From the Department of Clinical Sciences, Karolinska Institutet, Stockholm, Sweden

LONG-TERM SICKNESS ABSENCE FOR PSYCHIATRIC DISORDER:

THE ASSOCIATION WITH STAFF
DOWNSIZING, TREATMENT,
WORKPLACE-ORIENTED
REHABILITATION, AND
SUBSEQUENT CAUSE-SPECIFIC
INPATIENT CARE AND MORTALITY

Anna Bryngelson



Stockholm 2013



"Det är värt att komma ihåg att alla de olika försäkringar, som nu skyddar hela svenska folket från ekonomiska svårigheter vid sjukdom, arbetslöshet, olycksfall, ålderdom och dödsfall ursprungligen kommer från fria och frivilliga initiativ i gemenskapen på en arbetsplats.

Den allmänna och obligatoriska sjukförsäkringen har sitt ursprung långt tillbaka i tiden i skråkassor och fabrikskassor. Genom att regelbundet lägga en avgift till en gemensam kassa ("en fabrikslåda"), åstadkommen av en enkel föreningsbildning, garanterades medlemmarna ... ett visst ekonomiskt stöd vid sjukdom, olycksfall och dödsfall. Det rörde sig visserligen om mycket små belopp. Men de räddade ändå de drabbade undan svälten."

Ur "Kampen för tryggheten", av Sigvard Classon, 1988.

"It is worth remembering that all the different insurances, which now protects the Swedish citizens from financial hardship during sickness, unemployment, accidents, old age and death originally derives from free and voluntary initiatives in the community in a workplace.

The general and mandatory sickness insurance has its origins far back in the guild funds and factory funds. By regularly adding a charge to a common fund ("a factory box"), provided by a single compound formation, were guaranteed members ... some financial support in case of sickness, accident or death. These were admittedly very small amounts. But they still kept the victims escape famine."

From "Struggle for security", by Sigvard Classon, 1988.

ABSTRACT

Psychiatric disorders have increased as causes of long-term sickness absence in Sweden as well as in other countries. Still, there is limited research on psychiatric sickness absence. The overall objective of this thesis was to contribute to the knowledge of long-term sickness absence for psychiatric disorders, focusing on the associations with staff downsizing, treatment, workplace-oriented rehabilitation, and also subsequent inpatient care and mortality.

In study I, aggregated data on psychiatric long-term sickness absence from AFA Insurance and information on staff numbers from the Swedish Association of Local Authorities and Regions was used. Seventeen county councils were examined. The results showed that staff downsizing was associated with subsequent increases in long-term sickness absence for psychiatric disorders. That is, the greater the staff reduction, the larger was the increase in psychiatric long-term sickness absence. The associations were similar in men and women as well as in different age groups, although statistical significance was only reached in the groups of women and middle-aged employees.

Study II was based on employees (80% from the Swedish municipalities and county councils), initially long-term sick-listed for a psychiatric disorder who answered a questionnaire on, *e.g.*, received treatment/rehabilitation. This information was linked to outcome data on sick leave. The results showed that those who reported having received workplace-oriented rehabilitation had reduced odds of subsequent sickness absence compared with those who did not. Drug treatment and physiotherapy, respectively, increased the odds of later sickness absence and disability pension.

In study III-IV, employees (in November/year) within municipalities and county councils were examined. Register linkages was done between data on socio-demographic factors, sickness absence, inpatient care and mortality. The analyses revealed that psychiatric long-term sickness absence was associated with increased risk of subsequent cause-specific inpatient care and mortality.

In summary, one finding of this thesis was that staff downsizing among county council employees was associated with later increase in psychiatric long-term sickness absence. Moreover, among employees with long-term sickness absence for a psychiatric disorder, workplace-oriented rehabilitation reduced the risk of subsequent sickness absence. Finally, psychiatric long-term sickness absence was associated with increased risk of later inpatient care and death due to cardiovascular disease, cancer and suicide attempt/suicide.

LIST OF PUBLICATIONS

- I. Bryngelson A, Mittendorfer-Rutz E, Fritzell J, Åsberg M, Nygren Å. Reduction in personnel and long-term sickness absence for psychiatric disorders among employees in Swedish county councils. An ecological population-based study. *Journal of occupational and environmental* medicine 2011;53(6):658-662.
- II. Bryngelson A, Mittendorfer-Rutz E, Jensen I, Lundberg U, Åsberg M, Nygren Å. Self-reported treatment, workplace-oriented rehabilitation, change of occupation and subsequent sickness absence and disability pension among employees long-term sick-listed for psychiatric disorders: a prospective cohort study. *BMJ Open* 2012;2:e001704.
- III. Bryngelson A, Åsberg M, Nygren Å, Jensen I, Mittendorfer-Rutz E. Cause-specific inpatient care among employees long-term sick listed for a psychiatric disorder in Sweden 1990-2007: a prospective cohort study. (Submitted).
- IV. Bryngelson A, Åsberg M, Nygren Å, Jensen I, Mittendorfer-Rutz E. All-cause and cause-specific mortality after long-term sickness absence for psychiatric disorders: a prospective cohort study. (Accepted for publication in PLOS ONE).

CONTENTS

1	Introduction						
	1.1 Background						
		1.1.1	Sickness benefits from the SSIA	3			
		1.1.2	AFA Insurance	4			
		1.1.3	Psychiatric sickness absence and diagnoses	4			
		1.1.4	Depression, anxiety, adjustment and stress-related disc	order 5			
		1.1.5	Long-term sickness absence	6			
		1.1.6	Staff downsizing	7			
		1.1.7	Treatment, rehabilitation, change of occupation	7			
		1.1.8	Inpatient care and mortality	8			
2	Aim	s		10			
	2.1	.1 Overall aim					
	2.2	2.2 Specific aims					
		2.2.1	Study I	10			
		2.2.2	Study II	10			
		2.2.3	Study III	10			
		2.2.4	Study IV	10			
3	Data and methods						
	3.1	1 Study I					
	3.2	Study II1					
	3.3	Study	Study III				
	3.4	Study IV					
4	Results						
	4.1	1 Study I					
	4.2	Study II					
	4.3	Study III					
	4.4	Study IV					
5	Disc	ussion		27			
	5.1	Main 1	results	27			
		5.1.1	Staff downsizing	27			
		5.1.2	Treatment, rehabilitation, and change of occupation	29			
		5.1.3	Inpatient care and mortality	31			
	5.2	Metho	odological considerations	32			
		5.2.1	Study I	32			
		5.2.2	Study II	34			
		5.2.3	Studies III and IV	34			
	5.3 Future research						
6	Conc	clusions		36			
7	Ackı	nowledg	gements	37			
8	Refe	rences.		38			
Stu	dy I-I	V					

LIST OF ABBREVIATIONS

CAM Complementary or alternative medicine

CBT Cognitive behavioural therapy

CDR Cause of death register
CVD Cardiovascular disease
CI Confidence interval

GAD Generalized anxiety disorder

HR Hazard ratio

ICD International Classification of Diseases

IPR Inpatient register

LISA Longitudinal integration database for health insurance and labour

market studies

LTSA Long-term sickness absence

LTSAP Long-term sickness absence for psychiatric disorders

OR Odds ratio

PTSD Post-traumatic stress syndrome RCT Randomised controlled study

RTW Return to work SR Sickness rate

SSIA Swedish Social Insurance Agency

1 INTRODUCTION

1.1 BACKGROUND

The 1990s were a turbulent decade, both economically and politically. (1) Sweden and other western European countries experienced an economic crisis, and Sweden had its most severe financial crisis since the 1930s. (1-2) Unemployment rose, and there was a large increase in public expenditure. Many Swedish employers in both the private and public sector reduced their personnel (2), *i.e.* job insecurity increased among those remaining in employment. During the 1990s, there was also a large increase in negative stress-related working conditions (low control and high demand, *i.e.* high job strain), especially within the Swedish welfare service sector (health care, school and care services) where females are in a majority. (1-2) Moreover, self-reported anxiety, sleeping problems due to thoughts about work, and pain became more common during this decade. (1, 3)

This thesis examines long-term sickness absence for psychiatric disorders between 1990 and 2002. In Sweden, after a couple of years of decline, there was a rapid increase in long-term (≥90 days) sickness absence from 1997 up to the first years of the 21th century in Sweden (figure 1). There was an increase for both sexes, but it was greater among women than men. Additionally, sickness absence particularly increased among public sector employees. (4-5) Occupations in these working sectors (e.g., physicians, nurses, teachers, care services personnel) also had relatively high levels of self-reported psychologically stressful work. (3) Characteristics of these kinds of jobs are that they involve much social contacts and responsibility for other individuals. Moreover, psychiatric disorders have become increasingly more common as causes of sickness absence in different western European countries, Sweden included. (6) The proportion of psychiatric long-term (≥60 days) sickness absences in Sweden incrased from 14% in the late 1980s to 18% in 1999, and continued to increase to 30% in 2003. (7-9) Thus, there has been an enlargement in psychiatric disorders as causes of long-term sickness absence over longer time, but the greatest and most rapid increase was during the period from the late 1990s until the first years of the 21th century. The increase was mainly due to a rising proportion of common psychiatric disorders such as depression, anxiety and stress-related disorders. (5-7, 10)

Number

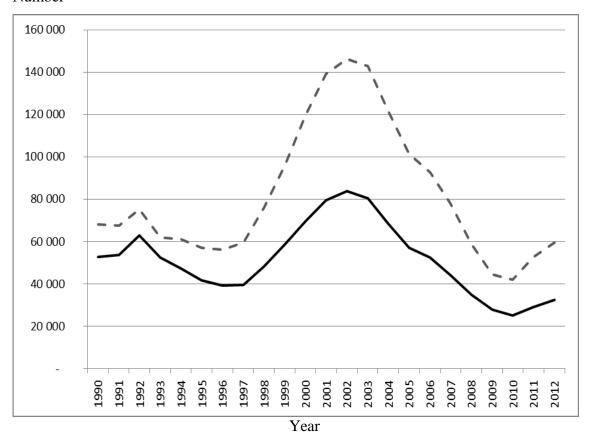


Figure 1. Number of ongoing spells of sickness absence, 90 days or more, due to all causes among women (dotted line) and men (solid line) in December from 1990 to 2012 in Sweden. Data from the Swedish Social Insurance Agency. Note: the "rehabilitation chain" was introduced in July 2008 with restricted sickness benefit to 1 year, though it could be longer in certain cases.

Overall psychiatric sickness absences tend to be long and therefore impose high costs on Swedish sickness insurance. (10) The often prolonged nature of psychiatric disorders might be due to, for example, the natural course of the diseases, treatment difficulties, poor work environments, or low work ability associated with such disorders. (11) The risk of disability pension is also relatively high among individuals with sickness absence due to psychiatric disorders. (12-14) For example, Kivimäki and colleagues (12) found that the risk for disability pension from psychiatric reasons in a Swedish county was increased 14.1 times among individuals with medically certified sickness absence for psychiatric disorders, as compared to a 5.7 times increased risk of disability pension among those sick-listed for musculoskeletal disorders.

The Swedish sickness benefit system provides financial security (15) and enables patients to rest, so that they can regain health and work ability. However, psychiatric sickness absence may have adverse consequences for the society, organizations and the individual. Attention has been drawn to the increased costs related to social security, health care and lost productivity associated with long-term sickness absence. (5, 16) Prolonged sickness absence could have both positive and negative consequenses for the individual. (17) Negative aspects might include social isolation (17-18) and an increased risk of marginalisation from the labor market in terms of disability pension or unemployment (12-14, 19), which, in turn, may elevate the risk of poor health and mortality. (20-23) There is limited research on sickness absence for psychiatric disorders (24). The following thesis attempts to extend the knowledge by examining psychiatric long-term sickness absence and its association with staff reduction, treatment, workplace-oriented rehabilitation and change of occupation, and also with subsequent cause-specific inpatient care and mortality.

1.1.1 Sickness benefits from the SSIA

In Sweden, sickness benefit (full- or part time) can be granted from the Swedish social insurance agency (SSIA) to all individuals, aged 16 years and older, who live in Sweden (or leave Sweden for a maximum time period of one year) if their work ability is reduced due to medical reasons. (25) Sickness benefit insurance is available to all persons who have the minimum level of annual income (with Swedish acronym, SGI). After the seventh day of sickness absence, a medical cerficate from a physician is required to receive further sickness benefit. Over the study period (in 1990 and from 1998 to 2002) there was no upper time-limit for sickness absence. (25-27) In 1990, benefit was paid from the first day of sick leave, and there was no period where the employer paid sickness absence compensation (the employer period). This system was changed in 1992, and between 1998 and 2002 there was a first waiting day of no benefit (qualifying day), and a 14 days employer period (from April 1998, before this the employer period was 28 days). After the employer period sickness benefit could be obtained from the SSIA if the reduced work abilty continued. From 1992 a rehabilitation benefit could be received from the SSIA during vocational rehabilitation. (26-27) Unemployed and self-employed persons receive all sickness benefit from the SSIA.

In study II, we analyse disability pension from the SSIA as an additional outcome to sickness absence in 2002. During this period, disability pension (full- or part time) could be granted to individuals in the ages 16-64 years if their work ability was permanently reduced, or reduced during a considerable time (temporary disability pension). (28)

1.1.2 AFA Insurance

Above the statutory sickness benefit insurance from the SSIA, most employees in Sweden are covered by an additional collective sickness insurance which is based on agreement between the parties on the labour market. One of the largest collective group insurance schemes in Sweden is run by AFA Insurance. All blue collar workers and all municipal and county council employees are covered by the sickness insurance. (29-30) The additional insurance during sickness covers persons who according to the SSIA have a minimum level of annually income (based on SGI). (30) In 1990, the insurance was provided when the individual had been employed for at least 180 days. For the period 1998-2002, the person had to be employed for at least 90 days in order to receive the additional benefit. Moreover, in 1990 there was seven waiting days before the sickness absence benefit was considered from AFA Insurance. After these waiting days, benefit was paid from the first day of sickness absence (full or part time). From 1998 until 2002, the additional sickness benefit was given from day 15 of the sickness period. During the study period, an additional benefit was also offered for the time when the individual was receiving disability pension from the SSIA. Time during which both sickness absence and disability pension was given, however, was considered as a period with sickness absence. Sickness benefit from AFA Insurance could be received until the age of 65. Insurance protection continued for up to two years afterwards in cases where an insured person lost his or her job and became unemployed (30)

1.1.3 Psychiatric sickness absence and diagnoses

The SSIA uses the coding system in the International Classification of Diseases (ICD). Among psychiatric disorders (ICD-9 codes 290-319; ICD-10 codes F00-F99), mood (affective) disorders (ICD-10 codes F30-F39), as well as neurotic, stress-related and somatoform disorders (ICD-10 codes F40-F48) dominate as causes of long-term (>60 days) sickness absence in Sweden (13% and 12%, respectively in 2009). (9) Most frequent are depressive episode and recurrent depressive disorder (ICD-10 codes F32

and F33), anxiety disorders (panic disorder, generalized anxiety disorder (GAD), mixed anxiety and depressive disorder, "other" anxiety disorders) (ICD-10 code F41), and also stress-related and adjustment disorders (ICD-10 codes F43). Other disorders, such as schizophrenia, schizotypal and delusional disorders (ICD-10 codes F20-F29), and disorders due to psychoactive substance use (ICD-10 codes F10-F19) are much less common as reasons for long-term sickness absence (0.5% and 0.6%, respectively, in 2009). (9) From 1999 until 2003, the proportion of long-term sickness absences due to these latter disorders did not increase in Sweden. (8) Among men are depression and alcohol-related psychiatric disorder relatively more common, while anxiety/stress-related disorder and sleeping disorder are more frequent in women. (9)

Burnout is included in the ICD-10 (code Z73) and classified under the sub-group "problems related to life-management difficulty". Maslach defined burnout as a state of emotional exchaustion, cynisism and inefficiancy at work. (31) In 2000, 3% of long-term sick-listed in Sweden were diagnosed suffering from burnout. (7) However, after the diagnostic label "exchaustion disorder" (ICD-10 code F43.8) was introduced in Sweden by the Swedish National Board of Health and Welfare in 2003 (32), burnout was more seldom specified on medical certificates. (9)

The boundaries between psychiatric disorders can be unclear, and different psychiatric disorders sometimes co-occur, for example in terms of 1) depression, anxiety or stress-related disorders, and 2) personality disorders and disorders due to psychoactive substance use. (11) Moreover, long-term sickness absence can be seen as a indicator of physical, psychological, and social malfunctioning in working populations. (33) In this thesis, an overall measure of sickness absence due to all psychiatric disorders was used. One problem when analysing overall psychiatric sickness absence is that the course and function associated with the different underlying disorders might vary. (11)

1.1.4 Depression, anxiety, adjustment and stress-related disorder

Symptoms of depression can be, for example, reduced mood, energy and interest, sleeping problems, and decreased self-esteem and self-confidence. (34-36) A depressive episode might be specified as mild, moderate or severe on the basis of the number of symptoms and their severity. (34-36) Anxiety can be defined as feelings of discomfort or bodily tense in relation to expected danger (with an internal or external cause). (35-37) In anxiety disorder, the symptoms may place heavy restrictions on the

patients daily life. Panic disorder is characterised by recurrent episodes of anxiety (panic) attacks which are not related to any certain circumstanse or situation. Symptoms of panic diorder vary between individuals, but may include chest pain, choking sensations and feelings of unreality. In GAD, anxiety is generalised and more persistent. Symptoms of GAD may include feelings of nervousness, muscular tension, palpitations, and dizziness. Fears of diseases and accidents might be present. In phobic anxiety disorders (*e.g.* agoraphobia, social phobias), the anxiety is related to particular situations or objects which are often avoided. Obsessive-compulsive disorder is characterised by recurrent and mostly painful thoughts, or compulsive and repeated acts, viewed by the patient as preventing negative but objectively speaking unlikely event. Individuals suffering from anxiety disorder often have a secondary depression. (35-37)

The ICD-10 code F43 contains the different categories adjustment disorder and reaction to severe stress. (35-36) Adjustment disorder can follow from a life crisis (due to a broken relationship, death of relative, job loss etc.). The disorder manifests in different ways, but may include for example lowered mood, anxiety and feeling of hopelesness. Moreover, a traumatic event or situation that is exceptionally stressful to practically everyone (*e.g.*, war, or a natural disaster) can lead to a delayed reaction in terms of post-traumatic stress syndrome (PTSD). The core symptoms of PTSD are re-experience of the trauma in terms of memories/nightmares, heightened startle reaction, and insomnia. These symptoms are often associated with anxiety and depression. (35-36) Further, prolonged stress without sufficient recovery during several years can lead to exchaustion disorder (32). The main symptoms of exhaustion disorder are severe tiredness, lowered cognitive abilities and a strongly increased sensitivity to stress. Exhaustion disorder is often complicated by a secondary depression. (32, 38) In the international literature, the same clinical picture may be referred to as clinical or severe burnout, job-stress-induced adjustment disorder, or neurasthenia.

1.1.5 Long-term sickness absence

Long-term (>90 days) sickness absence was choosen in the current research since it might be more closely associated with poor health than shorter sickness absence. (33, 39) A certificate made by the physician is required for longer periods of sickness absence (medically certified, >7 days), as compared to shorter sickness absence where the decision on sick leave is taken by the employee. Long-term sickness absence may

be less related to financial incentives than shorter sickness absence. (5, 27) The definition of psychiatric long-term sickness absence has varied in different studies (*for example*, in the United Kingdom: >7 days (40), in Norway: >8 weeks (41), in Sweden: >90 days (42)). This may give rise to some problems when comparing results between studies.

1.1.6 Staff downsizing

Staff downsizing, *i.e.*, reduction in personnel, may lead to increasing job insecurity, work demands and decreasing job control (43) which, in turn, might elevate the risks of psychiatric disorder and sickness absence (43-48). In order to cope with job insecurity in a downsizing organization employees may go to work in spite of sickness, which entails that sickness presenteeism will increase. Research (49) from Sweden has shown that working while ill in 1997 was particularly common among employees within care or welfare and education sectors. Sickness presenteeism may lead to an increase in future long-term sickness absence (50).

Staff downsizing has been found to be associated with an increased risk of medically certified sickness absence from all-causes and due to musculoskeletal disorders, poor self-rated health, psychotropic drugs, cardiovascular risk factors, mortality due to cardiovascular disease (CVD) and disability pension. (43, 51-57) In contrast to these findings, Theorell et al (58), as well as Martikainen and colleagues (59) found no association between organizational downsizing and increased long-term sickness absence (all-cause) and mortality (all-cause and specific-cause), respectively. In a Swedish study, personnel expansion, possibly associated with the centralization of functions where jobs could be gradually moved from smaller workplaces to larger central ones, was shown to be associated with increased risks of long-term sickness absence and hospital admission. (60) The mentioned studies of the relation between downsizing and sickness absence have focused on sick leave from all-causes and due to musculoskeletal disorders. There is limited research on the association between staff downsizing and psychiatric long-term sickness absence.

1.1.7 Treatment, rehabilitation, change of occupation

There is evidence that drug treatment and psychotherapy are effective in reducing the symptoms of mild and moderate depression (34). Among different psychotherapies, cognitive behavioral therapy (CBT) has the strongest evidence base. CBT comprises

many different treatments, where behavioral and/or cognitive changes are in focus. (34) Moreover, CBT and drug treatment have shown moderate effects in patients with anxiety syndrome. The symptoms are alleviated, although seldom fully eliminated. (37)

Treatment/rehabilitation methods to improve return to work (RTW) could be of different kinds. Drug treatment (*e.g.*, *with* antidepressant), psychotherapies (*e.g.*, CBT, psychodynamic therapy), physiotherapy, complementary and alternative medicine (CAM), and workplace-oriented rehabilitation, might be given to the patient in order to reduce sickness absence or enhance RTW. (11) CAM includes, for example, meditation or mindfulness. Mindfulness can be defined as "a state of deliberately non-evaluative attention to the present moment". (61) The aim is to learn how to observe one's own thoughts and feelings rather than getting carried away by, for example, worries and destructive thoughts. (61) Workplace-oriented rehabilitation might include, for example, adjustments of work to compensate for reduced work ability such as by limiting working time, by job training, or by ergonomic adaptation. (62) Additionally interventions to manage and reduce stress are commonly made. (11)

In a review Nieuwenhuijsen et al (63) found no support of an effect of medication, enhanced primary care, psychological interventions, alone or combined with medication, on sickness absence among workers who were depressed. A small study included in this review, however, revealed a favourable effect on days of sickness absence of combined psychodynamic therapy and medication, as compared to medication alone. Studies of CBT, relaxation training, counselling and stress-management interventions have shown marginal or no effect on sick leave or RTW. (64-70) Some previous studies have shown more favourable outcome in terms of RTW when the intervention was workplace-oriented. (71-73) Moreover, earlier studies have examined (temporary) changes in work tasks as a part of the intervention (*e.g.*, 71), but there is limited research on the association of having changed occupation with sickness absence after psychiatric long-term sick leave.

1.1.8 Inpatient care and mortality

Sickness absence has been shown to be associated with an increased risk of future poor self-rated health, physical complaints, low mental well-being and low work ability. (74-75) Additionally, Kivimäki et al (76) found that low levels of sickness absence among employees with poor health was associated with later improvement in self-reported

health. Psychiatric sickness absence has been shown to be associated with increased risk of future depression and disability pension. (77, 12-14) Vahtera and colleagues (78) found an elevated risk of poor self-rated health after sickness absence for psychiatric disorders. To the best of our knowledge, no study has examined the association between psychiatric long-term sickness absence and subsequent cause-specific hospitalization. Previous studies (*e.g.*, 79-83) from other treatment settings have shown that stress, depression and anxiety disorders are associated with an increased risk of CVD. There are mixed findings on depression as a predictor of cancer incidence (84). Moreover, previous research (85-88) has reported that depression, GAD, PTSD and alcohol dependence all increase the risk for suicide attempts. Studies examining employees on psychiatric long-term sickness absence can help improve our knowledge of the impact of psychiatric disorders on subsequent morbidity.

Psychiatric sickness absence has been shown to be associated with later mortality (*e.g.*, 89-92), but to our knowledge, only three studies (89-91) have examined the relationship with cause-specific mortality. In the Whitehall study of London-based civil servants, Head and colleagues (89) found an increased risk of all-cause and cancer mortality among employees with sickness absence for psychiatric disorders. Melchior et al (90) analysed the GAZEL study of employees of the French national gas and electricity company, and found that psychiatric sickness absence was associated with an elevated risk of mortality due to CVD, smoking-related cancer and suicide. Mittendorfer-Rutz and colleagues (91) used a Swedish nationwide population-based material to analyse mortality outcomes of psychiatric sickness absence. The results showed an increased risk of mortality due to all-causes, suicide, cancer (both smoking and non-smoking related), as well as CVD (the latter only in men). To the best of our knowledge, no previous study has analysed the association of sickness absence for psychiatric disorders with mortality during periods with varying levels of long-term psychiatric sick leave, and with a focus on long-term sickness absence of more than three months.

2 AIMS

2.1 OVERALL AIM

The overall objective of this thesis was to contribute to the knowledge of long-term sickness absence for psychiatric disorders, focusing on its associations with staff downsizing, treatment and rehabilitation, and also with subsequent inpatient care and mortality.

2.2 SPECIFIC AIMS

2.2.1 Study I

The aim of this study was to examine if reduction in personnel within Swedish county councils was associated with long-term sickness absence for psychiatric disorders.

2.2.2 Study II

The aim of this study was to analyse if self-reported treatment, workplace-oriented rehabilitation and change of occupation, were associated with subsequent sickness absence and disability pension among employees initially long-term sick-listed for psychiatric disorders.

2.2.3 Study III

The objective was to examine the association between psychiatric long-term sickness absence and future risk of inpatient care due to CVD, cancer and attempted suicide, after adjustment for socio-demographic factors and previous hospitalization due to somatic and psychiatric disorders.

2.2.4 Study IV

The first aim of this study was to analyse the association between long-term sickness absence for psychiatric disorders and the risk of mortality due to all-causes, and specific-causes (CVD, cancer and suicide) during the period 1990-2007. A second aim was to examine results for two cohorts with psychiatric long-term sickness absence in 1990 and in 2000.

3 DATA AND METHODS

The study populations, designs and statistical methods used in the four studies in this thesis are summarised in table 1.

3.1 STUDY I

In study I, aggregated data (93) was used of employees aged 18-64 years within seventeen Swedish county councils. Sweden is divided into eighteen county councils and two regions whose main responsibility is public health care. (94) Stockholm is the county council with the biggest population and Jämtland the smallest. In our analyses we included information on employees from 17 county councils. We excluded the two regions as well as the Stockholm County Council. The two regions, Skåne and Västra Götaland, were created during the study period by a merger of several smaller county councils. In connection with this a transfer of personnel from municipalities to the regions also took place which creates difficulties in calculating the staff numbers during the relevant time. This may lead to a potential bias in the assessment of the relationship between changes in staff size and sickness rates and they were therefore excluded. Stockholm was not included since this county council is dominated by the capital and has about a four times larger population and a much larger labor market than the other county councils, and therefore offers greater possibilities of finding alternative employment if the work environment becomes too stressful. Stockholm also has a much larger public transport system than any other county council. (94) Public transport is another of the responsibilities of the county councils, although health care is the main responsibility. Including Stockholm would therefore have decreased comparability.

Data included information on all new spells of psychiatric sickness absence from the database of AFA Insurance during 1998-2002, as well as data on staff numbers together with their age and sex from the Swedish Association of Local Authorities and Regions during 1993-2002. Data on employed persons were provided for employees with a monthly salary (full and part time employed). Personnel employed by the hour were not included. Additionally, data was not available for personnel with a monthly salary for less than three months or less than 40% of full time work during 1993-2000, while these were included in 2001-2002.

The outcome variables were changes (%) in sickness rates from 1998 to 2002. Sickness rate (SR) refers to the number of new spells of sickness absence for psychiatric disorders of 90 days or more (full and part time), initiated each year, per 1000 employed persons that year. An overall measure of psychiatric diagnoses was used (based on the ICD-9 codes 290-319, and ICD-10 codes F00-F99). We have used one overall measure of psychiatric disorders coded at AFA Insurance. Diagnoses derived from certificates of diseases issued by physicians. (29) The exposure variable was change (%) in staff numbers from 1993 to 1997.

Changes in staff numbers (%) from 1993 to 1997, as well as changes in sickness rates (%) from 1998 to 2002 were calculated. Bootstrap regression analyses (95) were used to examine whether there was an association between reduction in personnel and changes in sickness rates for psychiatric disorders, stratified by age and sex. We used bootstrap regressions as the assumption on a normal distribution required for linear regression was not given. In the analyses, 2000 samples were drawn from the original population, statistics for each sample were calculated, and the distribution of the sample statistics formed. The percentiles of the bootstrap distribution were used as measures of 95% confidence intervals (CI). Data were analysed using SPSS version 18.0.

3.2 STUDY II

Study II was based on a survey study of employees who in 1999 lived in Sweden, were aged 20-65 years and who according to the register of AFA insurance had a new spell of long-term sickness absence (>90 days) due to a psychiatric disorder (F-codes according to ICD-10; excluded were psychoses, bipolar affective disorders, and psychiatric disorders caused by psychoactive substance use), burnout (Z73), or exhaustion (T73). (42) On the basis of these criteria, 5,200 sick-listed employees from the AFA database were randomly selected for inclusion in the study (80% from the municipalities and county councils). (42) Of these, 99 were excluded (duplicates and deaths, persons living abroad, and those with protected personal information). The remaining 5,101 received a questionnaire in 2001 covering for example sociodemographic factors, psychiatric and somatic symptoms during sick leave, and received treatment.

3,053 individuals (60%) responded to the questionnaire. Register data on sick-leave for the years 1997-2002 from the SSIA were linked to this data. The register information

contains total number of sickness absence and disability pension days per person and year. Sick-leaves of part-time were summed. Thus, for example, two 50 % days of sickness absence were counted as one day. Individuals were further excluded due to the following: no sick leave in 1999 according to the SSIA (n=43); aged 62 years or older (due to a higher likelihood of receiving an old age pension) (n=79); no self-reported treatment (n=148); being granted disability pension (full and part time) 1999-2001 (n=295); with missing values on the covariates (n=164), and so our final study group was 2,324 individuals.

The outcome variables were sickness absence (totally >90 days) and newly granted disability pension due to all-causes (full and part time) in 2002 (from the SSIA). The main exposure variables were self-reported drug treatment (with no restriction on what kind of drugs), psychotherapy, physiotherapy, complementary or alternative medicine (CAM), and workplace-oriented rehabilitation. All these variables were dichotomised where those who reported having received the specific treatment/rehabilitation, were compared to those who did not report having received the treatment/rehabilitation (reference category). Additionally, since workplace-oriented rehabilitation might be followed by a change of occupation, we compared individuals who received workplace-oriented rehabilitation and/or changed occupation, with those that had neither received workplace-oriented rehabilitation nor changed occupation (reference category).

During the study period, after four weeks of sickness absence or repeated short-term sickness absence the employer was responsible for a so called rehabilitation investigation. (26, 28, 62) A rehabilitation investigation could also be requested by the employee. The employer was also responsible for the rehabilitation within the own workplace. The SSIA was responsible for coordinating rehabilitation between different actors (the employer, health care providers etc.). (26, 28, 62)

Crude and multiple analyses were performed by using logistic regressions. Results are presented as odds-ratios (OR). In the analyses we adjusted for previous (in 1997/1998) sickness absence, >14 registered days according to the SSIA, as well as socio-demographic variables (age, sex, socioeconomic status (based on occupation), immigrant status, household situation), depression and/or somatic symptoms at baseline (1999). Data were analysed by using SPSS, version 20.0.

3.3 STUDY III

We linked information from the longitudinal integration database for health insurance and labour market studies (LISA) (96) from Statistics Sweden, with exposure data on sickness absence from AFA Insurance, as well as the cause of death register (CDR) (97) and the inpatient register (IPR) (98-99) from the Swedish National Board of Health and Welfare. LISA was used for identifying the cohort, and for information on presence or absence of sickness absence (all-causes) according to the SSIA, sociodemographic variables and on migration. The CDR contains data on mortality due to different disorders of persons who are registered in Sweden at the time of their death. (97) Data from the IPR from 1987 and onwards provides information on all individual hospital discharges, including the diagnosis assigned by the treating physician. (98-99)

The examination was based on employed persons (minimum 1 hours' work/week in November in 1990) in the Swedish municipalities and county councils, aged 16-60 years, and included in LISA at baseline (31.12.1990) (n=1,159,822). Individuals aged 61 years and older were not included due to a higher risk of their being on an old-age pension. We further defined our study sample according to certain exclusion criteria. Individuals were excluded as follows: one person with psychiatric sickness absence in the AFA database but with no sickness absence in LISA during 1990; subjects with no psychiatric long-term sick leave and not included in the reference category (no registered sick leave in LISA) at baseline (n=911,872); those with missing data on the covariates (n=1,175); and those who were on disability pension at any time during 1990 (n=1,784). This resulted in a final study population of 244,990 individuals.

Cause-specific inpatient care according to ICD-9 and ICD-10 was used as the outcome measures for the period January 1 1991 – December 31 2007. We examined inpatient care due to cardiovascular diseases (ICD-9: 390-459, ICD-10: I00-I99), cancer (ICD-9: 140-208, ICD-10: C00-C97), and attempted suicide (including uncertain causes to adjust for regional and time differences in diagnostic practice) [100] (ICD-9: E950-E959 and E980-E989, ICD-10: X60-X84 and Y10-Y34). From here on, this combined measure is called "suicide attempt". Based on a sensitivity analysis we found comparability of the results from certain and uncertain suicide attempt.

The exposure variable was long-term (>90 days) sickness absence (full or part time) for psychiatric disorders (based on the ICD-9 codes 290-319) starting in 1990, which was compared with no registered sick leave from any cause according to LISA over the same year [reference group]. We have used an overall measure of psychiatric sickness absence coded at AFA Insurance.

Flexible parametric survival analysis (101-102) was used to calculate crude and adjusted hazard ratios (HR) with 95% confidence intervals (CI). We used four internal knots (at centiles 20, 40, 60 and 80) for the baseline hazard. Censoring was due to emigration or death. In the analyses of CVD and cancer, we adjusted for sociodemographic variables (age, sex, education, country of birth, family situation), previous (1988-1990) inpatient care due to the diagnoses related to the outcome (e.g. cancer when analysing cancer), inpatient care due to other somatic diagnoses and psychiatric diagnoses. In the analyses with suicide attempt as the outcome, we controlled for sociodemographic covariates and previous inpatient care due to somatic diagnoses, suicide attempt and psychiatric diagnoses. We also present results from additional analyses with uncertain causes excluded from the outcome measure on suicide attempt. The statistical package STATA version 11 was used for the analyses.

3.4 STUDY IV

This cohort study was based on employed persons (at least 1 hours' work/week in November each year) in the Swedish municipalities and county councils in the ages 16-60 years, who lived in Sweden on December 31, 1990 and 2000. These were 1,159 822 individuals in 1990, and 962,448 persons in 2000. LISA from Statistics Sweden (96), were linked to exposure data on sickness absence from the AFA database, the IPR (98-99) and the CDR (97) from the Swedish National Board of Health and Welfare.

Employees were excluded as follows: individuals with long-term psychiatric sickness absence in the AFA-database at baseline but without registered sick-leave according to LISA during the same year (in 1990, n=1; in 2000, n=691); and individuals not exposed to psychiatric long-term sickness absence and not part of the reference category (no sick leave in LISA) (1990, n=911,872), (in 2000, n=184,993). Due to the employer period introduced in 1992, the reference group with no registered sick leave contains a much larger group in 2000 (including 0-14 sickness absence days) than in 1990 (0 sickness absence days). Individuals who died at baseline (in 1990, n=0), (in 2000, n=1);

and persons with missing values on the covariates (in 1990, n=1,175), (in 2000, n=1,085) were also excluded. After final exclusions of individuals with disability pension in 1990 (n=1,784) and 2000 (n=11,218), as well as of persons with rehabilitation benefit among those in the reference group (n=323) according to LISA in 2000, our study populations comprised 244,990 individuals in 1990 and 764,137 individuals in 2000.

Mortality data was used as the outcomes for the period January 1 1991 – December 31 2007. All-cause mortality and mortality due to following causes were analysed: cardiovascular diseases (ICD-9 codes 390-459, ICD-10 codes I00-I99), cancer (ICD-9 codes 140-208, ICD-10 codes C00-C97), and suicide death. Suicide as a cause of death included undetermined causes of deaths in order to account for time- and regional differences in ascertainment routines. (100) The following ICD- codes on suicide and undetermined causes of deaths were combined: ICD-9 codes E950-E959 and E980-E989 and ICD-10 codes X60-X84 and Y10-Y34. A sensitivity analysis revealed comparability between the estimates for uncertain and certain suicide. This combined measure is hereafter referred to as "suicide".

The exposure variables was measured as having at least one new spell of long-term (>90 days) sickness absence (full- or part time) for psychiatric disorders (based on the ICD-9 codes 290-319; ICD-10 codes F00-F99) that started at baseline (1990 and 2000), compared with having no registered sick leave from any cause during the same years [reference group]. We used an overall measure of psychiatric sickness absence coded at AFA Insurance.

Flexible parametric survival analysis (101-102) was conducted to test whether psychiatric long-term sickness absence in 1990 was associated with mortality during follow-up 1991-2007. In additional analyses, we considered both the cohorts 1990 and 2000, with follow-up on mortality during 1991-1997 and 2001-2007, respectively. Individuals were censored if they emigrated or died from causes other than the cause-specific mortality in question. The results are presented as crude and adjusted HR with 95% CI. Baseline socio-demographic factors (age, sex, education, country of birth, family situation), as well as previous (1988-1990 and 1998-2000) inpatient care were adjusted for in the analyses. The analyses of all-cause mortality and suicide were controlled for inpatient care due to somatic diagnoses, psychiatric diagnoses and

suicide attempt. In the analyses of CVD and cancer, adjustments were made for inpatient care due to the diagnoses related to the outcome (CVD and cancer), other somatic diagnoses and psychiatric diagnoses. We used four internal knots (at centiles 20, 40, 60 and 80) for the baseline hazard, and two internal knots (at centiles 33, 67) for the time-dependent models. Further, we stratified analyses by sex when the likelihood-ratio test indicated statistically significant interaction with sex. We also present results from additional analyses with undetermined causes of death excluded from the outcome measure on suicide. Analyses were performed by using the statistical package STATA version 11.

4 RESULTS

The first main finding in this thesis was that staff downsizing was associated with subsequent increases in long-term sickness absence for psychiatric disorders. The greater the staff reduction, the larger was the increase in psychiatric sickness absence rate. Secondly, among employees initially long-term sick listed with psychiatric sickness absence, workplace-oriented rehabilitation was associated with reduced odds of subsequent sickness absence. Thirdly, psychiatric long-term sickness absence was prospectively associated with an increased risk of inpatient care and mortality due to CVD, cancer and suicide attempt/suicide.

4.1 STUDY I

There was an association between staff reduction and increase in psychiatric long-term sickness absence (table 2, B= 9.18, 95% CI 4.27; 14.90). That is, a staff reduction of 1% (within the range of staff reductions by 11% to 33%), was associated with an increase in the psychiatric sickness rate, on average, by 9%. When one outlier in the material (Kronoberg county council) was removed from the data in additional analyses, the overall result was similar to the one presented here (B=9.55, 95% CI 4.81; 17.01). The results further suggest associations between staff reduction and changes in sickness rates in all age groups. The relationship reached statistical significance in the age groups 35-49 years. Among women, there was a significant positive relation between reduction in personnel and increase in long-term sickness absence for psychiatric disorders. For men, an association in the same direction was observed, but it did not reach statistical significance.

Table 2 Association from bootstrap regressions between staff reduction (%) from 1993 to 1997, and changes (%) in psychiatric long-term sickness rate from 1998 to 2002 in seventeen Swedish county councils, among all employees and stratified by age and sex. 95% confidence intervals (percentiles)

	В	95% CI
All	9.18	4.27; 14.90
Age:		
18-34	11.15	-25.49; 54.05
35-49	9.00	5.31; 13.09
50-64	14.17	-1.03; 33.42
Gender:		
Women	9.41	5.03; 15.85
Men	8.16	-1.94 ; 15.66

4.2 STUDY II

Figure 2 shows that drug treatment, physiotherapy, and CAM, respectively were associated with significantly increased odds of subsequent sickness absence, >90 days (crude model, OR ranging from 1.30 to 1.61). These results remained robust after full adjustment for previous sick-leave, socio-demographic variables, as well as self-reported depression and/or somatic symptoms at baseline. Employees who received workplace-oriented rehabilitation had reduced odds of sickness absence compared with those who did not, after adjustment for all covariates (model 2, OR 0.81). Additional analyses (results not reported) showed that the inclusion of individuals with missing values on the covariates gave similar results for these treatment measures in the fully adjusted model (drug treatment: OR 1.59, 95% CI 1.31-1.93; physiotherapy: OR 1.42, 95% CI 1.20-1.67; CAM: OR 1.21, 95% CI 0.98-1.50; workplace-oriented rehabilitation: OR 0.83, 95% CI 0.70-0.98).

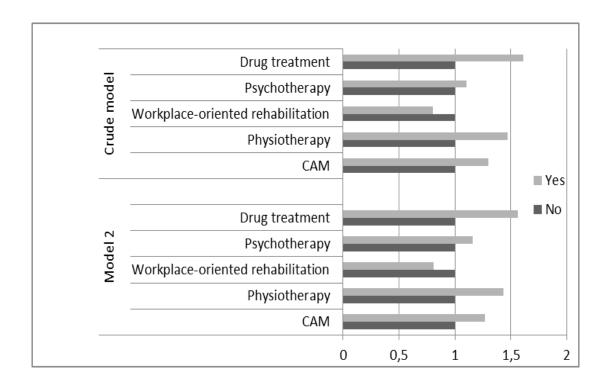


Figure 2 Odds ratios (OR) for the associations with sickness absence (>90 days, 2002) among employees on psychiatric long-term sick-leave in 1999 who reported having received different treatments. Model 2= adjusted for previous sick leave, sociodemographic variables, depression and somatic symptoms at baseline. p<0,05: All, except psychotherapy.

Figure 3 shows significantly reduced odds of subsequent sickness absence in the fully adjusted model for those employees who received workplace-oriented rehabilitation and/or changed occupation, compared with those who neither attended workplace-oriented rehabilitation nor changed occupation (OR ranging from 0.33 to 0.70).

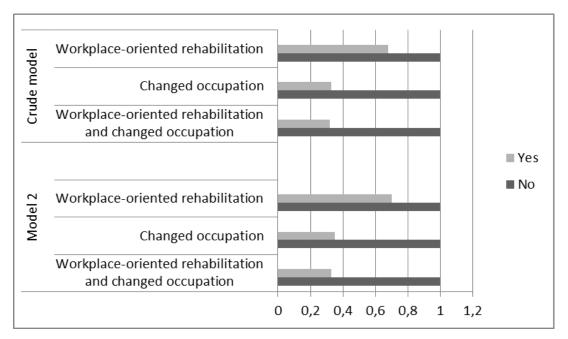


Figure 3 Odds ratios (OR) for the associations with sickness absence (>90 days) among employees on psychiatric long-term sick-leave in 1999 who reported having received workplace-oriented rehabilitation and/or changed occupation. Model 2= adjusted for previous sick leave, socio-demographic variables, depression and somatic symptoms at baseline. p<0,05: All.

There was a two-fold increase in the odds of being granted a new disability pension after drug treatment, and the odds of subsequent disability pension was shown to be 80% higher among individuals who received physiotherapy, compared with those who did not (results not shown). These results remained robust after adjustment for all included covariates.

4.3 STUDY III

Employees with a new spell of long-term sickness absence due to a psychiatric disorder in 1990, were at increased risk of subsequent cause-specific inpatient care during 1991-2007 compared to the reference group with no registered sick leave (table 3, crude model, HRs ranging from 1.44 to 16.16). Controlling for socio-demographic variables and previous inpatient care due to somatic diagnoses (model 2) reduced the estimates, but the risk remained significantly increased for hospitalization due to CVD (HR 1.71, 95% CI 1.54-1.91) and cancer (HR 1.21, 95% CI 1.05-1.40). The estimate for suicide attempt hospitalization diminished somewhat after adjusting for inpatient care due to somatic diagnoses and suicide attempt (model 2, HR 12.81, 95% CI 10.82-15.18). After final adjustment also for previous inpatient care due to psychiatric disorders (model 3),

HRs were still significantly elevated for hospitalization due to CVD (HR 1.58), and suicide attempt (HR 6.15).

Table 3 Long-term sickness absence for psychiatric disorders (LTSAP) (1990) and cause-specific inpatient care (1991-2007). Flexible parametric survival models with hazard ratios (HR) and 95% confidence intervals (CI).

		Model 1	Model 2*	Model 3
	Events	HR (95% CI)	HR (95% CI)	HR (95% CI)
Cardiovascular:				
No sick leave	21130	1	1	1
LTSAP	342	1.77 (1.59-	1.71 (1.54-	1.58 (1.41-
		1.97)	1.91)	1.77)
Cancer:				
No sick leave	14302	1	1	1
LTSAP	193	1.44 (1.25-	1.21 (1.05-	1.14 (0.98-
		1.66)	1.40)	1.33)
Suicide attempt:				
No sick leave	1414	1	1	1
LTSAP	206	16.16 (13.96-	12.81 (10.82-	6.15 (4.99-
		18.70)	15.18)	7.59)

Model 1: Crude; Model 2: Adjusted for socio-demographic factors and previous inpatient care due to somatic diagnoses, *Suicide attempt adjusted socio-demographic factors and inpatient care due to somatic diagnoses and suicide attempt; Model 3: Adjusted for the covariates in model 2 and inpatient care due to psychiatric diagnoses.

From additional analyses (results not shown), where uncertain causes were excluded from the suicide attempt outcome measure, the results were very similar for suicide as presented in table 5 in the fully adjusted model (HR 6.14, 95% CI 4.88-7.73).

4.4 STUDY IV

For the longer follow up period 1991-2007, employees with a new spell of long-term sickness absence due to a psychiatric disorder in 1990 were at increased risk of mortality from all- and specific causes compared to the reference group with no sick leave (table 4, crude model, HR ranging from 1.54 to 11.73). After adjustment for

socio-demographic factors and inpatient care due to somatic disorders (model 2), the estimates was increased for mortality due to all-causes (HR 2.29, 95% CI 2.00-2.61), CVD (HR 1.78, 95% CI 1.30-2.44), cancer (HR 1.22, 95% CI 0.97-1.54), and suicide (HR 12.16, 95% CI 8.87-16.66). In the final model, with further adjustment also for inpatient care due to psychiatric disorders, the increased risk remained significant for all-cause mortality (HR 1.56), and suicide (HR 3.84).

Table 4 Long-term sickness absence for psychiatric disorders (LTSAP) (1990) and mortality (1991-2007). Flexible parametric survival models with hazard ratios (HR) and 95% confidence intervals (CI).

		Model 1	Model 2	Model 3*
		HR (95% CI)	HR (95% CI)	HR (95% CI)
	Deaths			
All-cause				
No sick leave	9525	1	1	1
LTSAP	232	2.59 (2.27- 2.94)	2.29 (2.00- 2.61)	1.56 (1.34- 1.82)
Cardiovascular				
No sick leave	2301	1	1	1
LTSAP	40	1.85 (1.35- 2.52)	1.78 (1.30- 2.44)	1.35 (0.96- 1.92)
Cancer				
No sick leave	5113	1	1	1
LTSAP	74	1.54 (1.22- 1.93)	1.22 (0.97- 1.54)	1.07 (0.83- 1.36)
Suicide				
No sick leave	423	1	1	1
LTSAP	47	11.73 (8.68- 15.85)	12.16 (8.87- 16.66)	3.84 (2.41- 6.11)

Model 1: Crude; Model 2: Adjusted for socio-economic factors and previous inpatient care due to somatic diagnoses; Model 3: Adjusted for the covariates in model 2 and inpatient care due to psychiatric diagnoses. *All-cause mortality and suicide deaths adjusted for the covariates in model 2 and for inpatient care due to psychiatric diagnoses and suicide attempt.

Hazard ratio over time

Figure 4 shows a significantly elevated risk of all-cause mortality during most of the period 1991 to 2007 although it decreased over time, among the psychiatric long-term sick-listed compared with those with no sick leave in 1990. After adjustment for all covariates, there was a 2.62 times increased risk of all-cause mortality (95% CI 1.77-3.87) after 1 year (12 months) and a 1.84 times increased risk (95% CI 1.50-2.25) after 8 years (96 months).

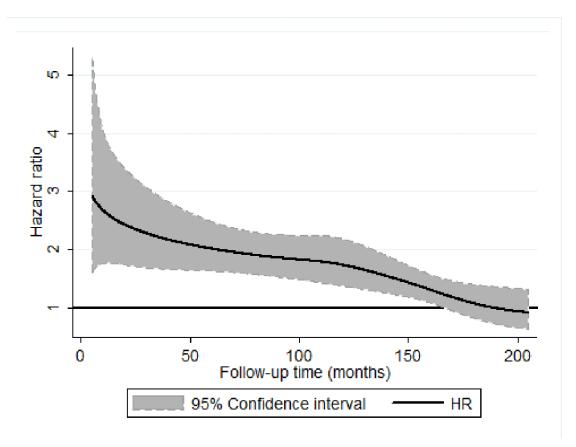


Figure 4 Long-term sickness absence for psychiatric disorders (1990) and all-cause mortality (199106-2007). Hazard ratio (HR) and 95% confidence interval (CI) (HR=black line and CI=shaded area) from time-dependent flexible parametric survival model adjusted for socio-demographic variables, and inpatient care for somatic, psychiatric diagnoses and suicide attempt.

Long-term psychiatric sickness absence in 1990 was found to be associated with an increase in risk of mortality due to all-causes, cancer and suicide considering the follow-up period 1991-1997 (table 5, model 1, HR ranged from 1.85 to 15.59). When adjusting for all covariates the excess risk remained significant for all-cause mortality (HR 2.00) and suicide (HR 4.77).

Employees with long-term sickness absence due to a psychiatric disorder in 2000 were at increased risk of mortality from 2001 to 2007 due to all- and specific-causes compared to the reference group (table 5, model 1, HRs ranged from 1.61 to 3.67). After adjustment for all the covariates including inpatient care due to psychiatric disorders, the estimates were increased for all-cause mortality (HR 1.47), CVD (HR 1.83), cancer (HR 1.33), and suicide (HR 2.15).

Table 5 Long-term sickness absence for psychiatric disorders (LTSAP) (1990 and 2000) and mortality (1991-1997 and 2000-2007). Flexible parametric survival models with hazard ratios (HR) and 95% confidence intervals (CI).

	1990				2000		
		HR (95% CI)	HR (95% CI)		HR (95% CI)	HR (95% CI)	
	Deaths	Model 1	Model 2*	Deaths	Model 1	Model 2*	
All-cause							
No sick leave	2238	1	1	6795	1	1	
LTSAP	75	3.49 (2.77- 4.39)	2.00 (1.52- 2.63)	131	1.90 (1.60- 2.25)	1.47 (1.23- 1.75)	
Cardiovascular							
No sick leave	527	1	1	1256	1	1	
LTSAP	<10	-	-	26	2.04 (1.38- 3.00)	1.83 (1.23- 2.72)	
Cancer							
No sick leave	1182	1	1	3901	1	1	
LTSAP	21	1.85 (1.20- 2.85)	1.18 (0.74- 1.88)	64	1.61 (1.26- 2.07)	1.33 (1.03- 1.70)	
Suicide							
No sick leave	167	1	1	429	1	1	
LTSAP	25	15.59 (10.23- 23.73)	4.77 (2.44- 9.35)	16	3.67 (2.23- 6.04)	2.15 (1.26- 3.67)	

Model 1: Crude; Model 2: Adjusted for socio-demographic variables and inpatient care due to somatic and psychiatric diagnoses. *All-cause mortality and suicide deaths adjusted for inpatient care due to somatic diagnoses, psychiatric diagnoses and suicide attempt.

Suicide without undetermined causes of deaths

From additional analyses (results not shown), where uncertain causes of death were excluded from the suicide outcome measures, we found similar results for suicide as those presented in table 4 and 5 in the fully adjusted models (for the time period 1990-2007: HR 3.43, 95% CI 2.01-5.84; for the time period 2000-2007: HR 2.41, 95% CI 1.38-4.20).

Hazard ratio over time

For the period 2001-2007 there was an increased risk of mortality that diminished over time among employees with long-term sickness absence for a psychiatric disorder in 2000 (data not shown). After adjustment for all covariates, the increased risk of overall mortality remained significant for about half of the period from 2001 to 2007. The HR for all-cause mortality was 3.72 (95% CI 2.73-5.08) after 1 year (12 months), and 1.35 (95% CI 0.99-1.84) after 3.5 years (42 months) in the fully adjusted model.

Differences in results between women and men

The results showed significant interaction with sex for the association of long-term sickness absence for psychiatric disorders with all-cause mortality for the period 1990-2007, as indicated by the likelihood-ratio test for the period 1990-2007 (p=0.043), and for the period 2000-2007 (p=0.007). Stratified analyses (not reported) showed different risk estimates for women and men during these periods. In the fully adjusted model, psychiatric sickness absence in 1990 was associated with an increased risk of all-cause mortality during 1991-2007 among women (HR 1.47, 95% CI 1.23-1.76) and men (HR 1.92, 95% CI 1.45-2.56). Moreover, the HR for all-cause mortality in the multivariate model was 1.30 (95% CI 1.05-1.61) in women, and 2.15 (95% CI 1.56-2.96) in men for the period 2000-2007.

5 DISCUSSION

5.1 MAIN RESULTS

The aggregated analysis revealed a significant association between reduction in personnel during five years, and increased psychiatric long-term sickness absence during the subsequent five years in Swedish county councils. That is, the greater the staff reduction, the larger was the increase in the psychiatric sickness absence. This association was found in men and women, and also in different age-groups, although statistical significance was only reached in the groups of women and middle-aged employees.

Among employees initially long-term sick listed for a psychiatric disorder, the results showed reduced odds of subsequent sickness absence among those who reported having received workplace-oriented rehabilitation, compared with those who did not. Individuals who received workplace-oriented rehabilitation and/or changed occupation seem less likely of having later sickness absence, as compared to those who neither received workplace-oriented rehabilitation nor changed occupation.

Psychiatric long-term sickness absence was associated with an increased risk of mortality from all-causes, and with subsequent inpatient care and death due to cardiovascular disease, cancer and suicide attempt/suicide. For both cohorts, 1990 and 2000, estimates for mortality point in the same direction. After adjustment for a number of socio-demographic variables as well as somatic and psychiatric inpatient care, estimates remained significant for all-cause mortality and all specific causes of death in the cohort 2000, and for all-cause and suicide deaths in the cohort 1990.

5.1.1 Staff downsizing

The results of our aggregated analysis are in line with studies on individuals, such as the adverse effects of downsizing and job insecurity on self-reported psychiatric disorder (47-48), as well as an increased use of psychotropic drugs after downsizing among those remaining in employment (54). The study by Vahtera et al (57) found no association between reduction of personnel and disability pension attributable to psychiatric disorder, but did find an association with disability pensioning due to physical disorder.

Among the many factors that may mediate the association between reduction in personnel and psychiatric long-term sickness absence, job strain from reduced work control and increased demands, effort-reward imbalance, and moral strain stand out as potentially important. First, staff downsizing may lead to reduced job control and increased work demands (43, 53), which in turn might increase the risk of psychiatric disorder. (44-46) In one study (103) examining a national representative sample from the labor force between 1991 and 1996 in Sweden, the authors found that major downsizing was associated with lower risk of self-rated psychological demands among male and female public sector employees. At the same time, other studies (104-106) examining Swedish hospitals during the 1990s reported increases in self-reported workload and job demands among hospital employees following downsizing. In our study we analysed county council employees which predominately work within the health care sector. Second, downsizing may result in a perceived lack of balance between efforts and rewards among those who remain in employment. (105) These factors increase the risk of developing stress-related diseases according to the effortreward imbalance model (107), and have been shown to elevate the risk of psychiatric disorders. (44-46) Additionally, psychiatric long-term sick leave might have increased among employees already having a (milder) psychiatric disorder. Third, staff reduction and increased work load may lead to moral strain from, e.g., lack of time to provide the care needed when working in health care facilities, failure to live up to others' expectation of one's work, and conflicts between work and private life, all of which have been associated with emotional exhaustion among health care personnel. (108)

The finding on an association between staff downsizing and increased psychiatric sickness absences need to be seen against the background of the turbulent 1990s, when Sweden experienced a deep economic crisis. Unemployment increased from 1.7% to 8.3% from 1990 to 1993 and affected 1.8 million Swedes over the decade. (1) This may have led to insecurity in relation not only to the one's own job and working sector, but also to the whole labor market. There was a growth in reported symptoms of anxiety and sleeping problems at the Swedish labor market during the 1990s (1-3). Lindholm and colleagues (109) found an increase between 1994 and 2002 in the proportion of individuals with self-reported fatigue, anxiety and worriedness (mainly fatigue) among younger (25-44 years) persons with sickness absence. Among older (45-64 years) persons with sickness absence the increase during the same time was restricted to a

growth in the proportion of individuals with self-reported anxiety and worriedness. Within these groups of younger and older sick-listed there were large variations over time of self-reported anxiety and wordiness (not in tiredness). However, the authors analysed sickness absence of more than 29 days totally which can include many short-term sickness absences due to milder conditions (colds etc.).

There may be differences over time in the extent to which physicians will detect psychiatric disorders in patients, and use psychiatric diagnoses on sickness certificates. Such possible shifts are not well studied. The stigma related to having a psychiatric disorder may also be reduced when the knowledge about these kinds of disorders increases. (24) The proportion of psychiatric long-term sickness absence has increased over longer time, but why was there such a rapid increase in psychiatric long-term sick leave from the late 1990s? Our ecological study showed that staff reduction over five years, was associated with increased rate of psychiatric sickness absence during the subsequent five years. In general, it might seem reasonable to assume that accumulated staff downsizing could have a delayed effect on the health of the personnel remaining in the workplace. Clinical experience also suggests that work-related psychiatric disorders are often the result of prolonged stress which may proceed during several years. (32) Further, when more co-workers became long-term sick-listed from the late 1990s onwards, demands and stress might have increased in organisations, e.g., due to problems in finding suitable staff replacement. This, in turn, may have led to even higher rates of psychiatric disorders and sickness absence among people remaining at work, which may partly explain the rapid increase in sickness absence during the late 1990s (cf. Fig. 1, page 1). (32)

5.1.2 Treatment, rehabilitation, and change of occupation

The favourable outcome of reduced odds of sickness absence after workplace-oriented rehabilitation in our study is in line with three earlier studies on RTW (71-73). In the study by Blonk et al (71) a combined intervention delivered by labour experts comprising a brief CBT program and advice on work processes and how to reduce workload etc., was compared with a no treatment group, and with extensive CBT conducted by psychotherapists. The extensive CBT intervention focused on cognitive restructuring, but also on work resumption, time-management, workplace interventions, conflict handling and fatigue. The combined intervention showed a superior effect on full RTW compared with the no treatment group, and compared to the extensive CBT

intervention. In the study (72), by van Oostrom and colleagues a workplace intervention reduced time until lasting RTW compared with controls (usual care) among employees who at baseline intended to return to work despite symptoms. Moreover, in a study by Karlsson et al (73) an intervention based on patient-supervisor communication in order to increase job-patient match improved long-term RTW among individuals on long-term sick leave due to psychiatric disorder. In the latter study (73) the control group comprised individuals who had declined participation in the intervention which might imply higher motivation of RTW among those included in the intervention.

Workplace-oriented rehabilitation might facilitate RTW through different mechanisms. For example, work ability may not improve as quickly as the core symptoms of depression. (110) If an employee returns to work with reduced depression symptoms, but lowered work ability, an adjustment of the job might be needed through workplace-oriented rehabilitation. Further, work-related stress and psychiatric disorder may from the beginning be a consequence of a long-term mismatch between the person's abilities and the work characteristics (73). If this mismatch remains after RTW the symptoms of psychiatric disorder may again evolve and perhaps lead to a relapse in sickness absence. If a match is not possible, the individual may need to change occupation/workplace. Our findings indicate that potential adjustments of the job to the employee's ability in terms of workplace-oriented rehabilitation, or in terms of a new occupation might reduce sick-leave. Such adjustments may lead to greater feeling of self-control and efficacy for the individual which might, in turn, lead to a faster RTW. (71-72)

Drug treatment was associated with increased odds of sickness absence and disability pension. This result remained also after controlling in the analyses for, *e.g.*, self-reported depression at baseline. Our sample is heterogeneous in terms of psychiatric diagnoses, and is likely to include both cases of major depression and ones where depressive symptoms are secondary to another condition, for example, stress induced exhaustion. Trajectories and treatment outcomes may differ between major depression and stress induced exhaustion.

5.1.3 Inpatient care and mortality

The findings revealed an elevated risk of inpatient care and mortality due to CVD after long-term psychiatric sickness absence. These results were in line with earlier research focusing on stress, anxiety and depression (79-83), and with previous studies on CVD mortality after psychiatric sickness absence (90-91). The result of an increased risk of death from cancer is in line with previous studies on mortality among patients with psychiatric sickness absence (89-91). Research findings regarding associations of psychiatric disorders with cancer incidence and cancer mortality are inconsistent. However, there seem to be stronger support that psychiatric disorders predict cancer mortality than cancer incidence. (84, 111-112) Mechanisms underlying the associations of psychiatric sickness absence with CVD and cancer, respectively, might include, *e.g.*, inattention to physical symptoms among patients with psychiatric disorders, delayed help-seeking for medical care among depressed people, lifestyle factors (smoking, alcohol intake, low physical activity, over-weight), and biological risk factors. (79, 81, 84, 91, 113-114)

In line with two previous studies on mortality (90-91) we found an increased risk of suicide, and also with inpatient care due to suicide attempt after sickness absence for psychiatric disorders. Estimates for suicide death risk were lower related to long-term sickness absence due to psychiatric disorders in 2000 than in 1990. This might not only be associated with differences in the reference groups and diagnostic patterns in the two periods, but also with improvements in treatments during that period (115). While the association between psychiatric disorders and attempted suicide/suicide is well known using data from different treatment settings (*e.g.* 85-88, 116), it should be noted that the association remained significantly increased after controlling for previous inpatient care. This draws attention to the importance of outpatient care settings with regard to appropriate treatment and follow-up as well as thorough suicide risk assessments of patient's sickness absent due to psychiatric disorders.

Long-term sickness absence may have negative consequences for the health behaviour (food habits, physical exercise and smoking) and for social relationships which might be potentially health hazards. (17-18, 20) The distinction of the inpatient care and mortality risk associated with the psychiatric disorder from the risk associated with long-term sickness absence cannot be made in our study. Psychiatric sickness absence might also increase the likelihood of labor market marginalization which, in turn, may

elevate poor health. Sickness absence has been shown to be associated with an increased risk of unemployment, and also more or less permanent exclusion from the labor market in terms of disability pension (12-14). Moreover, associations with increased risk of mortality after unemployment and disability pension have been reported. (21-23)

Long-term psychiatric sickness absence was found to be associated with an increased risk of mortality among both women and men. However, we found significant interaction with gender in the association with all-cause mortality in the fully adjusted models. Stratified analyses revealed higher estimates for the increased risk of all-cause mortality in men than in women. In the study by Mittendorfer-Rutz et al (91), an increased risk of CVD mortality was seen among men but not among women. The mechanisms involved for a higher mortality risk among men than in women might be, for example, gendered social roles resulting in less help-seeking behavior for psychiatric medical care among men and a tendency to interpret symptoms as psychiatric in the patient to lesser extent in men. (117-118) However, more research is needed to elucidate gender differences in health and social outcomes of long-term sickness absence due to psychiatric disorders.

5.2 METHODOLOGICAL CONSIDERATIONS

Aggregated prospective data was used in study 1. Study 2-4 was based on prospective individual-based data. Prospective information has advantages over cross-sectional data in terms of the possibility to analyse changes and to make interpretations about potential mechanisms over time.

5.2.1 Study I

The strengths of this ecological study include the long study period and access to a large data base with information on sickness absence diagnoses. Another advantage is the use of objective information on staff downsizing which was the same for all those affected, and was recorded independently of the outcome. This means that bias from self-reporting measures are being avoided. Our examination was limited to 17 county councils (out of 18 county councils and 2 regions in Sweden), and can therefore not be generalized to all county councils.

Ecological studies (93), *i.e.*, studies based on aggregated data, can be useful when examining the impacts of large-scale population interventions or changes, such as staff downsizing, on sickness absence. They are also valuable when trying to understand variations in sickness rates between populations or, in this case, county councils. Ecological studies are cheaper and more efficient than individual-based studies. But, at the same time, they often lack adequate data on covariates at aggregate level. Additionally, aggregated data give rise to problems in the interpretation of results. The ecological fallacy is to interpret results at individual level on the basis of aggregated data. (93)

Because of the still remaining stigma associated with psychiatric disorder (119), overestimation of psychiatric disorder on medical certificates may be unlikely. There might be some underreporting of sickness absence in the AFA database. The registration of sickness spells in this database depends on the awareness of the insurance and reporting of sickness absence among employees. Even if the additional insurance benefit offers an incentive for employees to report sickness absence, the strength of this incentive may vary, *e.g.*, according to the level of economic resources available to the individual.

Reduction of personnel in county councils between 1993 and 1997, the exposure period in this study, may have occurred not only because of downsizing following economic recession, but also because of personnel transfers from county councils to a) municipalities, where the largest transfer was during 1992 (120), and b) to private caregivers (121). However, this possible bias was minimized by choosing a study period starting in 1993, and also by excluding Stockholm, Gothenburg and Malmö, where the bulk of privatization occurred.

Factors other than staff downsizing and adverse working conditions are likely to have influenced the increase in long-term sickness absence for psychiatric disorders. For example, changes in lifestyle factors (increased alcohol, overweight) (5), lowered resources in terms of adequate rehabilitation (122), and varying sick-listing praxis among physicians in different counties (123) may have had an impact on the outcome.

5.2.2 Study II

In this large study, both male and female employees representing many occupations from both the public and private sector were included. Further strengths of the study were its prospective design, and the availability of high-quality outcome data on sickness absence and newly granted disability pension.

The outcome measure on sickness absence is the total number of days on sickness absence in 2002, and we do not know whether this represents one or several spells, or whether some spells started before 2002. Every spell will however have a longer duration than 14 days. Another limitation was that the measures on treatments/rehabilitation were self-reported and may therefore be subject to remembering or reporting bias. Misclassification of exposure can be either differential (dependent on the outcome), or non-differential (independent of the outcome). Non-differential misclassification of a dichotomous exposure will dilute an association, while differential misclassification can either exaggerate or underestimate an effect. (124) Moreover, we could not establish exactly when the treatment or rehabilitation took place. Treatment can have different outcomes according to whether it occurs early in a sick-leave spell, or after a longer period of time. In the analyses we only included individuals who reported having received at least one treatment. Among these respondents, for those who neither answered "yes" or "no" to the question if they had received a treatment, we assumed that they had not received the specific treatment.

We found reduced odds of sick-leave after a change of occupation in the fully adjusted model. This association is likely to be influenced by selection, insofar as people in better health may be more likely to manage changing job (125-126). Still, in our analyses, we adjusted for self-reported health at baseline, and also for previous sickness absence. It might be speculated that workplace-oriented rehabilitation is associated with health selection to the extent that persons with less severe conditions receive it to the greatest extent, but it might also be the other way around.

5.2.3 Studies III and IV

The strengths of these two cohort studies include the large study population, the prospective design and the long-term follow-up of inpatient care and mortality after psychiatric sickness absence. The register-based data means no bias related to self-reported information. Information on mortality with nearly complete coverage (97), and

having data on inpatient care due to different diagnoses preceding the outcomes and on several socio-demographic covariates are additional advantages. The mortality study sometimes included few cases of death for the psychiatric sick-leave category, particularly for the study period starting in 1990. This might have lowered the likelihood of finding significant associations for this period.

The outcome measure on inpatient care reflects hospital treatment, rather than all individuals with somatic and psychiatric disorders. Furthermore, the inclusion of a condition in the IPR depends on, *e.g.*, access to health care, the physician's tendency to admit a patient, and the individual's health care-seeking behavior. (98) Due to a trend towared more patients being treated in outpatient care settings the sensitivity of diagnoses in the register may have decreased over time. (98) Additionally, in the interpretation of the estimates related to the cohorts, it should be noted that there were differences in the reference-groups in 1990 (0 absence day) and in 2000 (0-14 absence days). This might have led to an underestimation of the association in 2000, as compared with 1990.

5.3 FUTURE RESEARCH

Future individual-based studies are justified to examine the association between staff downsizing and sickness absence for psychiatric disorders. Also, more studies, preferably with a RCT-design, are warranted to analyse the relation between workplace-oriented intervention and return to work after psychiatric sickness absence. Finally, future research might investigate whether psychiatric long-term sickness absence is associated with cancer incidence.

6 CONCLUSIONS

The overall objective of this thesis was to contribute to our knowledge of long-term sickness absence for psychiatric disorders, focusing on the associations with staff downsizing, treatment and rehabilitation, and also with subsequent inpatient care and mortality. One finding was that staff reduction among county council employees was associated with later increase in psychiatric long-term sickness absence. Moreover, among employees long-term sick-listed due to psychiatric disorders, workplace-oriented rehabilitation reduced the likelihood of subsequent sickness absence. Finally, psychiatric long-term sickness absence was associated with increased risk of subsequent inpatient care and mortality due to cardiovascular disease, cancer and suicide attempt/suicide.

7 ACKNOWLEDGEMENTS

It has been an exciting and challenging journey during my years as a phd-student. There are many individuals I wish to acknowledge.

I want to thank my co-supervisor **Marie Åsberg** for inviting me to do this research, for sharing your expertise in psychiatric research and for believing in my work. Åke **Nygren**, my mentor, also for inviting me to do this research, and for your valuable guidance and enthusiasm. **Irene Jensen**, my main-supervisor, thank you for support and for many constructive comments on my work. **Ellenor Mittendorfer-Rutz**, my co-supervisor, I would like to thank you for sharing your great knowledge in epidemiology, for your engagement and for responding to all those e-mails and rewritings.

I would like to thank all former colleagues at CHESS, in particular my co-author **Johan Fritzell** for giving me guidance during my first trembling steps as a researcher. The research group at Intervention and Implementation Research, IMM for a creative research environment. I also wish to thank all colleagues at Stressrehab, **Ulla Peterson**, **Kristina Wahlberg**, **Maria Wiklander**, **Elisabet Hollsten**, **Anna Nager**, **Veronica Murray**, **Aniella Besér**, **Eva Faxe**, **and Kristian Hagfors** for your friendship and for nice "fika".

I wish to acknowledge all the staff at KI DS-Adm, in particular **Nina Ringart**, for your efficient and professional handling of administrative subjects during my time as a KI-student.

Thank you **family and friends** for all your love, support, never-ending encouragement, and for believing in me when I needed it most.

This thesis was financially supported by AFA Insurance.

8 REFERENCES

- 1. Palme J, Bergmark A, Bäckman O, et al. Welfare trends in Sweden: balancing the books for the 1990s. J Eur Soc Policy. 2002;12:329–346.
- 2. SOU (2001). Välfärdsbokslut för 1990-talet. Slutbetänkande. (Welfare balance for the 1990s.) (In Swedish) Statens offentliga utredningar 2001:79, Stockholm.
- 3. Statistics Sweden (SCB) (2001) Negativ stress och ohälsa. Inverkan av högra krav, låg egenkontroll och bristande socialt stöd i arbetet. (Influence of high demands, low control and low social support in work.) (In Swedish) Stockholm.
- 4. The Swedish Social Insurance Agency (2002) Socialförsäkringen i siffror 2002. (Social Insurance in figures 2002.) (In Swedish) Försäkringskassan, Stockholm.
- Lidwall U. (2010) Long-term sickness absence. Aspects of Society, Work, and Family.
 Thesis. Karolinska Institutet. Stockholm.
- 6. Järvisalo J, Andersson B, Boedeker W et al. (2005) Mental disorders as a major challenge in prevention of work disability: experiences in Finland, Germany, the Netherlands and Sweden Social Security and Health Reports 66. Helsingfors: Edita Prima Ltd.
- 7. The Swedish Social Insurance Agency (2002) RFV Analyserar 2002:4. Långtidssjukrivningar för psykisk sjukdom och utbrändhet. -Vilka egenskaper och förhållanden är utmärkanden för de drabbade? (Long-term sick leaves for psychiatric disorders and burnout. What properties and conditions are distinguishing for the affected.) (In Swedish) Försäkringskassan, Stockholm.
- 8. The Swedish Social Insurance Agency (2004) RFV Redovisar 2004:8. Psykiska sjukdomar och stressrelaterade besvär. –Långvariga sjukskrivningar från 1999 till 2003. (Psychiatric disorders and stress-related conditions. Long-term sickness absences from 1999 to 2003.) (In Swedish) Försäkringskassan, Stockholm.
- 9. The Swedish Social Insurance Agency (2010) Socialförsäkringsrapport 2010:16 Långtidssjukskrivna. Beskrivande statistik 1999-2009: kön, ålder, arbetsmarknadsstatus, sjukskrivningslängd och diagnospanorama. (Long-term sicklisted. Descriptive statistics 1999-2009: sex, age, employment status, length of sickness absence and diagnose panorama.) (In Swedish) Försäkringskassan, Stockholm.
- 10. The Swedish Social Insurance Agency (2002) RFV Redovisar 2002:2. Vad kostar olika sjukdomar? –Sjukpenningkostnaderna fördelade efter sjukskrivningsdiagnos. (What are the costs of certain diseases? –Sickness insurance costs distributed after sick leave diagnosis.) (In Swedish) Försäkringskassan, Stockholm.

- 11. SOU (2011). Lättare psykisk ohälsa. In Rehabiliteringsrådets slutbetänkande. (Milder psychiatric disorders.) (In Swedish) Statens offentliga utredningar 2011:15, Stockholm.
- 12. Kivimäki M, Ferrie JE, Hagberg J et al. (2007) Diagnosis-specific sick leave as a risk marker for disability pension in a Swedish population. J Epidemiol Community Health 61:915-20.
- 13. Gjesdahl S, Bratberg E. (2003) Diagnosis and duration of sickness absence as predictors for disability pension: Results from a three year, multi-register based and prospective study. Scandinavian J of Public Health 31:246-54.
- 14. Alexanderson K, Kivimäki M, Ferrie JE et al. (2012) Diagnosis-specific sick leave as a long-term predictor of disability pension: a 13-year follow up of the GAZEL cohort study. J Epidemiol Community Health 66:155-59.
- 15. The Swedish Social Insurance Agency (2010) Social Insurance in figures 2009. Försäkringskassan, Stockholm.
- 16. Alexanderson K, Norlund A. (2004) Sickness absence: causes, consequences, and physicians' sickness certification practice. A systematic literature review by the Swedish Council on Technology Assessment in Health Care (SBU). *Scand J Public Health* 32(Suppl 63): 3-263.
- 17. Floderus B, Göransson S, Alexanderson K, Aronsson G (2005) Self-estimated life situation in patients on long-term sick leave. J Rehabil Med 37: 291-299.
- 18. Ockander M, Timpka T (2001) A female lay perspective on the establishment of long-term sickness absence. Int J Soc Welfare 10: 74-79.
- 19. Hesselius P. (2005) Does sickness absence increase the risk of unemployment. The journal of socio-economics 36:288-310.
- 20. Bunker ST, Colquoun DM, Murray ED, Hickie IB, Hunt D et al (2003) "Stress" and coronary heart disease: Psychosocial risk factors. Medical Journal of Australia 178(6): 272-276.
- 21. Gjesdal S, Haug K, Ringdal P. (2009) Sickness absence with musculoskeletal or mental diagnoses, transition into disability pension and all-cause mortality: A 9-year prospective cohort study. Scand J of Pub health 37:387.
- 22. Wallman T, Wedel H, Johansson S et al. (2006) The prognosis for individuals on disability retirement An 18-year mortality follow-up study of 6887 men and women sampled from the general population. BMC Public health 6:103.
- 23. Roelfs DJ, Shor E, Davidson KW, Schwartz JE. (2011) Losing life and livelihood: A systematic review and meta-analysis of unemployment and all-cause mortality. Social science and medicine 72:840-54.

- 24. Hensing G, Wahlström R. (2004) Sickness absence and psychiatric disorders. Scand J Public Health 32(Suppl 63):152-180.
- 25. The Swedish Social Insurance Agency (2004) Social Insurance in figures 2004. Försäkringskassan, Stockholm.
- 26. The Swedish Social Insurance Agency. (2005) Försäkringskassan, huvudkontoret. Försändringar inom socialförsäkrings- och bidragsområdena 1968-01-01 2005-01-01 (Changes within the social insurance and benefits 1968-01-01 2005-05-01). (In Swedish) Stockholm.
- 27. Lidwall U, Marklund U and Skogman Thoursie P. (2004) Sickness absence in Sweden. In Gustafsson R Å, Lundberg I (Edts.). Work life and health in Sweden. National Institute for Working Life. Stockholm, 2004.
- 28. The Swedish Social Insurance Agency (2002) Socialförsäkringsrapport 2002. (In Swedish) (Social Insurance report 2002). Försäkringskassan, Stockholm.
- Nathell L. Some determinants of sick leave for respiratory disease. –Occupation, asthma, obesity, smoking and rehabilitation. Dissertation, Carolinska Medico Chirugiska Institutet, Stockholm, 2002.
- 30. AFA Insurance. (1990-2002) Försäkringsvillkor 1990-2002. (In Swedish) AFA Försäkringsbolag, Stockholm.
- 31. Maslach C, Schaufeli WB, Leiter MP. (2001) Job burnout. Annu Rev Psychol 52:397-422.
- 32. The Swedish National Board of Health and Welfare. (2003) Utmattningssyndrom. Stresserelaterad psykisk ohälsa (Syndrome of exhaustion. Stress-related emotional ill-health). (In Swedish) Stockholm.
- 33. Marmot M, Feeney A, Shipley M et al. (1995) Sickness absence as a measure of health status and functioning: from the UK Whitehall II study. J Epidemiol Community Health 49:124-130.
- 34. The Swedish Council on Technology Assessment in Health Care. Behandling av depressionssjukdomar (Treatment of depression). (In Swedish) Stockholm, 2004.
- 35. The Swedish National Board of Health and Welfare. International statistisk klassifikation av sjukdomar och relaterade hälsoproblem. Svensk version. (ICD-10-SE) (International statistical classification of diseases and related health problems. Swedish version). (In Swedish). Stockholm, 2010.
- 36. World health organisation (WHO). The ICD-10 classification of mental and behavioral disorders. Assesed from: http://www.who.int/classifications/icd/en/bluebook.pdf, 2013-05.

- 37. The Swedish Council on Technology Assessment in Health Care. Behandling av ångestsyndrom (Treatment of anxiety disorder). (In Swedish) Stockholm, 2005.
- 38. Åsberg, M, Nygren Å, Nager A. (2013) Att skilja mellan depression och utmattningssyndrom. (In Swedish) Läkartidningen; 9.
- 39. Kivimäki M, Head J, Ferrie JE et al. (2003) Sickness absence as a global measure of health: evidence from mortality in the Whitehall II prospective cohort study. BMJ 327:1-6.
- 40. Stansfeld S, Feeney A, Head J et al. (1995) Sickness absence for psychiatric illness: The Whitehall II study. Social Science and Medicine 40(2):189-197.
- 41. Foss L, Gravseth HM, Kristensen P et al. (2010) Risk factors for long-term sickness absence for psychiatric sickness: A register-based 5-year follow-up from the Oslo Health Study. JOEM 52(7):698-705.
- 42. Vaez M, Rylander G, Nygren Å et al. (2007) Sickness absence and disability pension in a cohort of employees initially on long-term sick leave due to psychiatric disorders in Sweden. Soc Psychiatry Psychiatr Epidemiol 42:381-88.
- 43. Kivimäki M, Vahtera J, Pentti J, Ferrie JE. Factors underlying the effect of organizational downsizing on health of employees: longitudinal cohort study. *BMJ* 2000;320:971-975.
- 44. Stansfeld S, Candy B. (2006) Psychosocial work environment and mental health a meta analytic review. Scand J Work Environ Health 32(6):443-462.
- 45. Nieuwenhuijsen K, Bruinvels D, Frings-Dresen M. (2010) Psychosocial work environment and stress-related disorders, a systematic review. Occupational Medicine 60:277-289.
- 46. Siegrist J (2008) Chronic psychosocial stress at work and risk of depression: evidence from prospective studies. Eur Arch Psychiatry Clin Neurosci 258(Suppl 5):115-119.
- 47. Ferrie JE, Shipley MJ, Marmot MG et al. (2008) Flexible labor markets and employee health. *SJWEH Suppl* 6:98-110.
- 48. Ferrie JE, Shipley MJ, Stansfeld SA, Marmot MG. Effects of chronic job insecurity and change in job security on self-reported health, minor psychiatric morbidity, physiologic measures, and health related behaviours in British civil servants: the Whitehall II study. *J Epidemiol Community Health* 2002;56:450-454.
- 49. Aronsson G, Gustafsson K, Dallner M. Sick but yet at work. An empirical study of sickness presenteeism. *J Epidemiol Community Health* 2000;54:502-509.

- 50. Bergström G, Bodin L, Hagberg J, Aronsson G, Josephsson M. (2009) Sickness presenteeism today, sickness absenteeism tomorrow? A prospective study of sickness presenteeism and future sickness absenteeism. *J Occup Environ Med* 51(6):629-38.
- 51. Vahtera J, Kivimäki M, Pentti J. Effect of organizational downsizing on health of employees. *Lancet* 1997;350:1124-28.
- 52. Kivimäki M, Vahtera J, Ferrie JE, Hemingway H, Pentti J. Organisational downsizing and musculoskeletal problems in employees: a prospective study. *Occup Environ Med* 2001;58:811-817.
- 53. Kivimäki M, Vahtera J, Pentti J, Thomson L, Griffiths A, Cox T. Downsizing, changes in work, and self-rated health of employees: a 7-year 3-wave panel study. *Anxiety, Stress, and Coping* 2001;14:59-73.
- 54. Kivimäki M, Honkonen T, Wahlbeck K, et al. Organisational downsizing and increased use of psychotropic drugs among employees who remain in employment. *J Epidemiol Community Health* 2007;61:154-158.
- 55. Westerlund H, Theorell T, Alfredsson L. Organizational instability and cardiovascular risk factors in white-collar employees. *Eur J Public Health* 2004;14:37-42.
- 56. Vahtera J, Kivimäki M, Pentti J, et al. Organizational downsizing, sickness absence, and mortality: 10-town prospective cohort study. *BMJ* 2004;328:555-.
- 57. Vahtera J, Kivimäki M, Forma P, et al. Organisational downsizing as a predictor of disability pension: the 10-town prospective cohort study. *J Epidemiol Community Health* 2005;59:238-242.
- 58. Theorell T, Oxenstierna G, Westerlund H, Ferrie J, Hagberg J, Alfredsson L. Downsizing of staff is associated with lowered medically certified sick leave in female employees. *Occup Environ Med* 2003;60:9-.
- 59. Martikainen P, Mäki N, Jäntti M. The effects of workplace downsizing on cause-specific mortality: a register-based follow up study of Finnish men and women remaining in employment. *J Epidemiol Community Health* 2008; April 15. doi: 10.1136/jech.2007.068429.
- 60. Westerlund H, Ferrie J, Hagberg J, Jeding K, Oxenstierna G, Theorell T. Workplace expansion, long-term sickness absence, and hospital admission. *Lancet* 2004;363:1193-97.
- 61. Åsberg M, Sköld C, Wahlberg K, Nygren Å. (2006) Mindfulness-meditation nygammal metod för att lindra stress. Läkartidningen 42.
- 62. National Institute for Working Life. Ekberg K. Rehabilitation to work. In Gustafsson R Å, Lundberg I (Edts.). Work life and health in Sweden. Stockholm, 2004.

- 63. Nieuwenhuijsen K, Bültmann U, Neumeyer-Gromen A et al. Interventions to improve occupational health in depressed people (Review). The Cohrane Library Issue 2009;1.
- 64. De Vente W, Kamphuis JH, Emmelkamp PMG et al. Individual and Group Cognitive-Behavioral Treatment for Work-Related Stress Complaints and Sickness Absence: A randomized Controlled Trial. Journal of Occupational Health Psychology 2008;**13**(3): 214-31.
- 65. Bakker IM, Terluin B, van Marwijk HWJ et al. Cluster-Randomized trial Evaluating an Intervention for Patients with Stress-Related Mental Disorders and Sick-leave in Primary Care. PLOS Clinical Trials 2007;**e26**.
- 66. Stenlund T, Ahlgren C, Lindahl B et al. Cognitive oriented behavioural rehabilitation in combination with qigong for patients on long-term sick-leave because of burnout: REST A randomized clinical trial. Int J Behav Med 16:294-303.
- 67. Brouwers EPM, de Bruijne MC, Terluin B et al. Cost-effectiveness of an activating intervention by social workers for patients with minor mental disorders on sick leave: a randomized controlled trial. European Journal of Public Health 2006;**17**(2):214-20.
- 68. Brouwers EPM, Tiemens BG, Terluin B et al. Effectiveness of an intervention to reduce sickness absence in patients with emotional distress or minor mental disorders: a randomized controlled effectiveness trial. General Hospital Psychiatry 2006;**28**:223-29.
- 69. Van der Klink JJL, Blonk RWB, Schene AH et al. Reducing long term sickness absence by an activating intervention in adjustments disorders: a cluster randomized controlled design. Occup Environ Med 2003;60:429-37.
- 70. Van der Feltz-Cornelis CM, Hoedeman R, de Jong FJ et al. Faster return to work after psychiatric consultation for sick-listed employees with common mental disorders compared to care as usual. A randomized clinical trial. Neuropsychiatric Disease and Treatment 2010;6:375-85.
- 71. Blonk RWB, Brenninkmeijer V, Lagerveld SE et al. Return to work: A comparison of two cognitively behavioral interventions in cases of work-related psychological complaints among the self-employed. Work & Stress 2006;**20**(2):129-44.
- 72. Van Oostrom SH, van Mechelen W, Terluin B et al. A workplace intervention for sicklisted employees with distress: results of a randomized controlled trial. Occup Environ Med 2010;67:596-602.
- 73. Karlsson B, Jönsson P, Pålsson B et al. Return to work after a workplace-oriented intervention for patients on sick-leave for burnout a prospective controlled study. BMC Public Health 2010;**10**:301.

- 74. Ferrie JE, Kivimäki M, Westerlund H et al. (2011) Differences in the association between long-term sickness absence and long-term sub-optimal health by occupational position:a 14 year follow-up in the GAZEL cohort. Occup Environ Med 68:729-733.
- 75. Gustafsson K, Marklund S. (2011) Consequences of sickness presence and sickness absence on health and work ability: a Swedish prospective cohort study. Int J Occup Med and Environ Health 24(2):153-165.
- 76. Kivimäki M, Ferrie JE, Shipley MJ (2008) Low medically certified sickness absence among employees with poor health status predicts future health improvement: the Whitehall II study. Occup Environ Med 65:208-210.
- 77. Melchior M, Ferrie JE, Alexanderson K et al. (2009) Using sickness absence records to predict future depression in working population: prospective findings from the GAZEL cohort. Am J Public Health 99(8):1417-22.
- 78. Vahtera J, Westerlund H, Ferrie J E et al (2010) All-cause and diagnoses-specific sickness absence as a predictor of sustained suboptimal health: a 14 year follow-up in the GAZEL cohort. J Epidemiol Community Health 64:311-317.
- 79. Goldston K, Baillie A J (2008) Depression and coronary heart disease: A review of the epidemiological evidence, explanatory mechanisms and management approaches. Clinical Psychology Review 28: 288-306.
- 80. Rugulies R. (2002) Depression as a predictor for coronary heart disease. A review and meta-analysis. Am J Prev Med 23(1):51-61.
- 81. Kubzansky LD, Kawachi I. (2000) Going to the heart of the matter: do negative emotions cause coronary heart disease? Journal of psychosomatic research 48: 323-337.
- 82. Hemingway H, Marmot M (1999) Psychosocial factors in the aetiology and prognosis of coronary heart disease: systematic review of prospective cohort studies. BMJ 318: 1460-7.
- 83. Rosengren A, Hawken S, Öunpuu S, Sliwa K, Zubaid M (2004) Associations of psychosocial risk factors with risk of acute myocardial infarction in 11 119 cases and 13 648 controls from 52 countries (the INTERHEART study): case control study. Lancet 364: 953-62.
- 84. Spiegel D, Giese-Davis J (2003) Depression and cancer: mechanisms and disease progression. Society of Biological Psychiatry 54: 269-282.
- 85. Bernal M, Haro JM, Bernert S, Brugha T, de Graaf R et al. (2007) Risk factors for suicidality in Europe: Results from the ESEMED study. Journal of affective disorders 101: 27-34.

- 86. Nock MN, Hwang I, Sampson N, Kessler RC, Angermeyer M. (2009) Cross-national analysis of the association among mental disorders and suicidal behaviour: findings from the WHO world mental health surveys. PLOS Medicine 6: e1000123.
- 87. Uebelacker LA, Weisberg R, Millman M, Yen S, Keller M. Prospective study of risk factors for suicidal behavior in individuals with anxiety disorders. Psychological Medicine doi:10.1017/S003329171200504.
- 88. Holma KM, Melartin TK, Haukka J, Holma IAK, Sokero TP, Isometsä ET. (2010) Incidence and predictors of suicide attempts in DSM-IV major depressive disorder: A five-year prospective study. Am J Psychiatry 167:7.
- 89. Head J, Ferrie J E, Alexanderson K, Westerlund H, Vahtera J et al (2008) Diagnosis-specific sickness absence as a predictor of mortality: the Whitehall II prospective cohort study. BMJ 337: a1469.
- 90. Melchior M, Ferrie J E, Alexanderson K, Goldberg M, Kivimaki M et al (2010) Does sickness absence due to psychiatric disorder predict cause-specific mortality? A 16-year follow-up of the GAZEL occupational cohort study. Am J Epidemiol 172: 700-707
- 91. Mittendorfer-Rutz E, Kjeldgård L, Runeson B, Perski A, Melchior M et al (2012) Sickness absence due to specific mental diagnoses and all-cause and cause-specific mortality: A cohort study of 4.9 million inhabitants of Sweden. PLOS ONE 7:e45788.
- 92. Ferrie J E, Vahtera J, Kivimäki M, Westerlund H, Melchior M et al (2009) Diagnosis-specific sickness absence and all-cause mortality in the GAZEL study. J Epidemiol Community Health 63:50-55.
- 93. Morgensen H. Ecological Studies. In: Rothman K, Greenland S (eds.). *Modern Epidemiology*. Lippincott-Ravers publishers, Philadelphia, 1998.
- 94. The Swedish federation of county councils. *Statistisk årsbok för landsting. Statistical yearly book of county councils (in Swedish)*. The Federation of County Councils, Stockholm, 2004.
- 95. Davison AC, Hinkley DV. *Bootstrap Methods and Their Application*. Cambridge University Press, Cambridge, 1997.
- 96. Statistics Sweden. http://www.scb.se/Pages/List____257743.aspx. Assessed 2013-01-24.
- 97. The Swedish National board of health and welfare. Dödsorsaksstatistik (Causes of death statistics) (In Swedish). Stockholm, 2010.
- 98. Ludvigsson JF, Andersson E, Ekbom A, Feychting M, Kim JL, Reuterwall C, Heurgren M, Otterblad Olausson P. (2011) External review and validation of the Swedish national inpatient register. BMC Public Health 11:450.

- 99. The Swedish National board of health and welfare. (2009) Kvalitet och innehåll i patientregistret. (Quality and contents of the inpatient care registry.) (In Swedish). Stockholm.
- 100. Niederkrotenthaler T, Rasmussen F, Mittendorfer-Rutz E: Perinatal conditions and parental age at birth as risk markers for subsequent suicide attempts and suicide: a population based case-control study. *Eur J Epidemiol* 2012,DOI 10.1007/s10654-012-9724-4.
- 101. Royston P, Parmar MKB. (2002) Flexible parametric proportional-hazards and proportional-odds models for survival data, with application to prognostic modeling and estimation of treatment effects. Statistics in Medicine. Aug;21(15):2175-2197.
- 102. Lambert P C, Royston P (2009) Further development of flexible parametric models for survival analysis. The Stata Journal 9(2): 265-290
- 103. Ferrie JE, Westerlund H, Oxenstierna G, Theorell T. (2007) The impact of moderate and major workplace expansion and downsizing on the psychosocial and physical work environment and income in Sweden. Scand J Pub Health 35:62-69.
- 104. Petterson I, Hertting A, Hagberg J, Theorell T. (2005) Are trends in work and health conditions interrelated? A study of Swedish hospital employees in the 1990s. Journal of Occupational Health Psychology 10(2): 110-120.
- 105. Hertting A, Nilsson K, Theorell T, Sätterlund Larsson U. Downsizing and reorganizations: demands, challenges and ambiguity for registered nurses. *Journal of Advanced Nursing* 2004;45:145-154.
- 106. Brown C, Arnetz B, Petersson O. (2003) Downsizing within a hospital: cutting care or just costs? Social Science and Medicine 57:1539-1536.
- 107. Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996;1:27-41.
- 108. Glasberg AL, Eriksson S, Norberg A. Burnout and 'stress of conscience' among health care personnel. *Journal of Advanced Nursing* 2007;57:1-12.
- 109. Lindholm C, Fredlund P, Backhans M. (2005) Hälsotillstånd och sjukskrivningsutveckling. (Health condition and sickness absence development) Den höga sjukfrånvaron. Problem och lösningar. (The high sickness absence level. Problems and solutions.) (In Swedish) Working life Institute, Stockholm.
- 110. Mintz J, Mintz LI, Arruda MJ et al. Treatments of depression and the functional capacity to work. Arc Gen Psychiatry 1992;**49**:761-68.

- 111. Kisely S, Sadek J, MacKenzie A, Lawrence D, Campbell L A (2008) Excess cancer mortality in psychiatric patients. The Canadian Journal of Psychiatry 53(11): 753-61.
- 112. Lawrence D, Holman CDJ, Jablensky AV, Threlfall TJ, Fuller SA (2000) Excess cancer mortality in Western Australian psychiatric patients due to higher case fatality rates. Acta Psychiatr Scand 101: 382-88.
- 113. Vissoci Reiche EM, Odebrecht Vargas Nunes S, Kaminami Morimoto H. Stress, depression, the immune system, and cancer. Lancet Oncol 2004;5:617-25.
- Mykletun A, Bjerkestad O, Dewey M, Prince M, Overland S et al (2007)

 Anxiety, depression, and cause-specific mortality: The HUNT study. Psychosomatic medicine 69: 323-331.
- 115. Kapusta ND, Niederkrotenthaler T, Etzersdorfer E, Voracek M, Dervic K et al (2009) Influence of psychotherapist density and antidepressant sales on suicide rates. Acta Psychiatr Scand 119: 236-242.
- 116. Harris EC, Barraclough B (1998) Suicide as an outcome of mental disorders. A meta-analysis. British J Psychiatry 170: 205-228.
- 117. Hensing G. Alexanderson K, Allebeck P et al. (1996) Sick-leave due to psychiatric disorder: higher incidence among women and longer duration for men.

 British journal of psychiatry 169:740-746.
- 118. Hensing G, Brage S, Nygård JF et al. (2000) Sickness absence with psychiatric disorders an increased risk for marginalization among men? Soc Psychiatry Psychiatr Epidemiol 35: 335-340.
- 119. Lauber C (2008) Stigma and discrimination against people with mental illness: a critical appraisal. Epidemiolog Psychiatr Soc 17: 10-13.
- 120. The Swedish federation of county councils. (1998) Statistisk årsbok för landsting. Statistical yearly book of county councils (in Swedish). The Federation of County Councils, Stockholm.
- 121. The Swedish federation of county councils. (2002) Statistisk årsbok för landsting. (Statistical yearly book of county councils) (in Swedish). The Federation of County Councils, Stockholm.
- 122. Larsson T, Marklund S, Westerholm P. *Den galopperande sjukfrånvaron. The galloping sickness absence (in Swedish).* Work life Institute, Stockholm, 2005.
- 123. Arrelöv BE, Borgquist L, Svärdsudd KF. Influence of local structural factors on physicians' sick-listing practice: a population-based study. *Eur J Public Health* 2005;15:470

- 124. Rothman KJ, Greenland S, Lash TL. (2008) Modern epidemiology. Oxford: Oxford University Press.
- 125. Butterworth P, Leach LS, Streazdins L et al. The psychosocial quality of work determines whether employment has benefits for mental health: results from a longitudinal national household panel survey. Occupational Environmental Medicine 2011;doi:10.1136/oem.2010.059030.
- 126. Leach LS, Butterworth P, Strazdins L et al. The limitations of employment as a tool for social inclusion. BMC Public health 2010;**10**:612.