the odds for musculoskeletal disorders. Among the men, the association between burnout and musculoskeletal disorders was not significant after depressive symptoms were adjusted for.

Table 20. Weighted prevalence (%) of musculoskeletal disorders according to the level of the burnout dimensions

<table>
<thead>
<tr>
<th>Level</th>
<th>Exhaustion</th>
<th>Cynicism</th>
<th>Lack of PE*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Prevalence</td>
<td>N</td>
</tr>
<tr>
<td>No</td>
<td>2571</td>
<td>27.3</td>
<td>2481</td>
</tr>
<tr>
<td>Mild</td>
<td>617</td>
<td>38.6</td>
<td>714</td>
</tr>
<tr>
<td>Severe</td>
<td>180</td>
<td>43.2</td>
<td>173</td>
</tr>
</tbody>
</table>

\( \chi^2 (df), p \) 42.7 (2), <.001 22.6 (2), <.001 16.4 (2), <.01

*PE indicates professional efficacy

Table 21. Odds ratios of burnout for musculoskeletal disorders according to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Odds ratio (95% CI)</th>
<th>Adjusted(^a) odds ratio (95% CI)</th>
<th>Adjusted(^b) odds ratio (95% CI)</th>
<th>Adjusted(^c) odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>1628</td>
<td>1.25 (1.11-1.40)</td>
<td>1.21 (1.08-1.36)</td>
<td>1.20 (1.06-1.35)</td>
<td>1.08 (0.93-1.25)</td>
</tr>
<tr>
<td>Women</td>
<td>1596</td>
<td>1.39 (1.25-1.56)</td>
<td>1.29 (1.16-1.45)</td>
<td>1.31 (1.17-1.47)</td>
<td>1.22 (1.07-1.38)</td>
</tr>
</tbody>
</table>

\(^a\) Adjusted for age, marital status, basic education, occupational grade, and physical strenuousness of work

\(^b\) Adjusted for age, marital status, basic education, occupational grade, physical strenuousness of work, daily smoking, alcohol consumption, health-enhancing physical activity, and body mass index

\(^c\) Adjusted for age, marital status, basic education, occupational grade, physical strenuousness of work, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, and depressive symptoms

\(^d\) CI indicates confidence interval
4. RESULTS

Burnout and cardiovascular diseases

Of the persons with severe burnout, 28% had a cardiovascular disease compared with 20% of those with mild burnout and with 14% of those without burnout. The weighted prevalence of cardiovascular diseases increased statistically significantly with the level of burnout among the men (Table 22) (V). The prevalence of cardiovascular diseases increased with the severity of all three dimensions of burnout in the whole study population (Table 23) (V).

The odds ratios for cardiovascular diseases in relation to burnout are presented in Table 24 (V). Among the men, burnout was significantly

---

Table 22. Weighted prevalence (%) of cardiovascular diseases according to the level of burnout

<table>
<thead>
<tr>
<th>Burnout</th>
<th>All</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Prevalence</td>
<td>N</td>
</tr>
<tr>
<td>No</td>
<td>2438</td>
<td>14.3</td>
<td>1228</td>
</tr>
<tr>
<td>Mild</td>
<td>849</td>
<td>19.5</td>
<td>422</td>
</tr>
<tr>
<td>Severe</td>
<td>81</td>
<td>27.6</td>
<td>33</td>
</tr>
</tbody>
</table>

\( \chi^2 \) (df), p 23.1 (2), <.001 24.0 (2), <.001 4.00 (2), n.s.

Table 23. Weighted prevalence (%) of cardiovascular diseases according to the level of the burnout dimensions

<table>
<thead>
<tr>
<th>Level</th>
<th>Exhaustion</th>
<th></th>
<th>Cynicism</th>
<th></th>
<th>Lack of PE*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Prevalence</td>
<td>N</td>
<td>Prevalence</td>
<td>N</td>
</tr>
<tr>
<td>No</td>
<td>2571</td>
<td>14.5</td>
<td>2481</td>
<td>14.8</td>
<td>2209</td>
</tr>
<tr>
<td>Mild</td>
<td>617</td>
<td>19.7</td>
<td>714</td>
<td>17.1</td>
<td>948</td>
</tr>
<tr>
<td>Severe</td>
<td>180</td>
<td>23.3</td>
<td>173</td>
<td>27.8</td>
<td>211</td>
</tr>
</tbody>
</table>

\( \chi^2 \) (df), p 20.3 (2), <.001 21.6 (2), <.001 18.7 (2), <.001

*PE indicates professional efficacy
4. RESULTS

Table 24. Odds ratios of burnout for cardiovascular diseases according to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Odds ratio (95% CI)</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>Adjusted odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>1628</td>
<td>1.38 (1.22-1.56)</td>
<td>1.35 (1.17-1.54)</td>
<td>1.34 (1.16-1.54)</td>
<td>1.35 (1.13-1.61)</td>
</tr>
<tr>
<td>Women</td>
<td>1598</td>
<td>1.23 (1.07-1.41)</td>
<td>1.03 (0.88-1.21)</td>
<td>1.05 (0.90-1.23)</td>
<td>0.96 (0.81-1.13)</td>
</tr>
</tbody>
</table>

* Adjusted for age, marital status, basic education, occupational grade, and physical strenuousness of work

* Adjusted for age, marital status, basic education, occupational grade, physical strenuousness of work, daily smoking, alcohol consumption, health-enhancing physical activity, and body mass index

* Adjusted for age, marital status, basic education, occupational grade, physical strenuousness of work, daily smoking, alcohol consumption, health-enhancing physical activity, body mass index, and depressive symptoms

* CI indicates confidence interval

related to cardiovascular diseases, even when socio-demographic factors, the physical strenuousness of work, health behaviour, and depressive symptoms were adjusted for. After these adjustments, each 1-point increase in the burnout score was related to a 35% increase in the odds for cardiovascular disease among the men. Among the women, the association between burnout and cardiovascular diseases was not significant after the socio-demographic factors and the physical strenuousness of work were adjusted for.

Co-occurrence of burnout with mental disorders and physical illnesses

With the dichotomy of “no burnout” versus “mild-to-severe burnout”, 27.2% of the participants had burnout in this study. The co-occurrence of mild-to-severe burnout with mental disorders and physical illness in the total sample is presented in Figure 2 (unpublished data). Mental disorders included depressive disorders (i.e., major depressive disorder and dysphymic disorder), anxiety disorders, and alcohol use disorders, and physical illnesses included cardiovascular diseases, musculoskeletal disorders, respiratory illnesses, and a group of other physical illnesses. Participants were included in every combination of burnout and dis-
4. RESULTS

Mild-to-severe burnout
6.8% 3.1%

Mental disorders
4.6% 3.6%

Physical illnesses
12.7% 4.6%

No burnout or disorders
34.2%

Figure 2. Co-occurrence of mild-to-severe burnout with mental disorders and physical illnesses in the total sample (weighted prevalences, adding up to 100% of N = 3211)

Severe burnout
0.2% 0.5%

Mental disorders
0.9% 6.2%

Physical illnesses
0.7% 8.3%

No severe burnout or disorders
46.2%

Figure 3. Co-occurrence of severe burnout with mental disorders and physical illnesses in the total sample (weighted prevalences, adding up to 100% of N = 3211)

orders. Mild-to-severe burnout co-occurred with physical illnesses in 17.3% of the cases and with mental disorders in 7.7% of the cases in the total sample.

A severe level of burnout was present in 2.3% of the participants. The co-occurrence of severe burnout with mental disorders and physical
4. RESULTS

Table 25. Summary of the weighted prevalence (%) of common mental disorders, musculoskeletal disorders, and cardiovascular diseases according to the level of burnout

<table>
<thead>
<tr>
<th>Level of burnout</th>
<th>Depressive disorders</th>
<th>Anxiety disorders</th>
<th>Alcohol dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>3.2</td>
<td>2.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Mild</td>
<td>10.8</td>
<td>7.6</td>
<td>6.7</td>
</tr>
<tr>
<td>Severe</td>
<td>45.3</td>
<td>21.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of burnout</th>
<th>Musculoskeletal disorders</th>
<th>Cardiovascular diseases</th>
<th>No disorder or illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>27.6</td>
<td>14.3</td>
<td>41.2</td>
</tr>
<tr>
<td>Mild</td>
<td>36.1</td>
<td>19.5</td>
<td>25.8</td>
</tr>
<tr>
<td>Severe</td>
<td>46.7</td>
<td>27.6</td>
<td>9.6</td>
</tr>
</tbody>
</table>

illness among all the participants is presented in Figure 3 (unpublished data). Again, participants were included in every combination of burnout and disorders. Severe burnout co-occurred with physical illnesses in 1.6% of all the cases and with mental disorders in 1.4% of all the cases in this study.

The weighted prevalence of depressive disorders, anxiety disorders, alcohol dependence, musculoskeletal disorders, and cardiovascular diseases is summarized in Table 25 according to the level of burnout. Of those with severe burnout, 47% had a musculoskeletal disorder, and 45% had a depressive disorder. Ten per cent of those with severe burnout did not have any co-occurring disorder or illness.

**Brief summary**

Burnout co-occurred to a high extent with mental disorders and physical illnesses. There was a significant association between burnout and depressive disorders, anxiety disorders, and alcohol dependence for both genders, between burnout and musculoskeletal disorders among the women, and between burnout and cardiovascular diseases among the men.
4.4 Contribution of occupational burnout to long sickness absences

The association between burnout and the existence of at least one long sickness absence during a 2-year period is presented in Table 26 (VI). Burnout was positively associated with sickness absence for both genders after adjustment for the socio-demographic factors and mental disorders. After additional adjustment for physical illnesses, severe burnout was still positively related to sickness absence for both genders. The adjusted odds of having a long absence with severe burnout were 6.9-fold for the men and 2.1-fold for the women when compared with the situation with no burnout. However, the gender difference was not statistically significant. In contrast to men's results, the women's association between mild burnout and sickness absence was also statistically significant after adjustment for physical illnesses.

Table 26. Odds ratios for having a long medically certified sickness absence during 2 years in relation to the level of burnout according to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Number of absences</th>
<th>Adjusted\textsuperscript{a} odds ratio (95% CI)</th>
<th>Adjusted\textsuperscript{b} odds ratio (95% CI)</th>
<th>Adjusted\textsuperscript{c} odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No burnout</td>
<td>1154</td>
<td>162</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Mild burnout</td>
<td>393</td>
<td>79</td>
<td>1.42 (1.05 - 1.92)</td>
<td>1.37 (1.00 - 1.86)</td>
<td>1.26 (0.93 - 1.71)</td>
</tr>
<tr>
<td>Severe burnout</td>
<td>29</td>
<td>18</td>
<td>8.00 (3.09 - 20.7)</td>
<td>7.21 (2.69 - 19.4)</td>
<td>6.87 (2.65 - 17.8)</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No burnout</td>
<td>1138</td>
<td>239</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Mild burnout</td>
<td>389</td>
<td>127</td>
<td>1.71 (1.31 - 2.22)</td>
<td>1.60 (1.23 - 2.09)</td>
<td>1.55 (1.18 - 2.03)</td>
</tr>
<tr>
<td>Severe burnout</td>
<td>44</td>
<td>21</td>
<td>2.82 (1.49 - 5.37)</td>
<td>2.15 (1.12 - 4.11)</td>
<td>2.10 (1.10 - 4.01)</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Adjusted for age, marital status, and occupational status  
\textsuperscript{b} Adjusted for age, marital status, occupational status, and mental disorders  
\textsuperscript{c} Adjusted for age, marital status, occupational status, mental disorders, and physical illnesses  
\textsuperscript{d} CI indicates confidence interval
Table 27. Difference in the mean number of compensated sickness absence days during a 2-year period among employees with at least one long absence according to burnout, mental disorders, and physical illness

<table>
<thead>
<tr>
<th>Burnout</th>
<th>Mean number of absence days</th>
<th>Difference a</th>
<th>p-value b</th>
<th></th>
<th>Mean number of absence days</th>
<th>Difference a</th>
<th>p-value b</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>162</td>
<td>33.8</td>
<td>0.00</td>
<td>239</td>
<td>33.2</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>79</td>
<td>47.7</td>
<td>12.3</td>
<td>0.407</td>
<td>127</td>
<td>38.2</td>
<td>0.32</td>
</tr>
<tr>
<td>Severe</td>
<td>18</td>
<td>93.2</td>
<td>55.2</td>
<td>&lt;0.001</td>
<td>21</td>
<td>83.0</td>
<td>41.4</td>
</tr>
<tr>
<td>Mental disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>196</td>
<td>40.8</td>
<td>0.00</td>
<td></td>
<td>309</td>
<td>34.5</td>
<td>0.00</td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
<td>46.2</td>
<td>7.97</td>
<td>0.105</td>
<td>78</td>
<td>47.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Physical illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>68</td>
<td>22.5</td>
<td>0.00</td>
<td></td>
<td>116</td>
<td>27.5</td>
<td>0.00</td>
</tr>
<tr>
<td>Yes</td>
<td>191</td>
<td>49.1</td>
<td>22.6</td>
<td>0.007</td>
<td>271</td>
<td>41.2</td>
<td>11.4</td>
</tr>
</tbody>
</table>

a Adjusted for age, marital status, and occupational status
b Number of days was log-transformed before the analyses
4. RESULTS

Among the men with co-occurring disorders, severe burnout was related to 7.7-fold odds (95% CI 3.2–18.4) for sickness absence compared with the situation of no burnout (OR for mild burnout 1.3, 95% CI 0.9–1.8). Among the women with co-occurring disorders, the respective probability of severe burnout for sickness absence was 2.6-fold (95% CI 1.3–5.1), and that for mild burnout was 1.5-fold (95% CI 1.1–2.0).

The number of compensated sickness absence days in relation to burnout among those who had at least one long absence is presented in Table 27 (VI). Among the participants with absences, the number of sickness absence days was significantly associated with burnout among the men but not among the women. The men with severe burnout had 55 excess sickness absence days over the 2-year period when compared with the men without burnout after socio-demographic factors were adjusted for. In comparison, having a physical illness was related to 23 excess days among the men. The association between sickness absence days and severe burnout remained statistically significant among the men even after adjustment for co-occurring common mental disorders and physical illnesses. In this adjusted model, the men with severe burnout had 52 excess sickness absence days (p=0.002) over the 2-year period. The women with severe burnout had 41 excess sickness absence days after adjustment for socio-demographic factors, but this association did not reach statistical significance.

Concerning the results for the fourth study question, the contribution of burnout to work disability, it can be concluded that burnout was related to long medically certified sickness absences for both genders. The association between severe burnout and sickness absence was independent of co-occurring common mental disorders and physical illnesses.
5. DISCUSSION

5.1. Synopsis of the main findings

In this representative sample of the Finnish working population aged 30 years or over, the prevalence of severe burnout was 2.3%, while some symptoms of burnout, from mild to severe, were present in 27% of the cases. Employees aged 55 years or over had higher odds of having symptoms of burnout than the younger ones did. Manual workers and those unmarried had higher odds of mild-to-severe burnout than the other groups of participants. Especially among the women, those who had not finished comprehensive school had a higher level of burnout than the women who had comprehensive schooling. Moreover, the women in manual work scored higher on the exhaustion dimension of burnout than the women in lower-level non-manual work or self-employment did. They also scored higher on cynicism and lower on the professional efficacy dimension than the women in non-manual work did. Especially among the men, the level of cynicism was higher among those unmarried than among those married.

High job strain was associated with higher odds of having mild-to-severe burnout and a depressive disorder than low job strain was. Of these, the association with burnout was stronger, and it remained after adjustment for the indicators of mental health. In contrast, the associations between job strain and depressive disorders disappeared after adjustment for burnout. Unlike depressive disorders, burnout was also related to active and passive work after adjustments.

Burnout and all of its three sub-dimensions were associated with depressive disorders for both genders. Forty-five per cent of the employees with severe burnout also had a depressive disorder; when minor depressive disorder was also included among the depressive disorders, the
5. DISCUSSION

corresponding percentage was 53%. Both severe and mild burnout was related to major depressive disorder and dysthymic disorder, while mild burnout was also related to minor depressive disorder. The odds for any depressive disorder among the employees with mild burnout were higher among the men than among the women. Of the employees with severe burnout, 21% suffered from an anxiety disorder, and 10% had alcohol dependence. The associations between burnout and anxiety disorders and alcohol dependence remained for both genders after adjustment for socio-demographic factors.

Burnout and all of its three sub-dimensions were related to musculoskeletal disorders and cardiovascular diseases in the total sample. Among the participants with severe burnout, a musculoskeletal disorder was present in 47% of the cases, and a cardiovascular disease occurred in 28% of the cases. After adjustment for socio-demographic factors, the physical strenuousness of work, health behaviour, and depressive symptoms, burnout was associated with cardiovascular diseases only among the men and with musculoskeletal disorders only among the women. Ten per cent of those with severe burnout had no co-occurring disorder or illness.

The odds of having at least one long medically certified sickness absence during a 2-year period were higher for the employees with burnout than for their colleagues free of burnout. For the men who had at least one long absence in 2 years, severe burnout was associated with 55 compensated sickness absence days in addition to 9 days' qualifying period. For the women, the corresponding number was 41 days, but it did not reach statistical significance. For both genders, severe burnout was associated with sickness absence even after adjustment for co-occurring common mental disorders and physical illnesses. Among the women, mild burnout was also independently associated with sickness absence.

5.2 Occupational burnout in the arena of occupational health psychology

Burnout and ill health

Depressive and anxiety disorders

The observed positive association between burnout and depressive disorders in this population-based sample supports the concept that burnout
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and depression are associated; they seem to co-occur at a high rate. This finding is in agreement with the numerous positive associations found earlier between burnout and depressive symptoms in different kinds of samples (Meier 1984, Firth et al. 1986, Landsbergis 1988, Seidman & Zager 1991, Glass et al. 1993, McKnight & Glass 1995, Baba et al. 1999, Sears et al. 2000, Roelofs et al. 2005, Lindblom et al. 2006). Furthermore, the present results are in line with the findings of two earlier studies that explored the associations between burnout and depressive disorders in selected samples (Belcastro & Hayes 1984, Kinnunen et al. 2004).

Mild and severe levels of the three dimensions of burnout (i.e., exhaustion, cynicism, and diminished professional efficacy) were all associated with an increased probability of depressive disorders and, therefore, supported the syndrome quality of burnout. These associations are in line with the results of six earlier studies (Firth et al. 1986, Landsbergis 1988, McKnight & Glass 1995, Sears et al. 2000, Roelofs et al. 2005, Lindblom et al. 2006), but are contrary to the results of four studies concerning human service work in which only some of the burnout dimensions were related to depressive symptoms. Two small-scale studies found only the exhaustion dimension, which has usually shown the strongest associations with depression (Firth et al. 1986, Landsbergis 1988, McKnight & Glass 1995, Sears et al. 2000, Lindblom et al. 2006), to be related to depressive symptoms (Lemkau et al. 1988, Tselenis et al. 2001). Another study, which used a modified version of the Maslach Burnout Inventory and a mean split of the dimensional burnout scores, found high levels of exhaustion and diminished professional efficacy to be associated with depressive symptoms (Jayaratne et al. 1986). Furthermore, in logistic regression analyses, only exhaustion and depersonalization, categorized with tertiles, showed a significant association with depressive symptoms, as assessed with the Depression Scale by the Center for Epidemiologic Studies (Martin et al. 1997). Therefore, at least when considered in relation to depressive disorders, burnout could be considered a single work-related construct, even though consisting of three dimensions.

The present study confirmed a positive association also between burnout and anxiety disorders. Such an association has been suggested earlier by five studies showing a relationship between high levels of burnout syndrome or the three dimensions of burnout and a high level of state and trait anxiety among the Swedish working population (Lindblom et
5. DISCUSSION

al. 2006), in samples of human service work (Richardsen et al. 1992, Corrigan et al. 1995, Turnipseed 1998), and among patients with work-related problems (Roelofs et al. 2005).

Depressive and anxiety disorders are assumed to result from complex interlinked genetic, temperamental, and past and present environmental influences (Kendler et al. 1993, 2002 & 2006, Merikangas 2005, Caspi & Moffitt 2006). In the psychiatric literature, common risk factors for these disorders have included, for example, female gender, low socioeconomic position and security, the presence of physical illnesses, previous mental disorders, and a low level of social support (Salokangas & Poutanen 1998, Gruenberg & Goldstein 2003, Merikangas 2005, Rihmer & Angst 2005). Stressors, such as work-related life events, have also been found to precede the onset of depressive and anxiety disorders (Kessler 1997, Tennant 2001, Standfeld 2002, Leskelä et al. 2004, Wilhelm et al. 2004, Standfeld & Candy 2006).

It is possible that burnout is a part of the process leading to the development of depression or anxiety in situations in which the predisposing stressor is work-related (Greenglass & Burke 1990, Golembiewski et al. 1992, Leiter & Durup 1994, Iacovides et al. 1999, Bakker et al. 2000a, Hillhouse et al. 2000, Standfeld 2002, Iacovides et al. 2003). According to a recent hypothesis, adverse psychosocial work characteristics may affect mental health through a psychological pathway of injured self-esteem via erosion in the feelings of mastery in an adverse work situation (Standfeld & Candy 2006). Burnout could partly indicate this erosion of mastery and therefore be associated with depressive or anxiety disorders. Erosion in the feelings of mastery over the work situation closely resembles the dimension of diminished professional efficacy in the three-dimensional definition of burnout (Maslach & Jackson 1996).

However, the relationship between burnout and depressive or anxiety disorders could also be reversed. Employees with mental health problems may face difficulties in meeting their job demands or drift into jobs with low resources, or they may artificially perceive their work situation more negatively (de Lange et al. 2005) and thus show higher levels of burnout. Employees with various chronic illnesses, including depressive and anxiety disorders, reported higher levels of exhaustion in a cross-sectional study among university employees (Donders et al. 2007). Support for bi-directional associations between low mental health and negatively
perceived work characteristics have been found in prospective studies (de Jonge et al. 2001, de Lange et al. 2004). However, the pathway from health to work was less prominent than the one from work to health in these studies.

Previous findings on the temporal order between burnout and depressive symptoms are mixed. One longitudinal study supported prospective associations from the burnout dimensions to depressive symptoms (Greenglass & Burke 1990), another from depressive symptoms to exhaustion (McCranie & Bransma 1988), while a third failed to find support for either of these sequences. In the last study (McKnight & Glass 1995), burnout and depression were suggested to develop "in tandem". In a recent prospective study, in which well-being at baseline was taken into account, both of the sequences, from burnout to depression and from depression to burnout, emerged (Ahola & Hakanen 2007), supporting a bi-directional association also between burnout and mental health.

Alcohol dependence

The present results on mental disorders supported a positive association between burnout and alcohol dependence. This association is in agreement with two previous cross-sectional studies that found evidence indicating that work-related exhaustion is related to the screened risk for alcohol dependence (Cunradi et al. 2003, Winwood et al. 2003). Alcohol dependence is a mental disorder, which is assumed to develop as a consequence of a complex interplay between individual vulnerability, environmental risk factors, and pathological neural learning during repetitive use (Kaprio et al. 1987, Heath & Nelson 2002, Hyman 2005, Schuckit 2005). Individual vulnerability for alcohol problems is thought to include a familiar risk of the sensitized effects of alcohol use, the positive expectancy of the effects of alcohol, and the low personal and social resources for responding adaptively to stressors (Cooper et al. 1990 & 1992, Zimmermann et al. 2004).

Could a stressful work environment be an underlying factor for the observed association between burnout and alcohol dependence? Prospective associations have been found between adverse psychosocial work characteristics and an elevated risk for alcohol dependence, and these associations indicate that work stress is one possible environmental risk
factor for this disorder. In the North American Epidemiologic Catchment Area Program, high job strain was found to be a significant predictor of alcohol use disorders among men (Crum et al. 1995). The Whitehall II study among British civil servants showed that psychosocial work characteristics predisposed both men and women to a risk of alcohol dependence; effort-reward imbalance was a crucial factor for the men and low decision latitude was important for the women (Head et al. 2004). These results on work stress as an environmental risk factor for alcohol dependence are in accordance with the present result of a positive association between burnout, a possible consequence of chronic work stress, and alcohol dependence. However, as the development of burnout is related to a self-perpetuating process due to inadequate coping strategies (Schaufeli & Enzmann 1998), it is also possible that employees with low personal and social resources are vulnerable to both burnout and addictive behaviour in demanding work situations. Indeed, inadequate coping strategies have been suggested to be an essential element behind both burnout (Schaufeli & Enzmann 1998) and serious alcohol problems (Cooper et al. 1992).

The association between burnout and alcohol dependence can also derive from a connection between stress, craving for stress relief, and addictive behaviour on a neurobiological level (Brady & Sonne 1999). It has been theoretically proposed that stressful experiences and addictive behaviour may share common neural pathways involving dopamine receptors in the limbic system. Stress from disappointed reward expectancies due to unfavourable social exchange has been suggested to trigger neuro-regulatory dysfunction in reward-sensitive brain areas and further mitigate compensatory addictive behaviour (Siegrist 2000 & 2002, Hyman 2005). This process may be especially pronounced among persons with a familiar vulnerability for stronger dampening effects of alcohol in stress situations (Zimmermann et al. 2004). In this way, socio-environmental and personal factors can interact in shaping the complex patterns behind alcohol dependence at the neural level (Heath & Nelson 2002).

Musculoskeletal disorders

The robust positive association in the present study between burnout and musculoskeletal disorders independently of socio-demographic factors,
5. DISCUSSION

the physical strenuousness of work, and health behaviour is in line with the associations between burnout and musculoskeletal pain reported in two earlier studies (Soares & Jablonska 2004, Miranda et al. 2005). Musculoskeletal disorders are multi-factorial in nature; individual, environmental, and psychosocial factors affect their development (Hagberg et al. 1995). Exposure to work-related biomechanical and psychosocial factors has been found to be associated with musculoskeletal disorders (Bongers et al. 1993, Hagberg et al. 1995, Punnet & Herbert 2000, National Research Council and the Institute of Medicine 2001). In addition to direct pathways between work characteristics and musculoskeletal disorders, including repetitive work affecting muscles and joints and work stress increasing muscle tension, experienced strain has also been shown to mediate between work characteristics and the interpretation and reporting of musculoskeletal problems (Bongers et al. 1993, 2002, Ariëns et al. 2001, National Research Council and the Institute of Medicine 2001, Lundberg et al. 2002, Larsman et al. 2006).

The direct and indirect links between work characteristics and musculoskeletal disorders may also explain the observed association between burnout and these disorders. On the other hand, the association may also be reversed so that a musculoskeletal disorder and a related decrease in one’s work ability may have a negative effect on the capability of a worker to cope with his or her previous job demands and thus increase the risk of burnout (Hallman et al. 2003, Donders et al. 2007).

Cardiovascular diseases

The positive unadjusted association between burnout and clinically determined cardiovascular diseases is in agreement with similar results on burnout and self-reported cardiovascular disease in previous studies (Belcastro 1982, Hallman et al. 2003). In addition, it is consistent with earlier studies reporting associations between exhaustion and coronary risk factors (Melamed et al. 2006), such as increased levels of total cholesterol, low-density lipoprotein cholesterol, triglycerides, and uric acid, as well as elevated diastolic blood pressure (Melamed et al. 1992) and inflammatory biomarkers (Grossi et al. 2003). Although chronic stress has also been associated with an increased secretion of the stress hormone cortisol at awakening, the results on burnout or exhaustion
5. DISCUSSION


The observed association between burnout and cardiovascular diseases is in line with the previous findings showing a prospective association between work stress and cardiovascular disease. (For a meta-analysis of prospective cohort studies see Kivimäki et al. 2006b.) The adverse effect of sustained work stress on cardiovascular disease may be accounted for by several mechanisms (McEwen & Stellar 1993, Maier & Watkins 1998, Kiecolt-Glaser et al. 2002, Siegrist 2002, Epel et al. 2004, 2006, Chandola et al. 2006). The prolonged hyperactivity of the physiological stress mechanisms (i.e., the sympathetic-adrenergic-medullar system and the hypothalamic-pituitary-adrenal system), which slow the organism’s basic reparatory functions in order to reallocate energy and prepare the body to meet the increased demands of the perceived situation (Frankenhauser 1989, Brunner 1997), may predispose a person to cardiovascular disease through the wear and tear of the organism (i.e., accumulation of the so-called allostatic load) (McEwen & Stellar 1993, McEwen 1998a & 1998b). Psychosocial work characteristics can also affect cardiovascular disease through negative emotions (Musselman et al. 1998, Kiecolt-Glaser et al. 2002, Belkic et al. 2004, Everson-Rose & Lewis 2005, Suls & Bunde 2005). In addition, chronic work stress may influence cardiovascular disease indirectly through an unhealthy life style, often associated with chronic strain, in particular low leisure-time physical activity, overweight, cigarette smoking, and heavy alcohol consumption, or their co-manifestation (Kouvonen et al. 2005, Siegrist & Rödel 2006, Kouvonen et al. 2007).

Summary

It has previously been suggested that burnout is related to ill health. The present results from a representative sample of the Finnish working population over 30 years of age strongly support this hypothesis. Burnout showed a marked overlap with mental disorders and physical illnesses.
5. DISCUSSION

Because work stress has previously been shown to predispose people to depressive and anxiety disorders, alcohol dependence, musculoskeletal problems, and cardiovascular disease, it is plausible that burnout, as a consequence of chronic work stress, is related to these disorders. On the other hand, ill health has been shown to be related to exhaustion and a negative evaluation of work characteristics. Therefore, it is also possible that health problems predispose a person to burnout.

Distinction between burnout and ill health

Association with work characteristics

The consistent correlations between burnout and depressive symptoms (Meier 1984, Firth et al. 1986, Landsbergis 1988, Seidman & Zager 1991, Glass et al. 1993, McKnight & Glass 1995, Baba et al. 1999, Sears et al. 2000, Roelofs et al. 2005, Lindblom et al. 2006) have raised the question of whether burnout is conceptually redundant to depression. This study provided an opportunity to compare the work-related associations between burnout and depression and to evaluate the possible redundancy of these concepts in relation to one health-related aspect of the psychosocial work environment, the job strain.

In this study, work stress was operationalized according to the job strain model, which has previously successfully predicted various manifestations of ill health (van der Doef & Maes 1999, de Lange et al. 2003, Kivimäki et al. 2006b, Standsfeld & Candy 2006). High job strain, when compared with low job strain, was related to burnout. This finding strengthens the previous evidence on the association between job strain and burnout, which has, to date, mainly been based on findings concerning exhaustion (Rafferty 1987, Landsbergis 1988, Melamed et al. 1991, Bourbonnais et al. 1998, 1999). The association between high job strain and burnout was independent of the indicators of mental health. As a new contribution of the present study, the association between high job strain and depressive disorders was found to be fully dependent on burnout. In other words, after burnout was taken into account, there was no direct relationship between job strain and depressive disorders.

Causal chains such as mediated effects cannot be inferred from cross-sectional observational epidemiological data. However, such data can be
5. DISCUSSION

used to test whether the observed associations are consistent with what one would expect if the path from job strain to burnout to depression were causal.

In the present study, both of the operational criteria that would demonstrate a mediated effect of burnout between job strain and depressive disorders were met (Kenny 2005). Firstly, an association between burnout and depression was documented. Secondly, job strain was shown to be associated with depression, but only when burnout was not accounted for; the association between job strain and depressive disorders disappeared after adjustment for burnout. This kind of mediational effect of burnout between job strain and depressive symptoms was recently demonstrated also in a 3-year prospective study among dentists (Ahola & Hakanen 2007). Burnout has further been shown to mediate between work characteristics and health in studies in which health was indicated by sickness absence (Bakker et al. 2003) or psychosomatic complaints (Schaufeli & Bakker 2004). However, these elaborations need to be verified with longitudinal data on depressive disorders among various occupations to establish the direction of the associations and true causality between work, burnout, and depression.

The job strain model postulates that high job strain is a risk factor for mental strain and health problems, while active work with high demands and control is hypothesized to lead to average strain but also to favourable consequences, for example, work motivation and the development of new behaviour patterns (Karasek & Theorell 1990). When compared with low job strain in the present study, active work and passive work were related to an increased probability for burnout after adjustment for mental health. These associations are in accordance with the findings of previous studies on burnout (Landbergis 1988) and exhaustion (Kauppinen-Toropainen et al. 1983, Bourbonnais et al. 1998, 1999). The observed probabilities related to active and passive work in the present study were smaller than the one related to high-strain work. Corresponding associations were not found between active and passive work and depressive disorders. These results strengthen the proposed differential associations with work characteristics for burnout and depression (Warr 1987, Maslach et al. 2001).
5. DISCUSSION

Association with work disability

The observed positive association between burnout and long medically certified sickness absence is in line with earlier results that have shown high work-related exhaustion to be associated with an increased prevalence of self-reported sickness absence in a Swedish working population (Hallsten et al. 2002), human service work (Borritz et al. 2006), and transportation work (Cunradi et al. 2005) and burnout to predict increased company-registered (Bakker et al. 2003) and medically certified absences (Toppinen-Tanner et al. 2005).

As an original contribution of the present study, it was shown that severe burnout had a positive association with long medically certified sickness absence independently of co-existing common mental disorders and physical illnesses in a nationally representative sample. The controlled disorders and illnesses included depressive, anxiety, and alcohol use disorders, and musculoskeletal disorders, cardiovascular and respiratory diseases, and a heterogeneous group of other physical illnesses, among which are the leading causes of compensated sickness absences in Finland (The Social Insurance Institution of Finland 2005). Because long sickness absences have been found to predict future disability pensioning (Kivimäki et al. 2004, Lund et al. 2007), this result suggests that burnout may make a distinctive contribution to work disability when compared with ill health and therefore further supports the independent status of burnout in the arena of occupational health psychology.

Summary

Despite the strong associations between burnout and mental disorders and physical illnesses, several findings suggest that burnout may be partly distinct from depressive disorders and from ill health in general. Compared with depressive disorders, burnout was more strongly related to high job strain, and it was related to active and passive work after adjustments. The results were also consistent with the possibility that burnout would mediate the effects of job strain on depressive disorders. Furthermore, burnout had an independent contribution to work disability even when the effects of the co-occurring common mental disorders and physical illnesses were taken into account.
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Role of individual factors in burnout

Gender and the level of burnout

No gender differences were found for the level of burnout syndrome. This finding runs contrary to earlier results from population-based studies showing women to experience a slightly higher level of burnout than men (Kalimo & Toppinen 1997) or to be over-represented among employees with a high level of burnout (Lindblom et al. 2006). However, women experienced a slightly higher level of exhaustion, and this finding replicated the results of previous studies in human service work (Maslach & Jackson 1981, Töyry 2005).

It has been suggested that the possible gender difference in burnout may reflect differences in roles and occupations (Schaufeli & Greenglass 2001). However, differential exposure has generally accounted only minimally for women’s higher distress or lower health (Roxburgh 1996, Denton et al. 2004). In addition to having generally less control at work, women have been found to be more vulnerable to low job control than men (Rugulies et al. 2006); this finding supports the differential vulnerability to adverse conditions (Denton et al. 2004) and, especially, to low job control. In the present study, the women tended to show a slightly higher level of burnout when they had a low level of education or were in manual work than other women did. Parallel results of women with a low level of education showing worse health, indicated by self-reported general and mental health, fatigue, and musculoskeletal symptoms, than highly educated women was reported in a recent Swedish study (Dahlberg 2005). Vulnerability to low control may explain the association between a low level of education or occupational status and a higher level of burnout among women, because these socio-demographic factors are strong correlates of job control.

An alternative explanation for the slightly higher level of burnout among women in manual work is a gender difference in the process of worklife exit among men and women. In Finland, women have reached the statutory retirement age more probably than men, who have retired more often earlier on disability or unemployment pensions (Hakola 2000a & 2000b). The healthy worker effect has been shown to operate strongly among men in manual occupations (Bartley & Owen 1996).
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seems that men have to be healthy to remain employed in manual jobs. This assumption may apply to a less extent to women, who can continue to work with less selection and therefore be an unhealthier sub-population in their senior years than men are (Hakola 2000a).

The present result that those married had less burnout than those not married recognizes social support as a general health resource (Broadhead et al. 1983, House et al. 1988). Signs of the protective effect of marital status have earlier been reported for exhaustion (Hallsten et al. 2002). However, when the analyses were segregated by gender, the positive effect of marital status on burnout applied only to the men; the married or co-habiting men showed less cynicism than the men who were single, divorced, or widowed. Compared with women, men have been reported to seek less social support when coping with job loss or depression (Bebbington 1987, Salokangas et al. 1988, Leana & Feldman 1991). As being married has been found to be beneficial especially to men’s health (House et al. 1988), it is possible that the family provides men an important source of social support and therefore protects them against burnout.

In light of the present different results among men and women, the earlier mixed results on socio-demographic factors and burnout may be due to unsegregated analyses by gender.

Gender differences in the associations between burnout and ill health

The men with mild burnout in the present study had higher odds of having a depressive disorder than the women with a similar level of burnout. At least two issues may explain this finding. Firstly, the importance of work-related problems in the aetiology of mental disorders may be greater among men than women. Work may be a more dominant arena for men, whereas, for women, the aetiological factors of mental health may be distributed across several spheres of life, including domestic factors and social relations. Supporting this assumption, the relationship between work stress and the use of antidepressant medication was found only among men in a Finnish population study (Virtanen et al. 2007). This assumption is also in line with studies showing unemployment to be a greater health risk for men than for women (Artazcoz et
al. 2004, Cooper et al. 2006). Furthermore, it was shown in a cross-
sectional study among white-collar workers that men’s general distress 
was mostly related to work conditions, while women’s level of distress was 
determined by the interaction between conditions at work and at home 
(Krantz et al. 2005). Family structure and social relations were found to 
be more important determinants of women’s than men’s health in the 
large Canadian National Population Health Survey (Denton et al. 2004). 
Secondly, as elaborated by Hensing et al. (1996), the stigma and social 
consequences of having a psychiatric disorder may be worse at work for 
men than for women due to cultural role expectations. Because men are 
not supposed to show weakness, the consequences for the men suffering 
from mild burnout may be more severe than for the women.

In general, men have been found to use more alcohol and suffer more 
often from alcohol dependence than women (Grant et al. 2004, Pirkola 
et al. 2005). This finding has been explained by a gender difference in 
social and cultural behaviour regarding alcohol use (Holmila & Raitasalo 
2005). In the present study, the association between burnout and alcohol 
dependence was similar and of about the same magnitude for both gen-
ders. This result may partly reflect the changes in drinking habits among 
women during the past several years, including an increase in alcohol 
use (Grant et al. 2004, Raitasalo & Maaniemi 2007). Similar results for 
men and women in this study may also indicate that, in the relationship 
between burnout and serious alcohol problems, the significance of indi-
vidual factors outweigh the social and cultural behavioural models.

As a new contribution of this study, burnout was found to be related 
to musculoskeletal disorders only among women when depression was 
taken into account. Musculoskeletal disorders and many of their risk 
factors have generally been more prevalent among women, and the 
prevalence suggests differential exposure (Punnet & Herbert 2000, de 
Zwart et al. 2001). Women may also have a special vulnerability to 
physical strain (Punnet & Herbert 2000, de Zwart et al. 2001). In spite 
of possible gender differences, previous analyses on work characteristics 
and musculoskeletal problems have seldom been stratified by gender. 
The relationship between burnout and musculoskeletal disorders needs 
to be explored further in order to increase the understanding of why 
the association between burnout and musculoskeletal disorders may be 
mood-related only among men.
5. DISCUSSION

This study revealed that the association between burnout and cardiovascular diseases among women may depend on standard health risk factors such as older age, a low level of education, a low occupational grade, unmarried status (Hemingway & Marmot 1999, Kivimäki et al. 2002, Everson-Rose & Lewis 2005), and physical strain at work. In contrast, the association between burnout and cardiovascular diseases was independent of these factors among the men. Although the formal test of gender difference in the association between job strain and cardiovascular diseases failed to reach significance in a meta-analysis (Kivimäki et al. 2006b), the evidence on the associations between job strain and cardiovascular diseases have generally been stronger and more consistent among men and more sparse and less consistent among women (Belkic et al. 2004). Further supporting the gender difference, the association between burnout and cardiovascular biomarkers has also differed to some extent between the genders (Shirom et al. 1997, Toker et al. 2005).

To understand how stress affects the development of cardiovascular diseases among women, it may also be necessary to take into account domestic strain, because women may still be more responsible for domestic duties than men (Väänänen et al. 2004). The combined exposure to a high amount of both paid work hours and household work hours was significantly related to a high level of distress among women, whereas men’s distress was related to high paid work hours and not to household work hours in a cross-sectional study among white-collar workers (Krantz et al. 2005). Indeed, a double exposure to stress from work and from marriage was associated with the highest risk for coronary disease among women in the Stockholm Female Coronary Risk Study (Orth-Gomér & Leineweber 2005). Furthermore, low control at home predicted cardiovascular diseases among women but not among men in the prospective Whitehall II study among British civil servants (Chandola et al. 2004). Therefore, uncontrolled domestic strain may have imputed the association between burnout and cardiovascular diseases among the women in the present study.

Among the women, mild burnout was also independently related to sickness absence in contrast to the situation among the men. Instead, only for the men was severe burnout related to delayed return to work. Similar results showing that women have more absences and men have longer absences have been obtained previously concerning psychiatric
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disorders and sickness absence in a Swedish population-based register study (Hensing et al. 1996). In the NEMESIS study, mental disorders were more important predictors of sickness absence among men than among women (Laitinen-Krispijn & Bijl 2000).

A study with a large random British sample indicated that men tend to seek any form of help for stress or strain to a less degree than women (Oliver et al. 2005). A similar trend emerged concerning seeking professional help for psychiatric problems in four large-scale North American surveys (Kessler et al. 1981) and in a random Canadian sample (Bland et al. 1997). It seems that women interpret feelings of distress as signs of problems needing help more likely than men (Kessler et al. 1981). Therefore, women seek help more probably in distress and may get it in an earlier phase of the problematic situation than men do. If men miss professional advice and also obtain less social support, which among women can buffer mental health problems during work stress (Stansfeld et al. 1997, Väänänen et al. 2003), the problems may accumulate and a longer absence would then be needed for men to recover.

**Age and the level of burnout**

In contrast to what has been presented in two previous burnout reviews (Schaufeli & Enzmann 1998, Maslach et al. 2001), the level of burnout was not lower in the older age groups in the present sample of the Finnish working population aged 30 years or over. Instead, the prevalence of burnout seemed to slightly increase with age, although the absolute differences between the age groups were small. Corresponding findings have been obtained from Swedish and previous Finnish population-based samples (Kalimo & Töppinen 1997, Lindblom et al. 2006). Population studies catch all workers in different age groups and also those who might have changed jobs or occupations because of burnout. Therefore, population studies may provide a more reliable view on the relationship between age and burnout than studies using non-random occupational or organizational samples.

There are at least two conceivable explanations for an age-related increase in burnout. Firstly, the exposure time models of stress state that the incidence of ill health increases with the duration of the stressor exposure (Zapf et al. 1996). In line with these models, it has been
shown that prolonged exposure to poor psychosocial factors increases the probability of reduced well-being and the risk of disease (Kivimäki et al. 2002, Kalimo et al. 2003, Kivimäki et al. 2006a, Rugulies et al. 2006). It has also been emphasized that burnout takes time to develop (Schaufeli & Enzmann 1998, Maslach et al. 2001) and that the symptoms are persistent over time (McKnight & Glass 1995, Bakker et al. 2000b, Taris et al. 2005).

Secondly, the change in worklife in Western countries has been rapid during the past decade. Earlier, age with accumulating work experience usually benefitted the worker, raising his or her status and profi ciency. In today’s continuously changing worklife, the growing demands for learning and fl exibility may become a burden particularly for ageing workers who, on average, have less education than younger workers. However, the situation of young employees needs to be investigated in more detail in future studies because employees under 30 years of age were not included in the medical examination of the Health 2000 Study, which determined the inclusion criteria in the present study. In a previous Finnish population study on burnout, which included employees from 24 years of age on, no diff erence in the prevalence of burnout was detected between the age groups of 24–34 years and 35–44 years (Kalimo & Toppinen 1997). However, it is also possible that age and accompanying work experience are benefi cial in some sectors of the labour market. The negative association between age and burnout reported in burnout reviews (Schaufeli & Enzmann 1998, Maslach et al. 2001) is based on research done in human service work (Maslach & Jackson 1981, Mor & Laliberte 1984, Birch et al. 1986, Huberty & Huebner 1988, Rogers & Dodson 1988, Poulin & Walter 1993, Vredenburgh et al. 1999) and was also found for a nationally representative sample of Finnish physicians (Töyry 2005). The experienced human service workers may have learned special professional and coping skills that protected them especially against burnout in demanding non-reciprocal interactions. This issue should be explored further in the future by comparing human service workers with employees in non-human service professions in population-based samples.

Summary

Gender was not related to the level of burnout, but the associations between burnout and other socio-demographic factors and ill health
5. DISCUSSION

differed to some extent for the men and women. Especially among the men, burnout was related to being unmarried, having a cardiovascular disease, and being longer on sick leave. Especially among the women, burnout was related to low-quality jobs and having a musculoskeletal disorder. These gender differences may partly explain earlier mixed results concerning burnout and these factors in samples combining men and women. The positive association between age and the level of burnout in a working population may reflect the accumulated effects of prolonged work stress over time.

5.3 Evaluation of the study

Assessment of burnout

The general version, the MBI-GS (Schaufeli et al. 1996), of the most widely used and most extensively validated burnout instrument, the MBI (Maslach & Jackson 1996), was chosen for the assessment of burnout in the Health 2000 Study because it is widely regarded as a gold standard for measuring burnout (Schaufeli & Enzmann 1998, Schaufeli & Taris 2005). Satisfactory reliability and validity has been confirmed for the MBI-GS in different occupations (Leiter & Schaufeli 1996, Taris et al. 1999, Schutte et al. 2000, Bakker et al. 2002). The nationally established procedure used in the present study to form a weighted sum score for the burnout syndrome and to categorize the burnout sum score in three levels on the basis of the frequency of the symptoms (Kalimo et al. 2006) has been published in a peer-reviewed scientific journal (Kalimo et al. 2003), but its clinical validity has not been confirmed.

The results of the present study are dependent on the three-dimensional conceptualization of burnout, which has been criticized for its vague theoretical basis and a circular argument between the definition of burnout and the related measure of burnout (Shirom 2003, Kristensen et al. 2005). The associations between the three-dimensional operationalization of burnout and health may be stronger than the ones obtained between exhaustion and health, because the three-dimensional burnout syndrome has been proposed to be a possible consequence of prolonged exhaustion in the stress process. The available alternatives for assessing
5. DISCUSSION

...burnout are not free of deficiencies (Schaufeli & Taris 2005) and are much less evaluated and known. In the future, burnout research would benefit from reaching a shared consensus definition for burnout and from validated multi-method practice guidelines for its assessment.

**Major strengths**

This study employed a large population-based sample that represented the 30- to 64-year-old working population of Finland, including also employees who were on sick leave or leave of absence. This sample gives a unique quality to the present study as, to our knowledge, no previous findings on burnout and its correlates from nationally representative samples have been published in international peer-reviewed journals. The participation rate in the data collection of the present study was high; at least 80% of the working-age participants were covered. The use of weighting adjustment and sampling parameters in the analyses enabled the complex sample survey design and differences in sample attrition between subgroups to be accounted for. Therefore, the acquired results concerning burnout can be generalized to worklife, including all occupational branches in the age range of the participants.

Another major strength of the present study was its assessment of the health and work disability of the participants. The assessment of mental disorders was based on a fully standardized diagnostic interview, the CIDI, which provided the estimates for the diagnoses of DSM-IV mental disorders (Andrews & Peters 1998, Wittchen et al. 1998). The CIDI has been shown to be a valid method for assessing common mental non-psychotic disorders among primary care attendees (Jordanova et al. 2004) but it has not been validated in general populations. In a community setting, the depression module of the CIDI has been found to over-estimate prevalence rates slightly (Kurdyak & Gnam 2005). This over-estimation may have led to a slight inflation of the associations between burnout and depressive disorders and over-adjustment in the observed relationship between burnout and work disability. The assessment of physical illnesses was based on a comprehensive clinical health examination including a symptom interview, a history, and a medical examination by a research physician. Work disability was indicated by medically certified sickness absences for over 9 consecutive work days (Kivimäki et al. 2004, Lund et al. 2007),
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which were extracted from a register of The Social Insurance Institution of Finland covering all Finnish citizens. In the present study, the CIDI interview, the clinical health examination, and the use of absence records reduced the risks of common method bias, confounding by negative affectivity, selective record bias, and other problems characterizing research with only self-reported data.

Study limitations

The main limitation of the present study was its cross-sectional design, which does not allow for the ascertainment of temporal order in the associations between burnout and ill health. These associations are open to reversed causality (i.e., the direction of the associations remains unknown). In addition, due to the cross-sectional design, it was not possible to differentiate between the actual development of burnout during the work career and a cohort effect.

The cross-sectional design was especially problematic in the examination of the associations between job strain and burnout, both of which were self-assessed and therefore had an association open to the effects of common method variance (Lindell & Whitney 2001). In a meta-analytic review, burnout has been shown to be related to negative affectivity (i.e., a predisposition to experience negative emotions) (Watson & Clark 1984, Thorensen et al. 2003). Negative affectivity can colour all perceptions (Brief et al. 1988) and therefore may have artificially strengthened the observed relationship between job strain and burnout in the present study. However, the relationships between work stressors and experienced strain have tended to remain significant after adjustment for negative affectivity (Parkes 1990, Chen & Spector 1991, Moyle 1995, de Jonge et al. 2001). Job strain was more strongly related to burnout than to depression even when depression was also self-assessed in a longitudinal design (Ahola & Hakanen 2007); this finding suggests that the stronger association between job strain and burnout than the one between job strain and depression would not solely be an artificial result of common method variance. However, longitudinal studies on work, burnout, and health are called for to clarify the complex temporal associations in the process of stress in the work context.
5. DISCUSSION

The sampling excluded those 18 to 29 years of age from the health examination for financial reasons; too, chronic illnesses are usually less common among the young. It is possible that this exclusion may have slightly affected the observed association between burnout and illnesses. Therefore, the results can be most reliably generalized to employees over 30 years of age.

Of the mental disorders, the three prevalent and relevant groups of disorders regarding working populations (i.e., depressive disorders, anxiety disorders, and alcohol dependence) (Sanderson & Andrews 2006, Honkonen et al. 2007) were analysed in relation to burnout. Of the physical illnesses, musculoskeletal and cardiovascular disorders were investigated in detail because they are among the leading causes for work disability in Finland (The Social Insurance Institution of Finland 2005). These disorders and illnesses belonged also to those that have been shown previously to be related to exhaustion (Shirom et al. 2005). When sickness absence was explored, also alcohol abuse was included in the mental disorders, and respiratory diseases and a mixed group of physical illnesses were added to the physical illnesses used as confounding factors.

Not all of the possible disorders and illnesses that the subjects might have had were recorded. They include adjustment disorders and neurasthenia, which may be used as a diagnosis in cases of burnout (Schaufeli et al. 2001, Glass et al. 2004), and personality disorders. Therefore, the present study may present an underestimation in the overall prevalence of ill health in relation to burnout, as well as regarding the adjustment for sickness absence. In addition, personality, temperament, and other individual factors, including recent life events, were not controlled for, and it is not known whether these variables would have modified the relationships between burnout and ill health. These possible associations remain as an important subject to be examined in future studies.

5.4 Conclusions

The present findings concerning the Finnish working population suggest that occupational burnout is strongly related to ill health. Burnout and common mental disorders seem to co-occur among both men and women; the most substantial overlap was observed with depressive dis-
orders. There is also common co-existence with burnout and physical illnesses. After possible confounders were taken into account, burnout was related to musculoskeletal disorders among the women and to cardiovascular diseases among the men. Because the design of this study was cross-sectional, no inferences can be drawn about the true temporal order between burnout and the manifestations of ill health.

Burnout was also related to long medically certified sickness absences. Severe burnout has an independent contribution to sickness absence, which was not totally accounted for by common mental disorders and physical illnesses. Especially among the men, the absences due to severe burnout were lengthy, lasting twice as long as those for physical illnesses.

The association between burnout and depressive disorders, musculoskeletal disorders, and cardiovascular diseases was evident for all three dimensions of burnout; this finding suggests that the associations between burnout and ill health are not explained solely by the exhaustion dimension of burnout. Significant associations concerning all three dimensions of burnout may justify the use of the three-dimensional burnout concept and a total burnout score.

Despite the strong associations between burnout and disorders and illnesses, burnout does not seem to be totally redundant to ill health. Burnout was more strongly work-related than depressive disorders and severe burnout was related to work disability independently of common disorders and illnesses.

The present data suggest that there are no substantial differences in the level of burnout between subgroups of socio-demographic factors. However, the associations between burnout and other socio-demographic factors differed to some extent between the genders. Burnout is also partly a different kind of health risk for men and women. Among the men, mild burnout was a higher risk in relation to depressive disorders, and severe burnout was associated with delayed return to work, while, among the women, mild burnout was more probably related to absence from work.

Although cohort effects cannot be excluded, the possible positive association between age and burnout suggests that conditions increasing the risk of burnout either accumulate over time or are more prevalent among older employees. The present findings suggest that burnout may capture accumulating psychological work-related strain.
5. DISCUSSION

5.5 Policy implications

In order to promote health and prevent an early exit from the labour market, the work situation of clients should always be assessed in health care when working-age persons are being delt with. Burnout can be directly screened when work-related problems are encountered in medical check-ups and in occupational health services. Severe burnout can be regarded as a proxy for health-impairing work stress, and therefore can serve as a risk marker for work disability.

Many of the work-related variables associated with a high level of psychological ill health are potentially amenable to change (Michie & Williams 2003, Bourbonnais et al. 2006). Continuous improvement of psychosocial work characteristics could probably help prevent some burnout, and it could be facilitated by regular workplace surveys. In order to elicit the need for individual and occupational interventions, it may be beneficial to use coding for burnout in addition to making a diagnosis, as a factor that affects health status (World Health Organization 1992) or a condition that may require clinical attention (American Psychiatric Association 1994), in all health care contacts. Besides tailored individual interventions, a change in the work conditions in which burnout has evolved may promote long-lasting recovery from this stress-related condition (Bernier 1998, Weber & Jaekel-Reinhard 2000, Glass et al. 2004).

A higher probability of burnout among ageing workers is challenging when contrasted with the national aims to lengthen the approximate work career of the population set in face of the ageing work force and the tendency towards early retirement in Finland and other European countries (Järvisalo et al. 2005, Ilmarinen 2006a & 2006b). In addition to ageing workers, special attention should be paid to women with low-quality jobs and men with work-related problems, since some associations with burnout were highlighted in these groups. It is likely that, to be effective, interventions need to be tailored according to the special characteristics of the target group.
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Occupational burnout and health

In today’s demanding and continuously changing work life, work stress-related problems of individual employees often manifest themselves as burnout. Occupational burnout is a syndrome of exhaustion, cynicism, and diminished professional efficacy. It is caused when high demands and low resources at work are combined with insufficient ways of coping. So far, research on burnout has concentrated primarily on the process of burnout, and less is known about the consequences of burnout for individuals and society.

This population-based study examines the associations between burnout and health according to gender and discusses aspects such as common mental disorders, musculoskeletal disorders, cardiovascular diseases, and long sickness absences. In addition, the socio-demographic correlates of burnout are determined, as well as the status of burnout in the arena of occupational health.