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**LONG-TERM
SICKNESS ABSENCE**
Aspects of Society,
Work, and Family

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ABSTRACT

Sickness absence has varied considerably in Sweden over time and increased substantially between 1997 and 2002, especially among women. The composition of such absence has also changed in that there have been increases in sick leave due to mental illness, prolongation of sickness absence periods, and a larger proportion of women than men on long-term sick leave.

The general aim of the research presented in this thesis was to identify societal and work- and health-related factors underlying the fluctuations in long-term sickness absence (LTSA) in Sweden over the last two decades. Another objective was to identify important risk factors for LTSA among women and men in the working population, considering characteristics of work, family, and individual.

In Paper I, aggregated monthly data (December 1992–September 2008) were used to assess structural factors associated with variations in the number of ongoing spells of LTSA (> 59 days). Although specific changes in the sickness insurance scheme may have had an impact, no consistent pattern of associations was found. Furthermore, in contrast to previous studies, the present findings indicated that the composition of the labour force was less relevant for explaining variations in LTSA over the last decades. Instead, it emerged that LTSA was associated with public health indicators such as alcohol sales and factors connected with working conditions and worker health.

Paper II employed two similar cross-sectional case-control studies covering 1986–1989 and 2002. The aim was to investigate changes over time in risk factors for LTSA and changes in the fraction of LTSA attributable to these risk factors. Both studies were based on samples of long-term sick listed (> 59 days) and samples of employed in ages 20 to 64 as a comparison group. The results indicate an association between female sex and LTSA in 2002. Also, different aspects of the psychosocial work environment and the job situation were more pertinent risk factors for LTSA in 2002 than in the late 1980s. Still, the relevance of an adverse physical work environment is evident for both male and female employees. An increased population at risk over time contributed substantially to LTSA, and the most evident examples were an ageing workforce, adverse psychosocial work environments, and overweight or obesity.

The specific aim of the research reported in Paper III was to investigate the relevance of the demand-control model and social support in predicting LTSA, and to identify gender- and employment-sector-specific patterns. The data from 2002 used in Paper II were analysed. Associations with LTSA were found for weak social support and high-strain jobs among both sexes, and for active jobs among women. The relevance of the demand-control model for LTSA was more evident in the private sector than in the public sector.

Paper IV presents a longitudinal cohort study of employees aged 25–50, which was performed to elucidate the association between work-to-family and family-to-work interference and LTSA (> 14 days). The overall association between work-family interference in 2004, and subsequent LTSA during follow-up in 2005 was weak. However, among men with higher socioeconomic status, and to some extent also among women taking the main responsibility for housework and family, interference from work-to-family was associated with LTSA.

In conclusion, the major finding of the current research is that the deterioration in psychosocial work environments during the 1990s was an important factor leading to increased LTSA between 1997 and 2002. Moreover, the rise in LTSA was reinforced by other changes, such as an ageing workforce and changes in lifestyle factors. The adverse psychosocial work environments are significant not only because they are pertinent risk factors for LTSA, but also because they have become more common within the working population. With dual-earner families as the dominant norm in Sweden, balance between work and family also represents a factor that affects worker health and LTSA.

Keywords: sickness absence, sickness insurance, labour market, job strain, work environment, lifestyle factors, work-family interference, gender

SAMMANFATTNING

Sjukfrånvaron har varierat över tid i Sverige och ökade avsevärt i slutet av 1990-talet. Sjukfrånvarons struktur har också förändrats med större inslag av psykisk ohälsa, allt längre sjukskrivningar och en allt större andel kvinnor bland de långtidssjukskrivna. Det övergripande syftet i avhandlingen var att identifiera relevanta förklaringsfaktorer på samhällsnivå bakom variationerna i antalet pågående långvariga sjukskrivningar i Sverige under de senaste två decennierna. Ett ytterligare syfte var att identifiera arbets-, familje- och individrelaterade riskfaktorer för långvarig sjukskrivning bland förvärvsarbetande kvinnor och män.

I Studie I användes aggregerade månadsdata (december 1992–september 2008) för att analysera vilka strukturella faktorer som samvarierar med antalet pågående långtidssjukskrivningar (> 59 dagar). Även om vissa specifika regeländringar i sjukförsäkringen haft viss betydelse, framträdde inget tydligt mönster. Förändringar i arbetskraftens sammansättning hade en begränsad betydelse under den studerade perioden. Däremot fanns en positiv samvariation mellan ett ökat antal långtidssjukskrivna och folhälsorelaterade faktorer såsom ökad alkoholförsäljning, och en försämrad psykosocial arbetsmiljö.

I Studie II användes två tvärsnittsundersökningar omfattande perioden 1986–1989 och 2002. Syftet var att undersöka förändringar över tid i riskfaktorer för långtidssjukskrivning och om det skett förändringar i antalet som exponeras för dessa riskfaktorer. Båda undersökningarna bestod av en grupp långtidssjukskrivna (> 59 dagar) och en jämförelsegrupp av arbetande i åldrarna 20–64 år. Resultaten visade en tydlig överrisk för långtidssjukskrivning för kvinnor år 2002, när graviditetsrelaterad sjukskrivning exkluderats. Olika aspekter av arbetsförhållanden och den psykosociala arbetsmiljön visade ett starkare samband med långtidssjukskrivning år 2002. Den fysiska arbetsmiljön äger dock fortsatt stor relevans för långtidssjukskrivning bland både kvinnor och män. En ökande andel av arbetskraften exponerades också för olika riskfaktorer vilket bidrog väsentligt till ökad långtidssjukskrivning. Tydliga exempel är högre ålder, övervikt eller fetma samt dålig psykosocial arbetsmiljö.

I Studie III var syftet att studera betydelsen av den psykosociala arbetsmiljön, mätt som kravkontroll och socialt stöd, för långvarig sjukskrivning på individnivå med fokus på skillnader mellan kvinnor och män och mellan anställning i privat- och offentlig sektor. Analysen gjordes på samma data från 2002 som användes i studie II. Svagt socialt stöd liksom anspända arbeten med höga psykologiska krav och lågt eget inflytande samvarierade med långtidssjukskrivning för både kvinnor och män medan så kallade aktiva jobb med höga krav och högt eget inflytande hade samband med långtidssjukskrivning för kvinnor. Kravkontroll modellen samvarierade i högre grad med långtidssjukskrivning bland anställda i den privata än i den offentliga sektorn.

I studie IV användes en longitudinell kohort-studie av individer i åldern 25-50 år där syftet var att undersöka sambandet mellan konflikter mellan arbets- och familjeliv och långtidssjukskrivning (> 14 dagar). För konflikter mellan arbets- och familjeliv under 2004 och långtidssjukskrivning under 2005 var det generella sambandet svagt för både kvinnor och män oavsett om källan till konflikten var arbetet eller familjelivet. Dock fanns ett samband mellan konflikter som gick från arbets- till familjelivet och långtidssjukskrivning för män med högre socioekonomisk status, samt i viss mån också för kvinnor med huvudansvaret för hemarbete och familj.

Huvudslutsatsen är att en försämrad psykosocial arbetsmiljö under 1990-talet var en viktig faktor bakom det ökade antalet långtidssjukskrivningar under senare delen av 1990-talet i Sverige. Andra förändringar såsom åldrande arbetskraft och olika livsstilsfaktorer kan ha förstärkt ökningen av långtidssjukfrånvaron. Medan den psykosociala arbetsmiljön kan ses som en ny framträdande riskfaktor för långtidssjukskrivning så har det samtidigt skett en ökning av andelen individer som är exponerade för olika riskfaktorer. Exponeringen ökade under 1990-talet med allt fler i högre förvärvsaktiva åldrar, ökad övervikt eller fetma samt fler med dålig psykosocial arbetsmiljö. Balans mellan arbete och familjeliv har också betydelse för hälsa och sjukfrånvaro bland förvärvsarbetande kvinnor och män i Sverige.

LIST OF PUBLICATIONS

- I. Lidwall U, Marklund S. Trends in long-term sickness absence in Sweden 1992–2008: the role of economic conditions, legislation, demography, work environment, and alcohol consumption. (Submitted)

- II. Lidwall U, Bergendorff S, Voss M, Marklund S. Long-term sickness absence: changes in risk factors and the population at risk. *International Journal of Occupational Medicine and Environmental Health* 2009; 22(2):157–168.

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- III. Lidwall U, Marklund S. What is healthy work for women and men? – A case-control study of gender- and sector-specific effects of psycho-social working conditions on long-term sickness absence. *Work* 2006; 27(2):153–163.

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- IV. Lidwall U, Marklund S, Voss M. Work-family interference and long-term sickness absence: a longitudinal cohort study. *European Journal of Public Health* 2009; doi: 10.1093/eurpub/ckp201.

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ABBREVIATIONS

BMI	body mass index (body weight kg/body height ²)
CI	confidence interval
FWI	family-to-work interference
LTSA	long-term sickness absence
OR	odds ratio
WFI	work-to-family interference

INTRODUCTION

The magnitude of sickness absence compensated by national social insurance has changed substantially in Sweden over time [1]. Long-term sickness absence (LTSA) declined in the early 1990s, increased sharply from 1997 up to 2002, and thereafter began once more to decrease, see Figure 1. Since 1982 women account for more LTSA than men [1], and since 2001 the ratio of women to men in ongoing LTSA spells has been around 1.75.

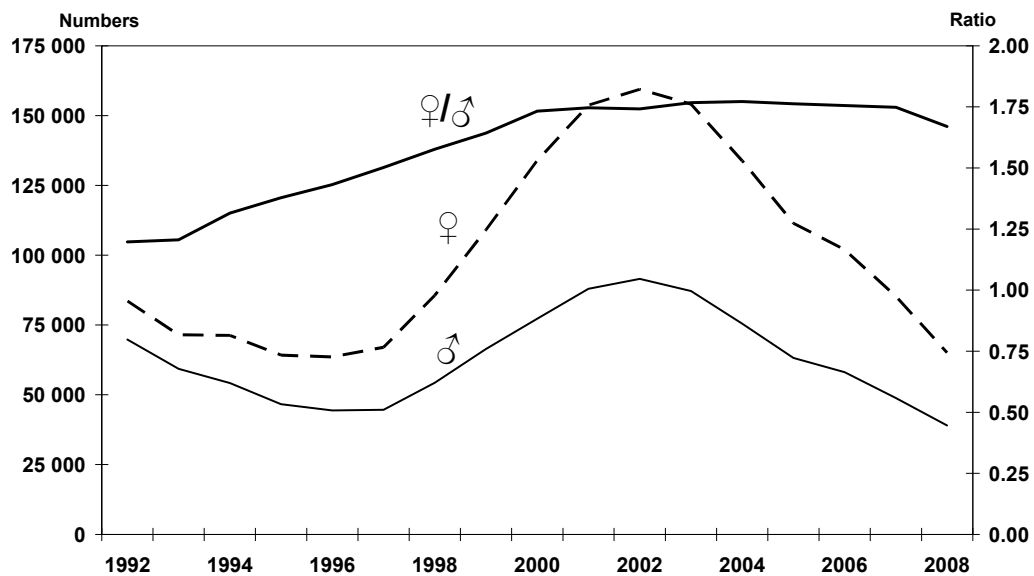


Figure 1 Number of ongoing long-term sickness absence spells (> 59 days) in December 1992 to December 2008 and the ratio of women to men (♀/♂). Data from the Swedish Social Insurance Agency

Several mechanisms have been proposed as possible explanations for the steep escalation in LTSA in the late 1990s: an ageing work force [1, 2]; deterioration of psychosocial work environments, especially in the female-dominated public sector [3, 4]; attitudes and norms [5, 6]; economic incentives [7, 8]. Nevertheless, fluctuations in sickness absence must be analysed to establish associations between changes in important explanatory factors and variations in sickness absence. This has been done in a few studies using aggregated longitudinal macro data for Sweden [1, 7, 9-11], but such analyses are often hampered by several methodological limitations. One such shortcoming is the lack of suitable data on a broad array of relevant factors that ought to be included in the evaluation. In contrast, studies of micro data on individuals often have the advantage of providing relevant information about living conditions, working conditions, and health. Hence, the use of a combination of macro and micro data would increase the possibility of shedding light on the marked increase in LTSA that occurred in the late 1990s. The objective of the present research was to identify societal and work- and health-related factors behind the fluctuations in LTSA over the last two decades, and to ascertain important risk factors for LTSA among women and men in the working population, considering characteristics of work, family, and individual.

BACKGROUND

The high levels of sickness absence in general and LTSA in particular in Sweden constitute an important research issue from both an economic and a public health perspective. To public costs for social security, costs to organisations due to lost productivity should be added as well as costs related to health care [12, 13].

Considering the level of the individual, a number of negative consequences have been pointed out in the literature. For example, it has been observed that an increased number of sick leave spells and extended duration of sickness absence elevate the risk of future unemployment [14, 15]. Furthermore, it has been reported that lengthy sick leave heightens the risk of permanent exclusion from the labour market through disability pension [16-19], and it has also been found that LTSA is related to mortality [20-26].

However, there may be positive aspects of (sickness) absence as well, such as reduction of job-related stress and restored health and work ability [12, 27]. The basic intention of compulsory sickness insurance is to provide economic security in case of disease or injury and reduced work capacity [28, 29]. It seems that going to work while ill, referred to as sickness presence or presenteeism, is just as common as sickness absence [30-33], and it may lead to more extensive sick leave [34].

In addition to the fact that LTSA is associated with a number of adverse consequences, there is evidence that the mechanisms underlying short- and long-term sick leave differ to some extent [24, 35-37]. LTSA seems to be less sensitive to economic incentives [1, 17, 38], and, compared to short-term absence, in which the decision to stay home from work can be made by employees themselves, LTSA can be regarded as less voluntary and more closely related to illness or injury [24, 36]. Medically certified sickness absences occurring within a given jurisdiction can serve as a measure of ill health in the working population, if ill health is considered to be a mixture of social, psychological, and physiological malfunctioning [36]. However, it must also be taken into consideration that a large number of people with health problems and illnesses do not use sick leave or claim sickness absence benefits [39].

SWEDISH SICKNESS INSURANCE AND THE CONCEPTS OF DISEASE, ILLNESS AND SICKNESS

Swedish sickness insurance covers all people (Swedish or foreign citizens) who are living in Sweden, are 16 years of age or older, and have at least a minimum annual income from work [40]. The primary requisite for being eligible for sickness benefit is that the person in question has a disease or injury that reduces his/her ability to work by at least 25%. Depending on the degree to which work ability is lowered, the rate of compensation provided by the sickness insurance scheme can be 100%, 75%, 50%, or 25% [40].

After the first day of sick leave (which is a qualifying day without compensation), sick pay is provided by the employer for the first 14 days of a period of absence. A certificate from a physician is required from the eighth day of a spell of sickness absence. If the reduction in work capacity persists after the end of the sick pay period,

the employee receives sickness cash benefit from the national social insurance system [40]. Up to 2008, there was no official limit on how long a person could receive the cash benefit [41]. However, since July 2008, provision of such compensation has been restricted to one year, although it can be prolonged under certain circumstances [40].

The legislation in this area has not provided a precise definition of the concept of disease, and the broader concept of illness has often been applied in the practice of sickness certification [42]. Disease is generally regarded as the diagnosis given by a physician after a medical examination, whereas illness refers to individuals' own perceptions of their health status in the form of self-reported mental or physical symptoms, and sickness refers to the social role given to a person whose health is somehow impaired [39]. Being absent from work due to an ailment is such a social role, which entails the benefit of being exempted from work duties, but also the obligation to get well and not to engage in other activities during the period of sick leave [43].

DEFINITIONS OF LONG-TERM SICKNESS ABSENCE

LTSA has been defined in different ways in the literature. In the Whitehall II study of British civil servants, sick leave exceeding seven days was considered to be LTSA [24, 36, 44-49], and absence of more than 21 days was regarded as a very long spell [50]. Researchers in the Ten Town study of municipal employees in Finland defined LTSA as lasting seven days and also three days [21, 51]. In the Swedish HAKuL investigation of public sector employees and the French GAZEL study sick leave lasting 28 days or more was designated LTSA [23, 52-55]. In the Danish DWECS/DREAM study and some investigations conducted in Norway, sick leave spanning eight weeks or more was considered to be LTSA [20, 56-61]. Other studies in Sweden have used cut-offs at three weeks [62], 56 days [63], and 60 days [35], and several have defined LTSA as lasting at least 90 days or more [4, 64-66].

The choice of cut-off point in the definition of LTSA is rather arbitrary and also depends on the sickness absence insurance scheme in the particular setting under investigation [36] and the availability of data [67]. The divergent definitions that have been applied pose a problem when trying to compare the results of different studies [68]. However, despite the use of disparate measures of LTSA in different settings, many of the findings indicate similar causal mechanisms of prolonged sickness absence.

In the current research, LTSA was defined as medically certified sick leave covered by compensation. Spells lasting 60 days or more were included in the studies reported in Papers I–III. Pregnancy-related diagnoses were excluded in two investigations (Papers II and III), and one study included spells of 15 days or more regardless of diagnosis (Paper IV). Otherwise, all causes of LTSA were analysed, even though they may have been the result of partly different mechanisms [13].

Partial sick leave was not considered in the present research. In 2001, such absence represented 15% of the LTSA in Sweden [69]. Among those with prolonged sick leave, partial compensation has been found to be more common among women than men, and to be used more often at the beginning of the period of absence [70]. In Sweden, partial

sick leave has been regarded as a measure to increase return to work, although there is no firm evidence to support that conclusion [71].

GENDER AND DIAGNOSES IN LONG-TERM SICKNESS ABSENCE

In recent years, nearly two out of three people on sick leave in Sweden were women (see Figure 1), which makes sickness absence a gender-related issue [72]. Sick leave rates are also higher for women in many other European countries, but the difference between the sexes is greater in Sweden [73]. Pregnancy-related disorders are fairly common causes of sickness absence among women in Sweden [74, 75], accounting for 10% of spells lasting more than 14 days in 1999 to 2002 [76]. However, absences associated with pregnancy are usually short compared to those caused by mental or musculoskeletal disorders [77], which represent the majority of spells of LTSA [78].

Notwithstanding, differences between women and men in relation to reproduction and pregnancy can explain only part of the gender gap in sickness absence. Indeed, socio-cultural dissimilarities in health-related behaviour and differences between the sexes in relation to working life, family life, and other social contexts may be just as important as biomedical disparities [72]. Gender differences in health and sick leave may be the result of the diverse social roles of women and men in work and domestic life [79-83], and hence variation in exposures rather than vulnerability may account for differences in health [82]. Therefore, all analyses in the present studies were performed separately for women and men, a strategy that can facilitate interpretation of results from a gender perspective and generate more explicit hypotheses regarding dissimilarities in sick leave between the sexes [84]. However, such an approach can not reveal the gender-related mechanisms that may have an effect on differences in LTSA.

Over the last two decades, the diagnostic composition of LTSA in Sweden has changed for both women and men. As indicated in Table 1, according to the World Health Organisation International Classification of Diseases (ICD-10), an increasing proportion of LTSA is due to mental disorders. But, this is primarily related to an increase in common mental disorders such as depression, anxiety syndromes, stress reactions, and burnout conditions [1, 85]. Although the rates of sickness absence in Sweden have been high in an international perspective [73, 86, 87], the pattern of increased work disability due to mental disorders is not restricted to this country alone [88].

Table 1 Distribution of long-term sickness absence (> 59 days) by diagnosis (classified as ICD10-chapters) for various periods from 1986 to 2006, based on data from the Swedish Social Insurance Agency (LS database)

	1986–1991	1992–1994	1999–2002	2003–2006 ^a
Women				
Infectious and parasitic diseases (I)	0.5	0.9	0.6	0.6
Neoplasms (II)	1.9	3.5	3.2	3.7
Diseases of the blood etc. (III)	0.5	0.7	0.3	0.2
Endocrine diseases etc. (IV)	1.3	1.2	1.2	1.3
Mental disorders ^b (V)	12.9	16.3	24.2	31.7
Diseases of the nervous system etc. (VI-VIII)	3.5	3.3	3.8	3.9
Diseases of the circulatory system (IX)	2.9	4.1	3.2	2.4
Diseases of the respiratory system (X)	2.8	2.2	2.1	1.5
Diseases of the digestive system (XI)	3.4	3.0	1.8	1.7
Diseases of the skin etc. (XII)	2.1	1.7	1.0	0.7
Diseases of the musculoskeletal system etc. (XIII)	40.8	36.9	36.1	29.3
Diseases of the genitourinary system (XIV)	2.9	2.0	1.0	0.9
Pregnancy etc. (XV)	10.7	11.7	6.7	9.3
Congenital malformations etc. (XVI, XVII)	0.2	0.3	0.6	0.3
Symptoms etc. ^c (XVIII)	6.1	1.7	7.6	6.0
Injury, poisoning etc. (XIX)	7.3	10.7	6.8	6.5
Total	100	100	100	100
Number of spells in the study	2,631	2,000	14,492	11,646
Men				
Infectious and parasitic diseases (I)	0.4	0.9	0.7	0.9
Neoplasms (II)	2.6	2.4	3.4	4.6
Diseases of the blood etc. (III)	0.2	0.1	0.4	0.3
Endocrine diseases etc. (IV)	1.3	1.6	1.6	0.9
Mental disorders ^b (V)	15.8	16.5	20.5	25.0
Diseases of the nervous system etc. (VI-VIII)	4.2	3.4	4.4	4.3
Diseases of the circulatory system (IX)	7.6	11.7	8.3	7.7
Diseases of the respiratory system (X)	2.6	2.4	2.0	1.6
Diseases of the digestive system (XI)	5.2	4.0	2.5	2.1
Diseases of the skin etc. (XII)	2.1	0.9	1.1	0.8
Diseases of the musculoskeletal system etc. (XIII)	38.1	36.4	37.0	33.2
Diseases of the genitourinary system (XIV)	0.7	0.8	0.5	0.7
Congenital malformations etc. (XVI, XVII)	0.3	0.5	0.3	0.3
Symptoms etc. ^c (XVIII)	3.7	1.9	5.6	4.9
Injury, poisoning etc. (XIX)	15.5	16.5	11.8	12.9
Total	100	100	100	100
Number of spells in the study	1,915	1,518	8,257	6,453

^a Refers to spells with onset in 2003, 2005 and 2006.

^b Burnout (Z73.0) was classified as a mental disorder in 1999–2006.

^c Chapter XXI (Z00-Z99) "Factors influencing health status and contact with health services" excluding burnout (Z73.0) was classified as Symptoms etc. (XVIII) in 1999–2006.

THEORIES AND PREVIOUS RESEARCH ON SICKNESS ABSENCE

Despite the impact that sickness absence has on society, organisations, and individuals, an overall theory or causal model of this phenomenon is lacking [89]. The most widely known and applied is the process model of employee attendance proposed by Steers and Rhodes [90, 91], in which absence is perceived as the result of an interaction between personal characteristics, the work situation, and the social environment. These researchers broadened the earlier focus on job satisfaction in the literature to include factors associated with the ability to be present at work [90, 91]. This model represents a comprehensive attempt to outline the interrelationships between factors, especially attendance motivation and ability to attend. However, it can also be seen as an overview of factors that influence absence, which can be clustered as follows: work-related values and attitudes, personal factors (e.g., sex, age, education, health, family situation), working environment and job situation, attendance pressures (e.g., economic conditions, work group norms), and finally job satisfaction and motivation [91]. These categories are not mutually exclusive, and there are obvious interrelations between them.

Even though an extensive model may be useful, it is difficult to visualise a complex, all-encompassing general theory of sickness absence. Nevertheless, theories and models are needed chiefly to test the relevance of different explicit propositions and to organise knowledge. Broader theories can serve as frames of reference to facilitate interpretation of results and formulation of more rigorous hypotheses and theories.

Steers and Rhodes developed their process model to explain absence in general on the individual and company level, whereas the objective of the present studies was to identify factors associated with LTSA primarily on the societal and individual levels. Different research traditions are often applied in investigations of the micro and macro levels. The micro approach is mainstream in medical science and psychology, and the macro approach is more common in social sciences such as economics and sociology [89], although ideally theories and empirical research should incorporate factors at different structural levels [27, 92]. In general, changes at the macro level (e.g., in the sickness absence insurance scheme) are likely to influence both the individual and the organisational level. In turn, changes at the micro level (e.g., in the absence behaviour of individuals) will, if extensive enough, affect the absence rates at the macro or aggregate level.

Another influential paradigm of absenteeism was presented by Dagfinn Ås in 1962, and it is called the “push-pull model” [93], because it implies that workers are either pushed or pulled into being absent by different factors at work. Push factors include unpleasant conditions related to the work situation and the workplace, whereas pull factors are attitudes within workgroups and ties with the employer [93]. The basic propositions made by Ås have been further elaborated in the “attraction-repulsion model” aimed at explaining increases in long-term sick leave and granting of disability pension [94, 95]. In this context, pull or attraction factors are mainly generous sickness insurance legislation and lenient administration, whereas the push or repulsion factors comprise structural changes in the labour market caused by things like changes in technology or exposures at the workplace level (e.g., in the physical and psychosocial work environments) [94, 95].

In the present studies, the pull factors related to absence behaviour were considered to be fixed, except when aggregated data were used to analyse changes made in sickness insurance legislation and other structural factors. The analysis of risk factors using micro data was instead focused on different push factors, that is, those more closely associated with worker health.

Aspects of society

Differences in social policy are linked to national disparities in social outcomes [29, 73, 96, 97], and thus the structure and administration of the sickness insurance scheme in each country can be looked upon as a fundamental factor affecting sickness absence as a phenomenon. Without a sickness insurance scheme there would be no compensation for sick leave, although people would still be absent from work due to illness, disease or injury. It is known that LTSA is more closely associated with illness and disease than shorter sickness absence is [24, 36]. However, LTSA can also to some degree be regarded as motivated behaviour exhibited by individuals [27, 98], and various groups of people [5, 99] who are insured, and, in turn, it is connected with the structure of the sickness insurance system [100, 101].

Most studies of the associations between sickness absence and societal and structural factors have been conducted within the social sciences, and thus they have focused mainly on economic incentives in the sickness insurance scheme [7, 8, 100-104] and the potential effects of changes in unemployment levels and business cycles [1, 9, 73, 105]. Economic studies often fail to account for differences in the health status of workers and the health selection mechanisms in the labour market [106-109], or other factors that can have an impact, such as working conditions [110].

The idea of an association between increased unemployment and decreased sickness absence at the aggregate level is based on the notion that employed people have lower sick leave rates because they are afraid of losing their jobs if they are absent too often [111], and that there is selection out of employees with extensive sick leave to unemployment [112]. This agrees with a prospective cohort study conducted in Finland, in which it was found that local unemployment was negatively associated with short-term sick leave but was positively associated with LTSA [113]. These discrepancies in the direction of associations with sick leave spells of different lengths may be determined by whether unemployment is related to the business cycle or is more structural in nature. It is plausible that business cycle effects are related to short-term sick leave, but structural effects are more closely related to prolonged absence [38].

Many studies of changes and dissimilarities in sickness absence levels have analysed aggregate data [1, 73, 86, 96, 97], which means that different indicators of societal conditions were studied in relation to variations in the number of people on sick leave. It has been found that sick leave is linked to changes in and characteristics of the sickness insurance system [1, 7, 73, 96], and to fluctuations in unemployment levels and the macro economy [1, 9, 73, 105]. Furthermore, ecological studies have also revealed associations with changes in the demographic composition of the labour force [1, 73] and some health-related indicators such as alcohol consumption [11, 114] and mortality [10].

Aspects of work

By definition, sickness absence entails non-attendance at work, and thus it follows that conditions in the workplace may be important causes of such absence. Generally speaking, work is beneficial to health and well-being, because it provides economic resources, social status, and participation in societies where employment is the norm [115, 116]. It should also be mentioned that social status and being employed or unemployed also constitute the main causes of social differences in health [115, 116]. Work can be detrimental to health by involving various negative physical and psychosocial exposures [115, 116].

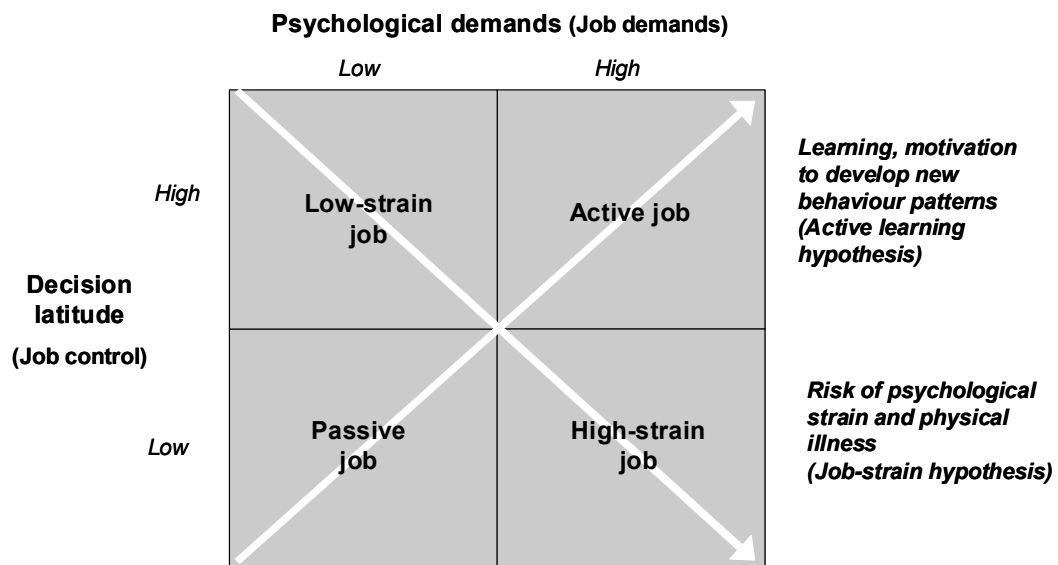
It has been reported that physical working conditions, especially ergonomic aspects such as heavy lifting and uncomfortable work postures, are associated with sick leave in general [56, 60, 110, 117] and back and neck disorders in particular [118, 119]. Furthermore, there is growing awareness of possible effects of interactions between ergonomic working conditions and the psychosocial work environment [60, 119, 120]. By comparison, evidence is lacking with respect to associations with other physical dangers (e.g., chemical and biological hazards) in the work environment, because few quality studies have considered sick leave as the outcome [110]. However, there are obvious health hazards and risks for occupational accidents in certain industries and workplaces [121], and those that involve harmful substances, noise, and dust are related to specific occupational diseases that also entail sickness absence [122].

However, in recent work environment research, the trend has been to pay substantial attention to psychosocial conditions in the workplace. Associations between worker health and the psychosocial work environment have been well illustrated by the demand-control model, which was presented by Karasek in 1979 and was later further developed in collaboration with Theorell [123, 124]. As shown in Figure 2, the basic idea of the demand-control model is the need for balance between psychological demands and worker authority or decision latitude (control). Jobs with high psychological demands and low decision latitude are considered to have adverse effects on health (the job strain hypothesis) [123, 124].

When psychological demands are high, employees have to work fast and hard, the work requires too great an effort, the time for completing the tasks is insufficient, and the demands are contradictory. Low control means that the workers have little chance of influencing what is to be done or how it is to be carried out, they feel there is a lack of stimulus, and the tasks they perform are repetitive [123, 124]. An increasing number of studies are focusing on demand-control and sickness absence [27, 35, 47, 48, 51, 66, 125-128], and in general the results thus far suggest that there is an association between low job control and high rates of sickness absence [110]. In addition, several studies have indicated a connection between job strain and sickness absence [27, 35, 48, 51, 66, 126].

It has also been reported that “passive jobs” involving low demands and limited control are detrimental to employee health because of the lack of stimulation at work [124]. In contrast, “active jobs” with substantial psychological demands and high decision latitude should prevent job-related stress by enhancing competence and providing active coping strategies according to what is called the active learning hypothesis [123,

124], see Figure 2. However, in disagreement with the demand-control theory, some Swedish studies have revealed positive associations between long-term sick leave and active job situations among women [35, 127].



Adapted from 'Job demands, job decision latitude and mental strain: Implications for job redesign' by Robert Karasek published in *Administrative Science Quarterly* (1979;24(2):285-308) by permission of *Administrative Science Quarterly*. © 1979 Cornell University.

Figure 2 The demand-control model

Later, Johnson and Hall introduced workplace social support into the demand-control model as a factor that counteracts stress and decreases the risk of illness [129]. In general, weak social support at work has been found to be positively associated with sick leave [48, 125, 130-134].

Other researchers have drawn attention to the fact that the evolving service economies lead to fundamental changes in many people's working situations, since numerous occupations involve close contact with customers, clients, or patients, which can sometimes be highly stressful [135, 136]. These dimensions are lacking in the demand-control model [136], and hence a job demand-service model has been proposed that can better elucidate the health implications of the working conditions in service occupations such as health care and education [135]. After the sharp increase in sickness absence in Sweden in 1997–2002, research efforts increased with the aim of explaining worker health and sickness absence in the public sector, mainly within health care, child care, and education [52-55, 119].

Some other working conditions also deserve attention. In a Finnish study, it was shown that having extensive control over working times could reduce the adverse effect of work stress on sickness absence, especially among female employees [137]. Furthermore, working overtime has been found to be negatively associated with sick leave [138, 139], although it may have detrimental effects on health if the degree of voluntariness of the overtime work is low or there are other potentially harmful conditions in the workplace. Employment security has also been found to be associated with sickness absence, seen as lower absence rates among people with temporary employment and higher rates among those with permanent contracts [102, 140]. Those

who have temporary employment and thus lower job security may be reluctant to take sick leave, since it may reduce their prospects of retaining their jobs [141].

Aspects of individual factors and family conditions

Several individual factors such as sex, age, socioeconomic status, and lifestyle, as well as factors related to the family situation, may be associated with sickness absence. An extensive overview of risk factors for sick leave in general revealed a clear correlation with age [110], and it has also been found that higher age is more strongly associated with LTSA and disability pension than with short-term sickness absence [2]. Moreover, it is plausible that socioeconomic status affects LTSA [44, 58, 142, 143], although a large part of the social gradient in sickness absence may be due to physical working conditions [58, 144].

In general, lifestyle factors such as overweight or obesity [45, 55, 145-147], smoking [145, 148], and alcohol consumption [46, 149-151] are associated with sickness absence, even after controlling for health status and workplace factors [110, 145]. However, the causal pathways behind such associations are unclear, and lifestyle risk factors are usually part of more complex lifestyle patterns associated with increased health risks [110, 152].

Much interest has been focused on the differences in sick leave between the sexes [15, 37, 55, 67, 72, 153-157]. On the whole, female sex is connected with increased sickness absence, but little is known about the underlying mechanisms [110, 118, 158]. As mentioned, pregnancy-related disorders account for a significant proportion of women's sick leave [75], but a considerable amount of such absence might be due to the same aspects that give rise to sick leave in general, for instance work-related factors [159, 160].

Although it does seem that pregnancy-related disorders represent a clear-cut example of biological differences that result in disparities in sick leave, the picture is probably much more complicated than that, because the biological dissimilarities are reinforced in different arenas in society [161]. The biological division of the sexes is given, whereas social gender is created, sustained, and changed through people's individual and collective actions [161]. Social gender is not a "natural" consequence of biology but rather is socially constructed and therefore linked to time and culture [161]. Accordingly, the male behaviour involving late contacting of medical services and lower sickness absence rates may be partly understood as features of the dominant masculine ideal, which requires men to avoid showing weakness and to manage things on their own [161, 162]. In the present research, the social construction of gender is considered to result in differences in the social roles of women and men in work and domestic life, which in turn leads to dissimilarities in exposures and health-related outcomes such as long-term sick leave [79-83].

The common pattern in Sweden comprises dual earner families in which both women and men combine the parental role with gainful employment. Of all children below the age of 18 years in 2005, 85% had a mother and 94% a father participating in the labour market [163]. In general, working life and the domestic sphere have been studied separately with regard to their impact on health and sickness absence, and little interest

has been focused on the combined effects of those two factors in that context. Family conditions and other personal circumstances, such as cohabitation and the presence of children, may constitute a heavier workload and stress, especially for women [164, 165], mainly due to higher exposure to demands at home. However, most previous research has indicated weak relationships between the number and age of children on one hand and sickness absence on the other [37, 52, 138, 154, 155], although it has also been found that being a single parent is associated with higher levels of sick leave [52, 155].

Findings in the literature indicate that exposure to the double work-home burden and multiple roles does not necessarily lead to adverse health outcomes and sickness absence, because the effects may be moderated by factors such as material and social resources. It has been suggested that the association between demands, resources, and perceived stress operates through work-family interference [166], a condition that occurs when individuals consider themselves as having an inter-role conflict between work and family in the sense that the role pressures from these two domains are mutually incompatible [167]. Little attention has been paid to the relationship between work-family interference and sickness absence, although some studies indicate that such a connection does exist [52, 168, 169]. In particular, interference from the work to the family domain has been shown to be associated with the occurrence and the duration of sickness absence [168, 169].

AIMS OF THE THESIS

The general aim of the research presented in this thesis was to identify societal and work- and health-related factors behind the fluctuations in long-term sickness absence (LTSA) in Sweden over the last two decades. Another objective was to identify important risk factors for LTSA among women and men in the working population, considering characteristics of work, family, and individual. The specific aims were as follows:

- I. To identify factors that might be important for our understanding of variations in the number of ongoing spells of LTSA among women and men between 1992 and 2008, focusing on amendments to legislation, labour market factors and demography, and changes in working conditions and worker health (Paper I).
- II. To determine whether there were any changes in the factors associated with LTSA and to examine changes in the fraction of LTSA attributable to these risk factors in 1986–1989 and 2002, respectively (Paper II).
- III. To investigate the relevance of demand-control and social support at work in predicting LTSA and to analyse gender- and employment-sector-specific effects (Paper III).
- IV. To investigate the association between work-to-family interference, family-to-work interference and LTSA among women and men in different family- and work-related settings (Paper IV).

MATERIALS AND METHODS

Three types of data were used to address the above-mentioned aims: aggregated longitudinal data, cross-sectional data, and longitudinal cohort data. It was necessary to use longitudinal data to study changes in the aetiology in LTSA over time. Although aggregated data should always be interpreted with caution, the use of such information enables analysis of factors that may give rise to fluctuations in any important public health indicator, for example the number of spells of LTSA. Here, two similar cross-sectional studies conducted ten years apart allowed comparison of changes in risk factors in the working population. This approach was chosen, because it could provide important insights into shifts in aetiology. However, both cross-sectional investigations and aggregated studies have limitations with regard to drawing firmer conclusions about causality. By comparison, longitudinal cohort studies can make it possible to arrive at stronger conclusions about causality, but they are often hampered by high costs and diminishing numbers of participants. The present analysis of work-family interference was conducted as a longitudinal cohort study of exposure in 2004 and sickness absence outcome in 2005. The designs and methods used in each of the study reported in Papers I–IV are summarised in Table 2.

Table 2 Overview of study designs and methods

	Paper I	Paper II	Paper III	Paper IV
<i>Aim</i>	To identify factors important for variations in the number of ongoing spells of LTSA among women and men. Focus on legislation, labour market factors, demography, working conditions and worker health	To determine whether there were any changes in the factors associated with LTSA and to examine changes in the fraction of LTSA attributable to these risk factors in the late 1990s and early 2000s	To investigate the relevance of demand-control and social support at work in predicting LTSA and to analyse gender- and employment-sector-specific effects	To investigate the association between work-to-family interference, family-to-work interference and LTSA among women and men in different family- and work-related settings
<i>Design</i>	Aggregated longitudinal monthly data for December 1992 to September 2008	Two cross-sectional case-control studies covering 1986–89 and 2002 respectively	The same cross-sectional study from 2002 used in Paper II	Longitudinal cohort study using baseline data from spring 2004 and follow up in 2005
<i>Study population in Sweden</i>	The insured work force aged 16–64 years	The employed population aged 20–64 years	The employed population aged 20–64 years	The employed population aged 25–50 years
<i>Sample size</i>	190 observations	LTSA-groups: 1,622 and 2,009 Comparison groups: 1,019 and 1,903	LTSA group: 2,050 Comparison group: 2,063	2,867
<i>Outcome</i>	Number of on-going spells of LTSA exceeding 59 consecutive days (per 1,000 individuals aged 16–64).	Medically certified and compensated LTSA exceeding 59 consecutive days	Medically certified and compensated LTSA exceeding 59 consecutive days	Medically certified and compensated LTSA exceeding 14 consecutive days
<i>Statistical methods</i>	Linear regression. Descriptive statistics	Binary logistic regression. Population attributable fractions	Binary logistic regression	Binary logistic regression

PAPER I

In the study presented in Paper I, structural factors correlated with fluctuations in long-term sick leave were assessed using official aggregated data on LTSA with separate measures for women and men. The data analysed included the number of ongoing sickness absence benefit spells lasting longer than 59 days. The longitudinal data with monthly periodicity covered the period December 1992 to September 2008. The number of LTSAs per 1,000 persons aged 16 to 64 was used as the dependent variable.

The explanatory variables used included information from the National Labour Force Surveys (Statistics Sweden) on the unemployment rate, the labour force rate, and the proportion of the population aged 55–64 years. Other explanatory variables were data on work pace, working overtime, and sleeping problems gathered from the Survey of Working Conditions, and data on self-reported disorders due to stress and strain at work acquired from the Survey of Work-related Disorders (Statistics Sweden); these variables were measured separately for women and men. Additional explanatory variables included real wages from the System of National Accounts (Statistics Sweden) and alcohol sales from the Swedish Alcohol Retail Monopoly, but these data were not available by sex and hence joint measures were used instead.

Between December 1992 and September 2008, amendments to the Swedish sickness insurance scheme were made on 17 occasions, and these were classified in three different categories according to expected outcomes: increased LTSA, decreased LTSA, or ambiguous effect on LTSA. The legislative amendments were studied by use of a “dummy” variable technique in which the dummy variables had the value zero before implementation and the value one afterwards. These dummies were interpreted as the potential instantaneous change in the number of spells of LTSA that occurred during the month that the particular insurance scheme amendment was implemented and the time thereafter.

Multiple linear regression models were used to analyse associations between several macro indicators and the number of ongoing spells of LTSA. This was done separately for women and men, because factors influencing LTSA can differ between the sexes. First-differenced series were analysed, since the original LTSA series were non-stationary and exhibited positive serial correlation, as indicated by the Durbin-Watson statistics [170]. Inasmuch as there was seasonal variation in the data on LTSA, a number of dummy variables indicating calendar month were employed throughout the analyses.

The analyses included both bivariate and multiple regression, and only variables that were statistically significant at $p < 0.05$ were kept in the final regression model. Descriptive statistics and residual statistics were calculated and analysed together with residual plots to check for possible violation of assumptions of normality and homoscedasticity. Tolerance and variance inflation factor statistics were computed to detect multicollinearity in the fitted models [171].

PAPER II

Paper II describes analysis of data from two population-based cross-sectional case-control studies, one conducted in 1992 and the other in 2002 [17, 172]. The investigated samples comprised members of the labour force with a history of LTSA and a comparison group selected from the general working population. The cases included employees aged 20–64 years with sickness absence lasting at least 60 consecutive days in 1986–1989 and 2002, respectively. The two comparison groups consisted of corresponding samples of employees chosen from the entire eligible population aged 20 to 64. The first study (Study I) used a face-to-face structured interview technique, and the response rate was 69%. In the second study (Study II), a self-administered mailed questionnaire was employed, and the response rate was 62%.

Medically certified spells of compensated sick leave identified in national social insurance registers served as the outcome measure. Information about age and sex were also retrieved from those registers. All other independent variables were self-reported: smoking, body mass index (height and weight), years of education (0–9, 10–12, >12), and family situation (cohabiting and children). Both specific work environment factors and more general aspects were analysed, for example employment security (permanent/temporary), employment sector (public/private), and hours worked.

Physical work environment exposures were measured as ergonomic strain (lifting, bending, and repeated or monotonous movements) and contact with hazardous substances (tobacco smoke, gases, dust, and chemicals). Low levels of such exposures were contrasted with high levels (i.e. at least a few times a week or more often).

Using the Swedish 17-item battery [173], psychosocial work environment exposures were measured as psychological demands, control (decision latitude), and social support [124]. To enable comparison of changes in the population at risk, an absolute cut-off point was applied, with scores above 2.5 indicating high demands, high control, and good social support on the four-point scale. Demand and control were combined into the four different job types as depicted in Figure 2.

Distributions of sociodemographic, lifestyle, and work characteristics were calculated as prevalence proportions for women and men over time during the two periods. Logistic regression was used to determine associations between LTSA and the independent variables as odds ratios (ORs) with 95% confidence intervals (CIs). Gender-specific associations were detected by conducting all analyses separately for men and women, and changes in the pattern of associations over time were analysed using the same set of independent variables in both studies.

In addition, population-attributable fractions were computed based on estimated risk factors and the proportion of exposed individuals in the group with LTSA. Theoretically, such a fraction corresponds to the proportion of LTSA in the population that might have been prevented if the situation had been just as favourable for those who were exposed as it was for the unexposed individuals, given the existence of a causal association between the exposure and LTSA undistorted by any bias [174].

PAPER III

The assessment reported in Paper III used data from the same population-based cross-sectional case-control survey that was previously analysed (Study II in Paper II), which was conducted in the spring of 2002. As in the earlier investigation, the mean scores for demand, control, and social support were dichotomised with 2.5 as the cut-off score and combined into four job types (see Figure 2). A low-strain job was the reference category, and particular attention was given to high-strain and active job situations.

Several potential confounders were accounted for in the analysis: age, years of education, and family situation (cohabiting and children). Other potential confounders were physical work environment exposure, hours worked, and permanent or temporary employment. Physical work environment exposure was measured using questions about frequency of exposure to hazardous substances, noise and vibrations, heat or cold, heavy lifting, repeated movements, and risk of work accidents. Since the labour market in Sweden is gender divided, and there are high levels of sick leave in female-dominated municipal and county council workplaces, it is important to account for employment sector in the analysis. Six employment sector categories were used: state, municipality, county council, private, self-employed and other employers. Adjustments were also made for various social, behavioural, and health-related factors, such as financial problems, smoking, body mass index (height and weight), and self-rated health.

Logistic regression was conducted to assess the bivariate and multivariate relationships. The analyses were stratified by sex, and by sex and employment sector (public/private) in order to detect gender- and sector-specific associations. In these assessments, the public sector included state, municipal, and county council employees, or other such civil servants, and the private sector comprised non-public employees and the self-employed. Crude and adjusted ORs were computed. Adjustments were made for demographic characteristics, work characteristics, and social, lifestyle, and health-related factors.

PAPER IV

The investigation described in Paper IV analysed exposure data from 2004 and outcome data from 2005 obtained in a longitudinal cohort survey of a random and representative sample comprising 4,929 members of the Swedish population aged 25–50 [175]. In the spring of 2004, these people were contacted by Statistics Sweden for a telephone interview, which was structured and included the areas of family, work, and health situation. In all, 3,579 individuals (73%) completed the interview.

The analyses were restricted to people who were gainfully employed at baseline in 2004, which gave a sample of 2,967 subjects. Complete data were available for 2,867, and those individuals constituted the final sample for analysis. Data on compensated sick leave were acquired from registers kept by the National Social Insurance Agency, and data on sex and age came from the population registers of Statistics Sweden. Information on all other variables originated from the interview.

Having had at least one continuous period of medically certified sick leave exceeding 14 days in 2005 was used as the outcome variable, and it was contrasted with having shorter sick spells or no sick leave at all.

Items used to obtain information about work-to-family interference (WFI) and family-to-work interference (FWI) were adopted from the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS Nordic): “Do the demands of your work interfere negatively with your home and family life?” (WFI) and “Do the demands of your home and family life interfere negatively with your work related activities?” (FWI) [175]. Responses were given on a five-point scale: happens every day, every other day, at some time during the week, more infrequently, or never. WFI or FWI was considered for responses indicating interference at some time during the week or more often.

The family-related factors taken into consideration included cohabitation (single or living with spouse/partner), children younger than 16 years living at home, responsibility for household and family, responsibility for care of sick or handicapped relative, and employed spouse or partner.

The work-related factors comprised socioeconomic status based on occupation and employment position (lower white collar or blue collar, or lower versus mid-level white collar and above), permanent or temporary employment, part- or full-time paid work, shift work, and experiencing workplace reorganisation, closure, downsizing, or expansion. Poor self-reported health was defined as a rating of 4 or 5 on a five-point scale (very good, fairly good, neither good nor bad, fairly bad, very bad).

Prevalence proportions (%) of the different characteristics of the study population were calculated, and differences between cases and non-cases and between women and men were assessed using chi-square tests for all variables except mean age differences, which were analysed by t-tests.

To discern gender-specific effects, analyses were conducted separately for men and women. Stratified logistic regression was used to investigate the associations between WFI, FWI, and LTSA in different work- and family-related settings. Crude and adjusted ORs with 95% CIs were calculated, and significant associations were adjusted for age and self-reported health at baseline.

RESULTS

A general finding of the present research (Papers I–IV) was that LTSA was considerably more common among women than men, even after excluding pregnancy-related disorders and after adjustment for a number of possible confounding factors. There were differences as well as similarities in the relative effects of various explanatory factors among women and men, and this was noted in both the macro and the micro level analyses. Nevertheless, it seems that the similarities outweighed the disparities, although the gender-related differences in LTSA could only be explained to a limited degree by the explanatory variables that were used.

Another general observation was that working conditions were important for LTSA in both the macro and the micro assessments. Furthermore, it seems that associations between working conditions and LTSA operated both directly and indirectly via work-to-family interference among employees of both sexes.

PAPER I

The objective of the study reported in Paper I was to find relevant factors associated with the variations that occurred between 1992 and 2008 in the number of ongoing LTSA spells for women and men. The focus was on amendments to the social insurance legislation, labour market factors, demography, and changes in working conditions and worker health. Although LTSA did change after amendments to the legislation, especially for men, this showed only partial agreement with what was expected. Instead, for both sexes, an upward trend was observed during the late 1990s, and a downward trend from 2003 and onwards, regardless of the degree of generosity of the legislative modifications. Furthermore, neither the composition of the labour force nor labour market factors exhibited an anticipated consistent pattern (ageing work force, unemployment, and labour force rate). However, working conditions and factors related to worker health were, as predicted, positively associated with LTSA.

A few legislative amendments in particular led to changes in LTSA. As expected, those amendments implemented in 1993, which involved introduction of a waiting day and a stricter disability pension scheme, resulted in a decrease respectively an increase for men. There was also an anticipated association with the legislative modification made in 1999, which entailed introduction of more generous application of the disability pension scheme and led to decreased LTSA among men. For both sexes, LTSA was negatively associated with the legislative adjustment made in January 2002. However, the amendments introduced in July 2003 were found to be associated only with female LTSA, which was decreased, possibly due to increased inflow into disability pension and more restrictive assessment of clients in the sickness insurance scheme.

Neither the unemployment rate nor the labour force rate was associated with LTSA during the studied period. A negative correlation with LTSA was observed for real wages among men and, unexpectedly, also for an ageing workforce. For factors related to working conditions and worker health, there was a significant positive association between LTSA and high work pace for both women and men. For men, there was also

a positive association indicated by increased numbers reporting disorders related to stress and strain at work.

Increased sale of alcohol was associated with more spells of LTSA among both sexes. A rise of 1 dl of 100% alcohol in monthly sales was estimated to increase the number of spells among men by approximately 2.5 and among women by 2.0 per 10,000 persons aged 16–64. The trends in alcohol sales and LTSA were similar up to the end of 2004, but, from 2005 to 2008, the sales continued to rise, while LTSA dropped substantially. Thus, an association between elevated alcohol sales and LTSA can be identified only for the period before 2005.

PAPER II

The results of this investigation (Paper II) showed that the associations between LTSA and age, low education, overweight or obesity, job social support, and ergonomic exposure were fairly stable over time for both sexes. For men, exposure to hazardous substances and public sector employment were also consistent risk factors. New emerging risk factors for LTSA in the female working population were daily smoking, permanent and public sector employment, overtime work, active job situations, and job strain. Among male employees, job strain was a novel risk factor.

The risk of LTSA was notably higher for women than for men in 2002 (OR 1.84, 95% CI 1.57–2.15) but not in 1986–1989 (OR 1.08, 95% CI 0.89–1.31). These observations were made after adjustment for age, family situation, education, smoking, overweight or obesity, employment security, employment sector, hours worked, physical work environment, and psychosocial work environment.

In addition to some changes in the risk panorama, an increased population at risk contributed substantially to LTSA. Evident examples of this were an ageing workforce, adverse psychosocial work environments, and overweight or obesity.

For women, the population attributable fraction of the effects of the physical work environment on LTSA was consistently around 17–18% due to ergonomic exposure (see Figure 3a); the corresponding fraction for men was approximately 24–25%, and this higher proportion was due to greater exposure to hazardous substances (see Figure 3b).

Major increases in the population attributable fractions were found for women with permanent jobs and in public sector employment due to stronger associations with LTSA. Elevated population attributable fractions for high-strain jobs were mainly related to increased risks. For women in active jobs, the changes were connected with both a larger population at risk and increased risk.

Presuming that job strain, weak social support at work, working overtime, and public sector employment are risk factors reflecting adverse psychosocial work environments, it can be said that the population attributable fractions for LTSA in 1986–1989 and 2002 increased from approximately 17% to 50% for women and from approximately 15% to 33% for men, (see Figure 3a and Figure 3b).

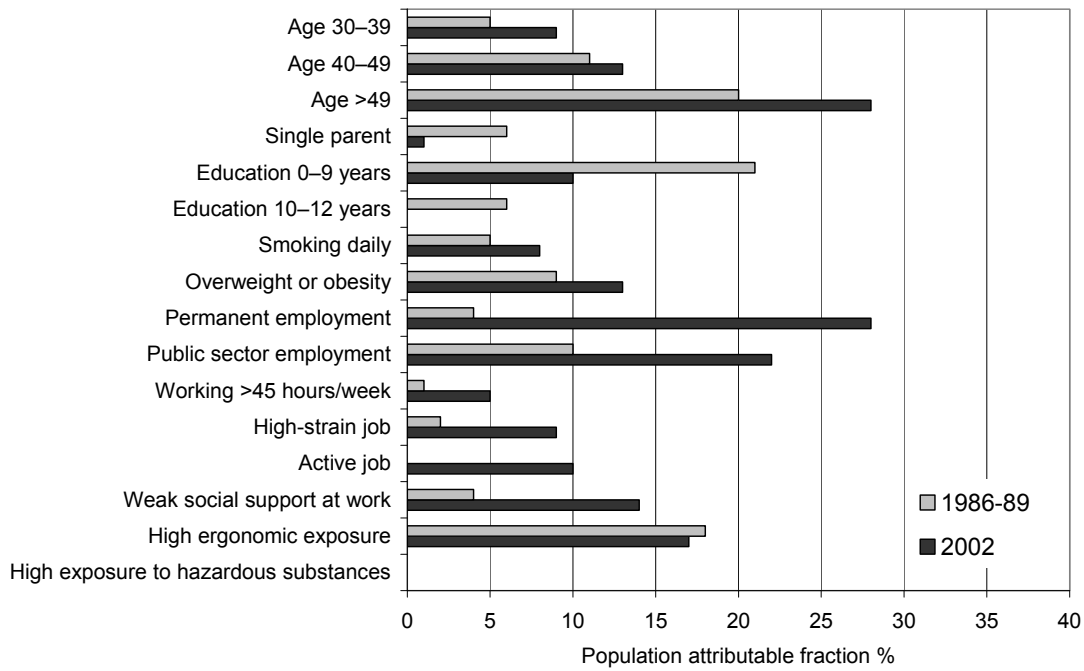


Figure 3a Population attributable fractions (%) of long-term sickness absence among women

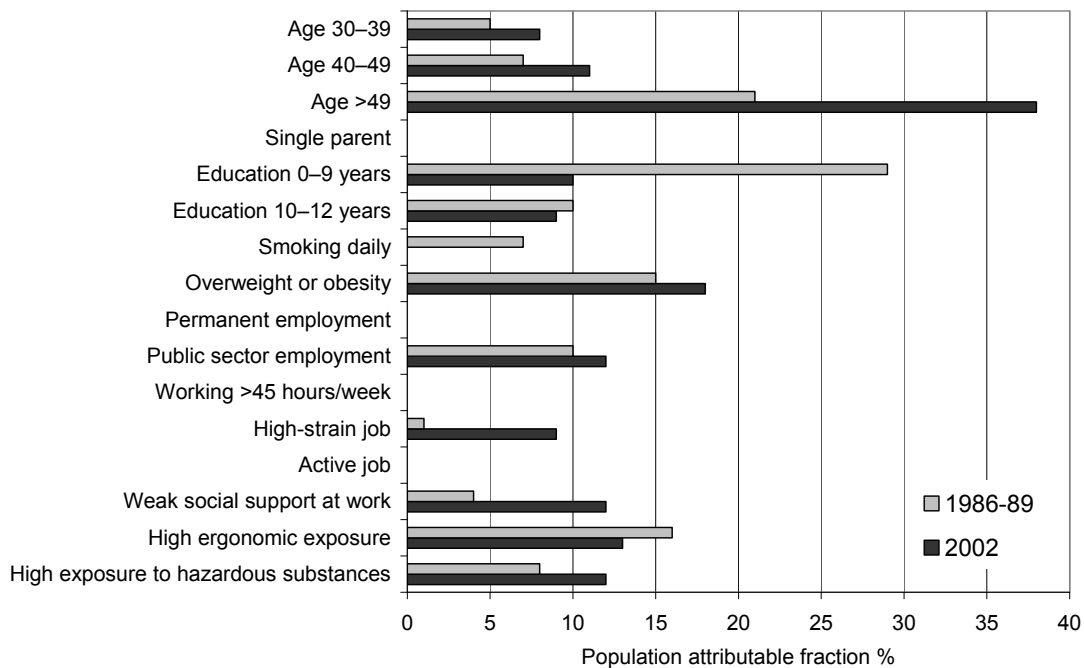


Figure 3b Population attributable fractions (%) of long-term sickness absence among men

PAPER III

The study reported in Paper III showed that having a high-strain job with high psychological demands and low decision latitude increased the odds for LTSA for both women (OR 1.95, 95% CI 1.43–2.67) and men (OR 2.15, 95% CI 1.44–3.21). In addition, it was noted that active jobs were associated with LTSA among women (OR 1.29, 95% CI 1.03–1.61); such a connection was also found for men, but it diminished after controlling for other relevant factors. Furthermore, the relevance of the demand-control model was more evident in the private sector (see Figure 4).

Weak social support was observed to be associated with LTSA in both women (OR 2.14, 95% CI 1.66–2.76) and men (OR 1.66, 95% CI 1.21–2.27), and this was apparent in both the private and the public sector. Considering associations with weak social support, the ORs for women were 2.23 (95% CI 1.63–3.04) in the public sector and 1.94 (95% CI 1.23–3.06) in the private sector, and the corresponding values for men were 1.77 (95% CI 1.02–3.06) and 1.56 (95% CI 1.05–2.32).

All results were adjusted for age, education, employment security, employment sector, hours worked, physical work environment exposure, financial problems, smoking, BMI and self-reported health.

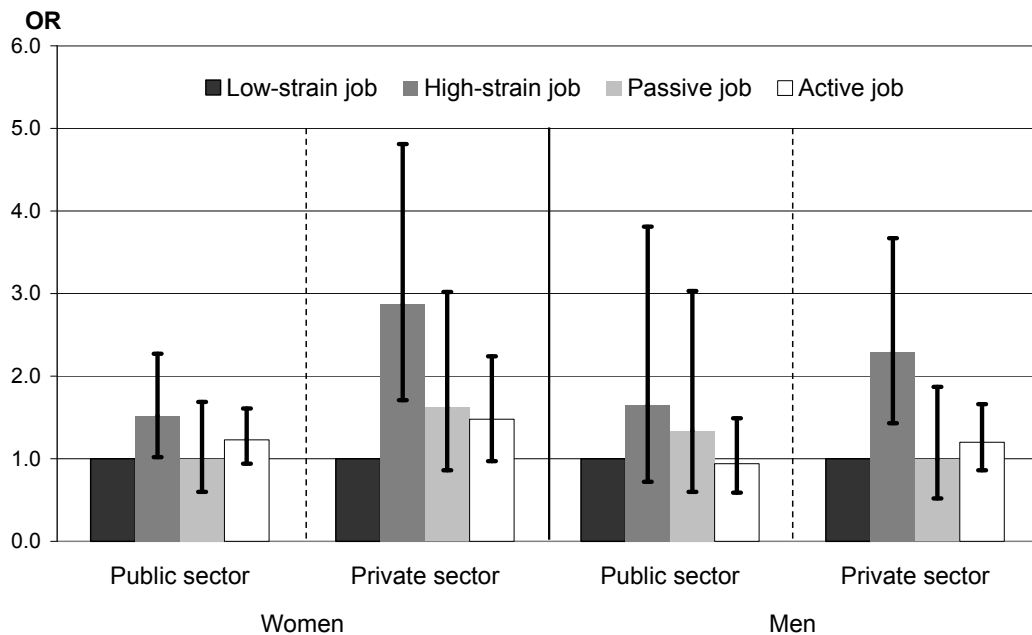


Figure 4 Associations between combinations of job demand and control and long-term sickness absence among women and men with public- or private sector employment. Adjusted ORs with 95% CIs (low-strain jobs as the reference category, OR = 1.0)

PAPER IV

The final study (Paper IV) showed that more women (31%) than men (25%) experienced work-to-family interference (WFI) at least once a week, and the corresponding values for family-to-work interference (FWI) were 12% and 13%, respectively. There was some overlapping, and 9% of the women and 10% of the men experienced both WFI and FWI. In 2005, LTSA was more prevalent among individuals with poor self-reported health. For men with LTSA, it was also more common to have children at home, be a single parent, have a lower socioeconomic status, or work shifts. The women with LTSA also had more frequently experienced workplace closure or reorganisation of the workplace.

No general associations between WFI or FWI and LTSA were found for women or for men. However, in the stratified analysis, associations with WFI were observed in some subgroups after adjustment for age and self-reported health. WFI was associated with LTSA among men with higher socioeconomic status. There was also a tendency to association between WFI and LTSA among women who had the main responsibility for housework and family (see Figure 5).

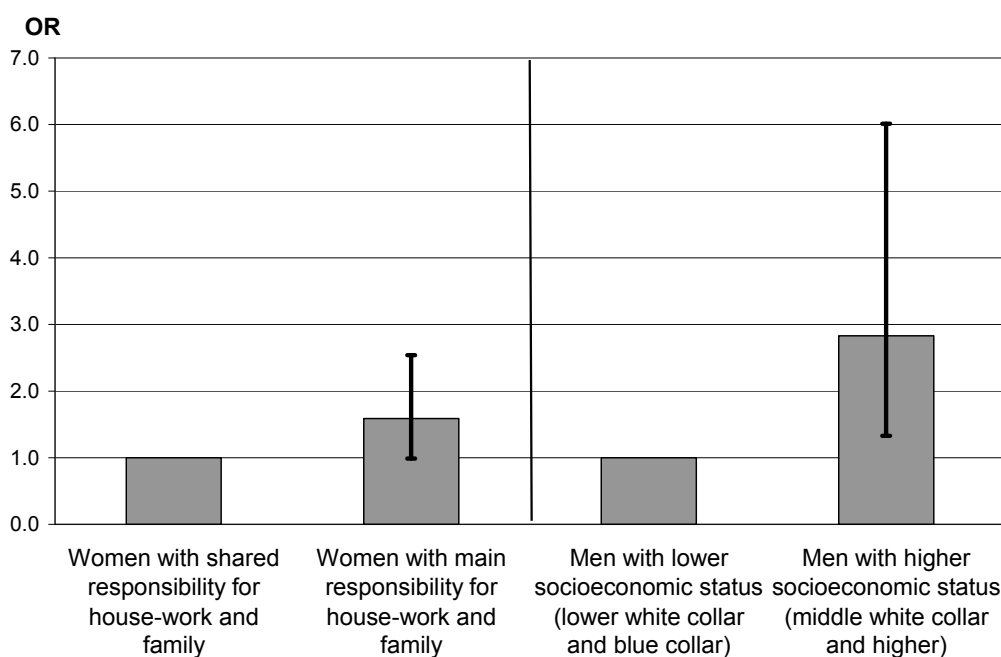


Figure 5 Associations between work-to-family interference (WFI) during the spring of 2004 and long-term sickness absence during follow-up in 2005 among women and men in different work- and family-related settings. Adjusted ORs with 95% CIs (reference categories, OR = 1.0)

DISCUSSION

As mentioned, the present research was conducted to identify societal and work- and health-related factors that have been associated with the fluctuations in LTSA in Sweden over the last two decades. Another objective was to ascertain important risk factors for LTSA among women and men in the working population, considering characteristics of work, family, and individual.

MAIN FINDINGS

Over the period 1992 to 2008, there was an upward trend in LTSA in the late 1990s and a downward trend from 2003 and onwards, essentially regardless of the degree of generosity of the sickness insurance system. Specific amendments to the Swedish sickness insurance scheme were only modestly associated with the number of spells of LTSA for women and men. In general, expected relationships were not found between the composition of the labour force, labour market factors, and LTSA. However, LTSA was positively associated with adverse changes in working conditions and increased alcohol sales.

The increase in LTSA in Sweden was also linked to a combination of changes in the risk panorama and the size of the population at risk. Employment conditions and factors related to the psychosocial work environment were more important in the early 2000s than in the late 1980s, especially for women. In 2002, LTSA was clearly associated with public sector employment and adverse psychosocial work environments. Even moderate changes to more unfavourable working conditions in public sector jobs may have an impact on the number of women with LTSA, since that sector has a large proportion of female employees.

In addition, it is apparent that lifestyle factors have played an increasingly important role in LTSA among both sexes, and the age gradient has become stronger over time as well, with more sickness absence among relatively young people.

Referring to the previously described push-pull model of factors that can lead to LTSA, one of the main messages of this thesis is that the push factors in the labour market and working life may be the chief explanation for the increasing numbers of employees on prolonged sick leave during the period 1997 to 2002. Notwithstanding, the high compensation levels and the discretionary scope with regard to assessment of disease and work ability are inherently important pull factors in the Swedish sickness insurance system [8, 96, 100]. An example of the discretionary scope is the use of stricter assessment of the right to sickness absence benefits, despite there being no specific amendments to legislation in that respect before 2008, which the Swedish Social Insurance Agency has officially offered as the reason for the decrease in sick leave since 2003 [176].

The present research revealed another feature of the Swedish sickness insurance scheme, namely, a tendency for legislative amendments to lag behind rather than lead changes in trends in LTSA. Consequently, the amendments are apt to strengthen rather than alter ongoing trends.

ASPECTS OF SOCIETY

Several studies using aggregated data [1, 7, 10] or individual data [8, 104, 177] have shown that legislative amendments to the sickness insurance system are associated with changes in the levels of sickness absence. Most of these investigations analysed data obtained before 1993 and did not address LTSA in particular. However, it does seem that lowered compensation levels in 1991 and the introduction of a waiting day in 1993 have contributed to an altered composition of sick leave seen as reduced incidence and increased duration [8, 177].

A majority of the legislative amendments have involved changes in compensation levels, and previous studies have indicated that LTSA is less sensitive to economic incentives [1, 17, 38], which agrees with the suggestion that LTSA is less voluntary and more closely connected to illness and disease [24, 36]. Hence, the finding presented in Paper I indicating relatively modest associations between LTSA and adopted amendments seem plausible. Despite that, it appears that there was an association between the number of spells of LTSA and changes in the disability pension system, and this applied to men in 1993 when the eligibility rules for disability pension became stricter and LTSA increased, and in 1999 when the eligibility rules became more lenient and LTSA decreased. The same pattern was found for women in 2003, when it was decided that disability pension was to be considered after one year of sick leave, and the number of LTSAs subsequently decreased, partly due to increased inflow to disability pension [69, 78].

The associations between sick leave in general and unemployment levels reported in other studies [1, 9, 73, 105], were not supported for LTSA by the present results (Paper I). The findings suggest that, compared to LTSA, short-term sick leave is more sensitive to changes in business cycles and unemployment.

It seems that the effects that changes in the composition of the labour force have on sick leave may have decreased since the late 1990s, because the current observations indicated that neither shifts in the level of labour force participation nor an ageing workforce has been associated with LTSA over the mentioned period. By comparison, earlier studies analysing Swedish sick leave data collected up to the early 2000s have discerned associations with both those factors [1, 73], which implies that there may have been an interaction between deteriorating psychosocial work environments and an ageing workforce in the late 1990s, as was proposed in one of the cited investigations [1]. In other words, it appears that parts of the previous correlations found between an ageing workforce and the numbers on LTSA could be attributed to changes in the psychosocial work environments.

Bäckman has proposed that real wages may represent an alternative to unemployment levels as an explanation for fluctuations in sick leave rates [10]. The positive association previously reported by Bäckman supported the idea of an “income effect” in which sick leave increases when a person’s income target can be reached with less hours worked [10]. Conversely, the current findings (Paper I) revealed a negative association between real wages and LTSA, which supports the idea of a “substitution effect”, albeit only among men. Hence, LTSA is reduced when the relative cost of time off work increases with rising real wages.

Earlier studies using aggregated data have also indicated a positive association between alcohol consumption and sick leave in general [11, 114]. According to the present results (Paper I), the negative effects of alcohol on public health include LTSA as well.

None of the above-mentioned studies of aggregated data used indicators of changes in working conditions. Despite the fact that the indicators described in Paper I were crude, the results of that investigation suggest that elevated levels of adverse working conditions and work-related stress contributed to the increased rates of LTSA during the late 1990s.

ASPECTS OF WORK

A general finding of both the macro and the micro studies was that working conditions influenced LTSA through direct associations and indirectly via work-to-family interference. The changes in exposure to adverse psychosocial work environments reported in Paper II have also been observed by other investigators [178-180], and the proposed shift in the aetiology of LTSA agrees with the findings of other studies conducted in Sweden [3, 4, 181-184]. The steepest increase in LTSA has been due to mental illness, which supports the relevance of changes in the psychosocial work environment [51, 179, 185, 186]. In addition, sickness absence increased most among employees in the sectors of the labour market showing the most negative development, that is, the county councils and municipal public services such as health care, education, and care of children and the elderly [3, 178, 181]. Women constitute the vast majority of the employees in these public services, which also contributed to an increased gender gap in sickness absence.

The analysis described in Paper II suggested that, alongside public sector employment, permanent employment is emerging as a new risk factor for LTSA among women. Other investigators have observed higher absence rates among those on permanent contracts, possibly because temporary employees are reluctant to take sick leave due to their lower job security [102, 140]. However, it is also plausible that permanent employment can increase the probability of experiencing organisational instability in the form of downsizing or expansion, which has been found to be associated with sickness absence [4, 187]. The latter conclusion regarding the connection between employment security and LTSA is also supported by the present results (Paper II).

As indicated in Paper II, working overtime (i.e., more than 45 hours paid work per week) appeared as another novel risk factor for women. Other studies have shown a negative association between working overtime and sick leave [138, 139], but it is possible that such work can be detrimental to health if there is low employee control over the number of hours worked [137]. A potential mechanism in this context is that the risk of LTSA is increased by overtime work performed in conjunction with adverse working conditions, low degree of voluntariness, and extensive domestic responsibilities.

The findings described in Paper III concur with the notion that LTSA is associated with demand-control and social support among both women and men. Furthermore, also for both sexes, the present results regarding the Swedish working population agree with the job strain hypothesis and with the fact that studies have consistently shown that weak

social support on the job is associated with LTSA [48, 51, 125, 186]. The results concerning job strain were more distinct in the private sector, which indicates that the demand-control model is more applicable in manufacturing and business activities.

The relevance of the active-learning hypothesis for working women in Sweden can be questioned, since active jobs were found to be associated with LTSA in women, as has also been reported earlier [35, 127]. Active jobs with high decision latitude and high psychological demands seem to be a risk factor for LTSA especially among women, which is worrying considering that such job situations are becoming increasingly common. It is plausible that the gendered division of household labour, family conditions, and domestic responsibilities represents an extra workload and stress for employed women [164, 165, 188], which in turn may augment the effects of extensive demands at work. There is no evidence favouring the hypothesis that active jobs are problematic solely for women in the public sector, because they have low status jobs involving poorer working conditions. Nonetheless, further research is needed to determine why active jobs are related to LTSA. If this situation is associated with higher levels of work-to-family interference, active jobs will probably become more problematic for men as well, assuming that gender equality will increase with regard to domestic responsibilities [189].

Even though it seems that the psychosocial work environment has become increasingly important as a factor affecting LTSA, the relevance of an adverse physical work environment in this context is still evident for both male and female employees, as described in Paper II. In short, that investigation demonstrated a relationship between ergonomic exposure and LTSA among men and women, which agrees with the findings of previous studies [56, 60, 110, 117, 118, 119], and exposure to hazardous substances also emerged as a potential risk factor for men. The continuing importance of the physical work environment should be further emphasised, because there can be adverse interactions between ergonomic working conditions and the psychosocial work environment [60, 119, 120]. For instance, insufficient time to perform work tasks could reduce the capacity to manage heavy lifting and increase the exposure to uncomfortable work postures.

ASPECTS OF INDIVIDUAL FACTORS AND FAMILY CONDITIONS

Compared to men, women were considerably overrepresented among those with LTSA in 2002 (OR 1.84), even after adjustment for a number of other factors (Paper II), and this excess risk of LTSA could not be explained by conventional factors. However, home-related stress and work-family imbalance are more evident among working women [190-192], which may contribute to the increased gender differences in the prevalence of LTSA.

As noted in Paper I, changes in the age composition of the workforce from 1992 to 2008 were not associated with increased LTSA at the aggregate level. However, studies using data collected up to the early 2000s in Sweden have found such relationships for both LTSA [1] and sick leave in general [73]. At the level of the individual, the present results show a clear association between higher age and LTSA (Paper II), and this has also been reported extensively in previous research [110], which has even indicated

stronger positive associations with LTSA and disability pension than with short-term sick leave [2]. With a greater proportion of the workforce being at risk (i.e., getting older), changes in the labour market entailing aspects such as more detrimental work environments may have an extensive effect on the number of people on prolonged sick leave [1]. According to the current findings (Paper II), the increasing number of employees aged 50 and above has had a substantial impact on LTSA in Sweden.

Educational level can be considered as a measure of socioeconomic position, and, along with occupational class, it can have a marked impact on differences in sick leave [143]. Here (Paper II), lower education was found to be consistently associated with LTSA over time, although a slight tendency towards decreasing differences between educational levels was observed for both sexes. One interpretation of this is that, to some degree, the social inequalities in sick leave have been reduced by the deterioration of psychosocial work environments with increasing job demands also in white collar occupations and in occupations with higher educational requirements [180]. Since the number of employees with only primary education (0–9 years) is steadily decreasing, the population attributable fraction of LTSA for low education is also decreasing, as pointed out in Paper II. Hence, it would probably be more correct to use socioeconomic position related to occupational status as an indicator in future studies of sickness absence in Sweden.

Lifestyle factors such as smoking [145, 148] and overweight or obesity [45, 55, 145-147] are associated with sick leave in general and with extensive sick leave in particular [55, 145-148]. The results in Paper II regarding overweight or obesity agree with previous studies showing that these aspects are evident risk factors for LTSA among both women and men. Increasing proportions of the working population were also found to be at risk [193], which contributes to increased LTSA (Paper II). On the other hand, smoking on a daily basis has been declining steadily among both sexes since the 1980s in Sweden [194]. However, smoking decreased more among men than among women in the 1990s, and the socioeconomic gradient with more smokers being less educated or blue-collar workers was stronger for women than for men in the early 2000s [194]. These observations might explain why the findings in Paper II show that smoking has become a risk factor for LTSA among women but not men.

Lifestyle risk factors such as smoking are usually part of more complex lifestyle patterns, for example involving adverse living and working conditions associated with increased health risks [110, 152], and such patterns may be more common among women than men, particularly with regard to working conditions [3] and extensive domestic responsibilities [164, 192]. Nevertheless, Lundborg found an association between smoking and the annual number of days of sickness absence for both women and men in Sweden in the late 1980s [148]. The difference between the results obtained by Lundborg and those reported in Paper II might be explained by a stronger association with short-term sick leave for men and/or changes in smoking patterns for both sexes during the 1990s [194].

Family conditions such as cohabitation and the presence of children might add to the workload and stress experienced by gainfully employed adults. According to the current results (Paper II), children in the family were not associated with LTSA among cohabiting parents, which agrees with other studies [37, 52, 155]. However, for a single

parent to bear the full responsibility for children is a definite source of strain and has been found to be associated with extensive sickness absence [52, 155]. In the present research (Paper II), this association was apparent in the late 1980s but not the early 2000s, possibly due to changing patterns in cohabitation over time, with children more often living alternately with separated parents, and partners forming new nuclear families with children from previous relationships [195].

In general, LTSA was found to be weakly associated with WFI and FWI (Paper IV). However, associations were observed between WFI and LTSA in certain work- and family-related settings. WFI was associated with LTSA among men with higher socioeconomic status (middle white collar and above) and among women bearing the main responsibility for housework and family. These findings correspond well with the results of earlier studies conducted in the Netherlands [168, 169].

The gendered work and family life seem to be expressed in the conditions associated with WFI and LTSA, which are related to family for women and to work for men [169]. WFI is also more than twice as common as FWI, and thus it seems that the work situation is the most critical aspect of daily life and work-family balance in the employed population. These observations support the suggestion that the relationship between WFI and sickness absence operates through factors associated with the psychosocial work environment [168]. It can be expected that WFI will be more prevalent than FWI in a highly work-oriented society such as that in Sweden, where both women and men are expected to have gainful employment [196]. Since many women bear the main responsibility for housework and family (48% in the cohort study described in Paper IV), increased WFI may have a considerable impact on the number of women facing LTSA. The same holds true for men with higher socioeconomic status, a group that constituted 40% of the investigated cohort.

The prevailing “half-way” gender equality in Sweden, meaning that women are participating more extensively in paid work while men are to a lesser extent increasing their share of domestic work and family responsibilities, can probably explain the finding that the women in this country experience more WFI than the men do [196]. A situation entailing more gender equality will be achieved in dual earner families when men and women share the domestic responsibilities to a greater extent, and this will probably also mean that the burden of strain and ill-health will be borne more equally by women and men [189]. The results reported in Paper IV suggest that this pattern is emerging to some degree in Sweden, since men with higher socioeconomic status and WFI are at risk of LTSA. A similar pattern was found in a Swedish study of individuals with a higher education, which showed that the conflict between demands from the home and work environments constituted a risk factor for sick leave among men but not women [138].

METHODOLOGICAL ISSUES

Ecological study

Studies of aggregated data can enable analysis of the effects that changes in ecological factors (e.g., sickness insurance policy and unemployment levels) can have on LTSA. Accordingly, this approach may identify politically relevant aspects, such as the roles of social security and labour market policies.

Other strengths of the present ecological study (Paper I) included the use of long time series of comparable sickness absence data and a broad array of explanatory variables. The ecological investigation covered the entire Swedish population and included all sick leave periods that exceeded 59 days. The use of absence data from national registers was also beneficial, since that information comprise all medically certified sick leave spells lasting longer than the sick pay period and entitle claimants to sickness cash benefit.

Unfortunately, all studies based on aggregated data involve difficulties related to interpretation and causality. Ecological fallacy is inherently associated with this type of research, in which inferences about individual behaviours are based solely on aggregated data, and such conclusions must be made with caution [197]. The current analysis of aggregated longitudinal data also had problems with multicollinearity, i.e. several independent variables were linearly correlated. This further emphasises the need for a circumspect approach to interpreting the results of the ecological study described in Paper I.

Some specific measurement difficulties should also be mentioned. The indicators of working conditions were obtained in surveys with their own particular shortcomings, and since the number of such observations was limited, linear interpolation had to be applied. The indicator of alcohol consumption did not include unrecorded consumption such as alcohol purchased outside the country. Another source of potential bias was the lack of separate measures for women and men with regard to real wages and alcohol consumption. Finally, it is possible that other causal factors that were not identified in the ecological study gave rise to bias.

Cross-sectional studies

An advantage of the analysis of the two studies described in Paper II was that the same set of factors and measurements of exposures was used in both investigations. Another strength was that sickness absence was measured by national social insurance register data, which mean that there was no underreporting of compensated sickness absence. In addition, the use of large population-based study samples enabled broad generalisation, and the data sets offered reasonably high validity and reliability because they contained well-measured indicators of conventionally used explanatory factors for sickness absence.

In the investigations presented in Papers II and III, another strong point was that possible confounding effects of the physical work environment were taken into consideration when analysing the associations between the psychosocial work

environment and LTSA. Moreover, pregnancy-related disorders were excluded in those studies, which increased the possibility of comparing associations found for women and men. However, that strategy could not give an entirely correct picture, since episodes of sickness absence linked to pregnancy are often reported as musculoskeletal or mental disorders [75, 78].

Other limitations were that the cross-sectional design of the two studies considered in Papers II and III did not allow firm conclusions to be drawn about causal pathways, and the differences between those investigations may have been a source of bias. In addition, the retrospective approach involving self-reporting of employment and working conditions may have led to problems with reversed aetiology, that is, individuals with LTSA may have been more apt to attribute their sick leave to exposures at work and outside work. Although this might represent an insignificant drawback in such research [198], it is possible that reversed causation can pose a problem when analysing the detrimental health effects of adverse work conditions [199], which might be reduced to some extent by adjusting for health. Adjustment for self-reported health was not done in the analysis described in Paper II, which may have been a shortcoming. However this was done in the subsequent investigation (Paper III), and the results obtained regarding demand-control and social support at work were very similar to those presented in Paper II.

Recall bias was another potential problem, especially in the study conducted in 1992 (i.e., Study I in Paper II). This was due to the longer time span between exposure and reporting, although the face-to-face interview technique that was used may have counteracted this difficulty to some degree. Bias might also have occurred as a result of the different survey methodologies (i.e., interview versus mailed questionnaire). Nonetheless, the increased job demands observed in Studies I and II discussed in Paper II correspond well with what has been reported earlier [180].

The response rate was higher in Study I conducted in 1992 (69%) than in Study II performed in 2002 (62%). The non-response pattern was similar in both those studies, with higher rates among younger subjects and among men. Previous research has indicated that lower response rates can be expected for individuals with less education, a lower socioeconomic status, and a marginal position in the labour market [200, 201]. Furthermore, it has been reported that lower response rates among people on long-term sick leave are probably due to impaired physical and mental health [201], and hence the associations reported here may have been underestimated if such health differences were associated with the factors that were analysed.

Another reason why associations might have been underestimated is that the comparison group from the employed population aged 20–64 also included people on long-term sick leave. Since sick leave were more common in Study II than in Study I the underestimation was most likely higher in the former study. Hence, the differences in estimated associations between Studies I and II might have been greater than was stated in Paper II. Notwithstanding, caution should be observed when interpreting the disparities found between women and men, as well as across employment sectors (Paper III) and across studies (the two investigations addressed in Paper II), since no formal statistical test of differences in estimates was made in those analyses.

Prospective cohort study

The strengths of the present cohort study (Paper IV) were as follows: a relatively large sample of the working population was analysed, register data on sickness absence were used, and a prospective cohort design was employed. Moreover, the considerable size of the population-based sample and the relatively high response rate (73%) suggest good generalisability. The outcome measure (i.e., having at least one spell of long-term sickness absence exceeding 14 days) might be considered to be somewhat crude, but it is nonetheless robust [67]. No information was available about the first and the last day of sick leave, and thus it was not possible to calculate the exact time span between exposure and outcome, or the length of the sick leave period.

Another potential limitation of the cohort study was the use of single items on WFI and FWI, which might have reduced the measurement validity. It is also possible that there was selection bias in terms of dropout by individuals whose working conditions involved higher WFI; this would have applied to women in particular and thus might have led to underestimation of the associations that were observed for women [202].

It should also be mentioned that detailed information about the causes of sickness absence (i.e., diagnoses) was not available in the cohort study. Therefore, pregnancy-related disorders could not be excluded, which reduced the possibility of comparing women and men with regard to factors associated with sick leave [75].

Suggestions for further research

The results of the current investigation suggest that, despite potential problems related to availability of data, longitudinal analyses of ecological data on sickness absence should incorporate indicators of changing working conditions and worker health. The findings also demonstrate that it is important to systematically revise risk factors over time and monitor changes in the population at risk. Ideally, this should be achieved by conducting longitudinal cohort studies that span several years and include repeated measurement of both exposures and outcomes. An alternative strategy would be to carry out repeated cross-sectional case-control studies with similar design. Moreover, there are numerous factors that influence sickness absence, and thus a broad understanding of this phenomenon requires the use of interdisciplinary approaches and investigation of factors at different levels.

Even though the psychosocial working conditions in Sweden did improve somewhat in 2005 and 2007, large parts of the labour force are still being exposed to negative psychosocial factors at work [203], and thus it may be too early to conclude that work disability and sickness absence are no longer induced by adverse psychosocial work environments. Furthermore, no general improvement in the health of the working population has been reported recently [204]. Inasmuch as the decrease in LTSA since 2003 may be the result of stricter assessment of the right to compensation [176], another relevant issue is whether growing numbers of employees are actually going to work despite health problems. Accordingly, it is important to investigate the phenomenon of sickness presenteeism [30, 32], and in parallel study paid and unpaid absence from work due to illness or disease.

The current investigation revealed associations between WFI and LTSA in some work and family settings, and the implication of this for future research should be to analyse the paid and the domestic workload in conjunction with work-family interference, rather than as separate entities. Attention should also be focused on other coping options and social insurance arrangements in further studies of the associations between extensive work and family responsibilities, work-family interference and sickness absence. Examples of other relevant outcomes include partial sick leave or disability pension, part-time work, non-participation in the labour market, paid maternity and paternity leave, and parental cash benefit for taking care of sick children.

In addition, it seems that there is a specific need to develop more cohesive research strategies that can capture gender differences in sickness absence, as indicated by the fact that a number of studies have found disparities between women and men in terms of both the incidence and the causal factors involved [67, 117, 138, 153, 155, 157, 168]. In that context, it appears that the use of traditional explanatory factors such as working conditions and family composition cannot suffice to explain the gender divide in (long-term) sickness absence [153, 157]. Active job situations entailing high psychological demands and high job control at work have become increasingly common and seem to be problematic for many women, especially in the private sector. Other aspects of work are becoming more pertinent as well, particularly for women, and one of these is public sector employment. Accordingly, more attention should be focused on women's working situations and living conditions, separately and in conjunction. However, it is even more important to take the analysis a step further and explore the mechanisms that shape the working and living conditions of women and men, and the health-related behaviours of both sexes [79-83, 162].

CONCLUSIONS

Considering the relatively extensive changes that took place in the labour market and work environments in Sweden in the 1990s, especially for women, as well as the importance of various aspects of the work environment in predicting LTSA, it seems that the deterioration of the self-perceived psychosocial work environment made a major contribution to the increased levels of prolonged absence between 1997 and 2002. The most pronounced rises in LTSA were reported in organisations with the most extensive problems regarding the psychosocial work environment, namely, the county councils and municipal services such as health care, education, and care of children and the elderly. This conclusion is also supported by the observation that mental illness accounted for the steepest increase in LTSA. Furthermore, the fact that women constitute the vast majority in the mentioned public services attributed to increased gender gap in sickness absence.

Considering the push-pull model of sickness absence, the present research showed that different push factors related to the labour market and working life represent the main explanation for the increasing numbers of employees on long-term sick leave from 1997 to 2002. However, it should be emphasised that the pull factors are an inherent part of the Swedish sickness insurance system, which includes high compensation levels and a discretionary scope regarding entitlement to sickness absence benefits.

The rise in LTSA in the 1990s was probably further reinforced by other changes that occurred at that time, such as the ageing of the workforce, increased alcohol consumption, and more widespread overweight and obesity. Clearly, psychosocial work environments can be considered to represent a new and more relevant risk factor for LTSA, but it is also important to consider that exposure to risk factors for such absence has increased. This is especially true for higher age, overweight and obesity, and various aspects of adverse psychosocial working conditions. Hence, understanding the magnitude of changes in LTSA requires monitoring of both the risk factors that are involved and the population at risk over time.

In the working population aged 20 to 64, both job strain and weak social support are associated with LTSA among women as well as men. The associations with job strain were more evident in the private sector, indicating greater applicability of the demand-control model in manufacturing and business activities as regards LTSA. Active jobs involve high psychological demands and high decision latitude, and for women they are also associated with LTSA, which is problematic since such occupational situations are increasingly common.

Work-to-family interference is also associated with LTSA among both women and men in the working population aged 25 to 50 years, and the differences between women and men in that regard indicate that gendered work- and family life are still prevalent. Extensive family responsibilities among women and extensive work responsibilities among men seem to hamper achievement of a balance between work and family in the working population.

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