

Health changes in a changing labour market

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Stockholm 2005

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This thesis is dedicated to S

Es irrt der Mensch, solange er strebt.

GOETHE

List of abbreviations

γ -GT	gamma-GlutamylTransferase
ACTH	AdenoCorticoTropic Hormone
ADL	Activities of Daily Living
ALAT	ALanine TRansaminase
ALMP	Active Labour Market Programme
ALU	ArbetsLivsUtveckling; Sw: Work Experience Scheme
a.m.	L. <i>ante meridiem</i> (before noon)
ANCOVA	ANalysis of COVariance
ANOVA	ANalysis Of VAriance
ASAT	ASpartate AminoTransferase
AST	cf. ASAT
c.f.	L. <i>confer</i> (compare with)
CHD	Coronary Heart Disease
CI	Confidence Interval (usually 95 % CI)
CNS	Central Nervous System
CRH	Corticotropin Releasing Hormone
CVD	CardioVascular Disease
DCM	The Karasek Demand-Control Model
DCQ	The Swedish Demand-Control Questionnaire
DHEA	DeHydroEpiAndrosterone
DHEA-s	DeHydroEpiAndrosterone Sulfate
e.g.	L. <i>exempli gratia</i> (for example)
GAS	General Adaptation Syndrome
γ -GT	gamma-GlutamylTransferase
GGT	cf. γ -GT
GH	Growth Hormone (STH, somatropin)
GnRH	Gonadotropin Releasing Hormone
HAD	Hospital Anxiety and Depression scale
HPA	Hypothalamic-Pituitary-Adrenal axis
HPG	Hypothalamic-Pituitary-Gonadal axis
ibid.	L. <i>ibidem</i> (in the same source as previously referenced)
i.e.	L. <i>id est</i> (that is to say)
IPM	National Institute for Psychosocial Medicine, Stockholm, Sweden
JCQ	The Job Content Questionnaire
JPM	Japanese Production Management
LH	Luteinizing Hormone
LME	Labour Market Exit
MANCOVA	Multiple ANalysis of COVariance
MS	Multiple Sclerosis
OR	Odds Ratio
TQM	Total Quality Management
SAM	Sympatho-Adreno-Medullary system
SOC	Sense Of Coherence
SPSS	Statistical Package for the Social Sciences
STH	SomatoTropic Hormone (GH, somatropin)
SWES	Swedish Work Environment Study (Arbetsmiljöundersökningen, AMI)
UE	Use for Everyone ('Det finns bruk för alla' in Swedish), an ALMP in West Sweden evaluated in Studies I and II
VAS	Visual-Analogue Scale
WOLF	WOrk Lipids and Fibrinogen (name of a Swedish prospective study)

Abstract

The late 20th century saw major changes in working life across the world. In Sweden, the changes on the labour market had a very strong impact in the early years of the 1990s. Not necessarily because they were larger than in other comparative countries, but because they happened quickly and marked a radical departure from the traditionally very stable and secure labour market in the country. In the span of a few years, almost full employment and high job security was replaced by high unemployment rates, decreased job security, and ubiquitous downsizing and re-organisation of companies. Unemployment was mainly countered by a large augmentation of active labour market programmes (ALMPs), offering intermittent activation of the unemployed.

The present thesis aims to investigate health consequences of the changing labour market of the 1990s in Sweden. This is done in three different contexts: survivors of organisational changes, participants in active labour market policy programmes, and different kinds of early labour market exit for older workers.

Papers I and II focused on an experimental active labour market programme with pronounced empowerment and (public) health goals. The hypothesis was that participation would improve health generally and result in a shift from catabolic to anabolic processes in the body. Some transient improvements were found, especially in well-functioning groups (Paper II), but there were also indications of long-term adaptation to unemployment (Paper I). Overall, the hypothesis was not supported, and the major conclusion was that six months participation was not enough to achieve lasting health effects.

Papers III and IV focused on those persons who stay in work after downsizing, re-organisation or rapid personnel expansion. In Paper III, job strain and cardiovascular risk factors were studied in companies which had been qualitatively classified regarding organisational change. The results indicate that several kinds of 'organisational instability', not only downsizing, might have adverse health effects. In Paper IV, sickness absence and hospital admission was studied in relation to personnel downsizing and expansion in a nationally representative sample of 24,036 workers. The results show an excess risk for health problems among employees who had been repeatedly exposed to either moderate downsizing or large expansion, and lower risk for those who had experienced moderate expansion. Together, Papers III and IV confirm earlier findings by other researchers that personnel downsizing predicts negative health outcome, but add that other types of major organisational change, including prolonged and rapid expansion, can have similar adverse effects.

Paper V examined the relative effects of different labour market exits (LMEs) on the risk of hospitalisation compared to those who stay in employment using a nationally representative sample of 7,024 older Swedish workers. The results showed an increased risk of hospital admission following LME for the unemployed. There was also a tendency that those who took disability pension had a reduced risk. These findings confirm the commonly found result that unemployment has negative health effects, but in addition they indicate that withdrawal from bad jobs and/or for persons with pre-existent health problems might have a protective effect on health.

Taken together, the thesis demonstrates that structural changes in the labour market, as exemplified by the major changes that took place in Sweden in the early 1990s, can have a significant and differentiated impact on public health, and that the negative health effects are not necessarily easy to counteract by labour market programmes. More research is called for, especially regarding effective interventions to protect health during structural changes at workplaces and in working life as a whole.

Keywords: Personnel Downsizing, Personnel Expansion, Labour market exit, Labour market programme, Unemployment, Occupational Health, Personnel Staffing and Scheduling, Sick Leave/statistics & numerical data, Hospitalization/statistics & numerical data, Triglycerides, Cholesterol, Fibrinogen, Prolactin, Dehydroepiandrosterone Sulfate, Blood pressure, Stress, Psychological/metabolism, Sweden.

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List of publications

The present thesis is based on the following published papers:–

Paper I

Westerlund H, Theorell T, & Bergström A. Psychophysiological effects of temporary alternative employment. *Social Science and Medicine* 2001;**52**:405–414.

Paper II

Westerlund H, Bergström A, & Theorell T. Changes in anabolic and catabolic activity among women taking part in an alternative labour market programme. *Integrative Physiological and Behavioral Science*, 2004;**39**:3-15.

Paper III

Westerlund H, Theorell T, & Alfredsson L. Organizational instability and cardiovascular risk factors in white-collar employees. *European Journal of Public Health*, 2004;**14**:37-42.

Paper IV

Westerlund H, Ferrie J, Hagberg J, Jeding K, Oxenstierna G, & Theorell T. Workplace expansion, long-term sickness absence, and hospital admission. *The Lancet*, 2004;**363**:1193-1197.

Paper V

Hyde M, Hagberg J, Oxenstierna G, Theorell T, & Westerlund H. Bridges, pathways and valleys: labour market position and risk of hospitalization in a Swedish sample aged 55-63. *Scandinavian Journal of Public Health*, 2004;**39**:368-373.

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Preface

Saepe stilum vertas, iterum quae digna legi sint scripturus.

Q HORATIUS FLACCUS

So, here, finally, is my thesis. After a decade of working on it, I had hoped to be able to present a polished and well-balanced work. But that was not to be. Instead, much of the ‘jacket’ has been written during a very special and memorable Christmas, just before the printer’s deadline at 0800 hrs, 27th December 2004. That’s not how it should be, but still how it usually is, at least for me. Of course, I could have postponed the presentation of the thesis, but sooner or later you come to a point where you have to draw a line: This is enough, time to move on. Perhaps also to accept that my multidisciplinary work has made me a jack of all trades and master of none.

Despite all the haste during its conception, I hope that the material in the thesis will provide ideas both for further research and for some necessary policy changes in working life. If there is one thing I want my readers to take to heart, it is that the organisational instability, which is the obverse of the flexible, modern labour market, has health consequences, which we cannot expect everybody to cope with by themselves. What we need to do, is to create stable structures for change, however difficult that may sound.

Now to the very heart of the matter. The main reason for writing a preface to a thesis is usually to express thanks to all those people who have in some way helped along the way. But no matter how many you list, some will be left out and forgotten. That is why I’ve chosen to mention only a few people, and only those who have contributed scientifically. That is not to say that I have forgotten all the rest, who have in some way or other made this thesis possible.

First of all, I would like to thank my supervisor *Töres Theorell*. Not only has he guided me through the long and often arduous path of my studies, but he has also consistently supported me also when times were difficult, as they were especially in the beginning. Without him, I may simply have chosen to follow some easier path...

My secondary supervisor *Bengt Starrin* has been far less involved in the thesis work than *Töres*, but he has nevertheless been a great source of inspiration. By inspiring dialogues, he has helped me understand what social disadvantage is – and how it can be studied scientifically without further stigmatising the victims.

Before I started with the projects which lead to this thesis, I worked as a research assistant for *Aleksander Perski*. During that time, I learned a lot from *Aleksander*, and was greatly stimulated by his broad and integrative view on stress. He is also a very nice person to work with, so thank you *Aleks*.

During the first years of my work I leaned heavily on my colleague *Anna Bergström* for support. Together we weathered out some pretty bad times. Thanks for all your patience with me, *Anna*!

Most help, both in practical and emotional terms, I got from my co-workers at *Mösseberg Research Station* (Forskningsstation Mösseberg), where all the empirical work to Studies I-II was carried out. I cannot mention all of the more than 50 people who have worked there, but one I cannot omit is *Agneta Sandström*. Not only has she been my most faithful and reliable colleague, she has also become a close friend of mine. If I have to pick two more of my co-workers, I think it has to be *Pirjo Öquist*, our district nurse who collected all the physiological samples in a most professional way, and *Stefan Andersson*, who did a large part of the interviews in the same studies when he didn't enter into long and stimulating discussions with me.

A special bonus that came out of working with *Mösseberg Research Station* was getting to know *Ronny Svensson* and *Gerd Adolfsson*. When the whole project seemed to founder during the very first year, *Ronny* unselfishly helped out. Without him, my first two studies would never have come to more than the planning stage. Out of this grew a deep and lasting friendship with both *Ronny* and his wife *Gerd*. A lucky turn of events indeed!

During the latter part of my work, I have found a new and congenial environment in the 'Ralf Group' at the IPM. It started tentatively with some very thought-provoking discussions over dinner with *Gabriel Oxenstierna*, and gradually I got more and more involved. *Gabriel* had the vision to create a large database by merging national registers, and I soon realised what an excellent material that was for scientific research. Perhaps even more important, though, was that *Gabriel* made me feel

welcome back in the scientific community after years in the evaluation business, and our collaboration has evolved into a rather intense partnership and friendship.

Jane Ferrie is another person who has been invaluable in my work. Her extensive knowledge of the field and her always eminently useful – and sharply critical – comments have been absolutely crucial in turning my raw ideas into publishable, well structured papers. Her belief in me has also been a great support.

I also want to thank *Martin Hyde*, my young, bright stimulating colleague who is the main author of the fifth paper in this thesis. Not only is Martin a helpful and able colleague, he's also a veritable engine with his contagious enthusiasm for scientific research.

Finally, I would like to thank all my fellow (former) graduate students in Töres' research group who have contributed with stimulating discussions over the years. Among you all, I especially want to mention *Anna Hertting*, *Bo Jonsson* and *Peggy Bernin*, who gave their generous support in the very last moments before my deadline.

My grateful thoughts also go to all those persons who supplied the material the thesis is based upon – the *participants* in the studies, who by researchers are often labelled 'subjects'. For the most part, I don't even know your names, but without your unselfish contribution, this research would simply not have been possible.

Last, but not least, I want to thank the *Karolinska Institute* and the *National Institute for Psychosocial Medicine (IPM)* – that provided the basis for my work – and the various *funding agencies* and institutions that contributed financially to my work, the work of my colleagues, and to Mösseberg Research Station, where much of the work was done.

Stockholm in December 2004

The Author

*Grau, teurer Freund, ist alle Theorie
Und grün des Lebens goldner Baum.*

GOETHE

Background

Health has improved tremendously in the developed world over the last couple of centuries. Life expectancy has risen steadily and many people now enjoy seven or even eight decades of life without any major illnesses or symptoms. The material standard of living has likewise developed incredibly. For those unfortunate enough to get sick or unemployed, there are extensive public social security systems in place, especially in Northern Europe.

The changes in the labour market have also been pronounced. Agricultural work, which used to dominate, is now only a small part of the labour market. Factory work, which largely supplanted agriculture, is now in turn gradually replaced with service work. At the same time, women's participation in the labour force has increased from near zero to almost the same level as men's.

A large part of the most dangerous and sometimes degrading jobs have disappeared or changed extensively. Machines have taken over many of the worst tasks, and instead of numerous workers doing hard manual labour, there are now small numbers of maintenance staff monitoring the work processes on computer terminals. Production which still relies on unskilled manual labour has largely moved to developing countries. In addition, those work tasks which still require manual effort, are often aided by advanced ergonomic solutions.

Physical demands have not entirely disappeared from the labour market, however. Elderly care, health care and retail – sectors in which women tend to dominate – still require a fair amount of physical exertion, often in combination with patient or customer oriented service work.

Whereas the physical work environment is likely to have been an issue for as long as man has been able to influence his environment, far less systematic attention has been paid to the psychosocial environment. The historical development is therefore much more difficult to trace. Anecdotal data from pre-industrial times tell both of horrendous environments, where people were treated no better than beasts, and of idyllic settings where people were happy despite sometimes hard physical work. Both pictures, as well as a continuum in-between, are probably true.

The rise of the labour movement in the late 19th century was a reaction against the working conditions during the early industrial era: hard, monotonous and sometimes dangerous physical labour, excessively long working hours, low pay, low status, minimal influence over the working situation and virtually no job security. Things have improved considerably since, thanks to a combination of technical and economic development on the one hand and political and social reforms on the other. Still, working people today spend far more time working than their hunter-gatherer forbears of the Palaeolithic past.

International labour market trends

In the past, long distance trade was restricted to a limited number of goods, mainly raw materials, which were refined locally. However, in the last decades, technical and political development has combined to open up a global market for more and more products and services. Also capital has become far more mobile across borders, and to a lesser degree also people.

Globalised competition generally tends to speed up product development and push down prices. Workers are affected in two ways. As consumers, they get access to an ever-increasing choice of reasonably priced products. As workers, they are exposed to strong market pressure on the companies in which they work: costs must be cut, and products developed and marketed successfully, or the company goes out of business.

In the 1980s, the Fordian concept of mass production, which dominated the 20th century, was strongly challenged by new production and management ideals. Japanese Production Management (JPM), Lean Production, Just-in-Time Production and Total Quality Management (TQM) became the buzzwords in the international business literature (Babson 1995, Price 1995, Womack, Jones & Roos 1990). The common theme is an effort to combine high production flexibility with increased cost-effectiveness. The means to achieve this were, *inter alia*: production error elimination, effective ordering decreasing the need to stock parts, swift delivery and production to customer orders decreasing the need to stock finished products, and more flexible work teams that can swiftly adapt to new production needs.

JPM and related concepts were originally intended for industrial assembly-line production, but were quickly translated also to management in service and white-collar occupations (Nilsson 1994). Downsizing – reduction of personnel either absolutely or relative to production volume – became a dominant way to save companies in economic crisis, to cut costs in the public sector, and to further increase competitiveness and profits of successful companies.

A related development is an increased demand of workers with specialised skills and higher education – and the virtual elimination of the unskilled jobs, which were the backbone of early industrial production. The educational systems have had to be adapted to a large increase in higher education and the need for lifelong learning. As a consequence, people study longer and enter the labour market later in life; many also leave the labour market temporarily during adulthood to pursue higher education.

People, who for some reason do not acquire specialised skills, face an increasingly difficult labour market. In some countries, notably Sweden, they are largely forced to live on unemployment benefit and social welfare (Persson 1998). In other countries, such as the United States, they are basically confined to very low pay, low status service jobs. Some authors, notably Rifkin (1995), have argued that a sizable part of the working age population will be permanently excluded from the labour market in the future, while others point to the demographic trends and argue that the decreasing proportion of the population will force people back on the labour market.

Despite better overall health and increased longevity, people in the Western world tend to leave the labour market earlier in life. There are basically two avenues to leave the labour force prematurely: Either through forced exit, because the individual cannot cope with the demands of work, or the voluntary, because the individual wants to enjoy life outside work. Pension schemes and social welfare systems make early labour market exit (LME) possible, and increased demands on the workforce sometimes makes it necessary.

The overall picture is that people today tend to spend a smaller portion of their lives actively working in paid work, but also that they might face higher demands while they are working.

Labour market changes during the 1990s in Sweden

In Sweden, the changes on the labour market had a very strong impact in the early years of the 1990s (Hallsten *et al.* 1999). Not necessarily because they were more extensive than in other comparative countries, but because they happened quickly and marked a radical departure from the traditionally very stable and secure labour market in the country. In the span of a few years, almost full employment and high job security was replaced by high unemployment rates, decreased job security and ubiquitous downsizing and re-organisation of companies. Unemployment was mainly countered by a large up-scaling of active labour market programmes (ALMPs), offering intermittent activation of the unemployed.

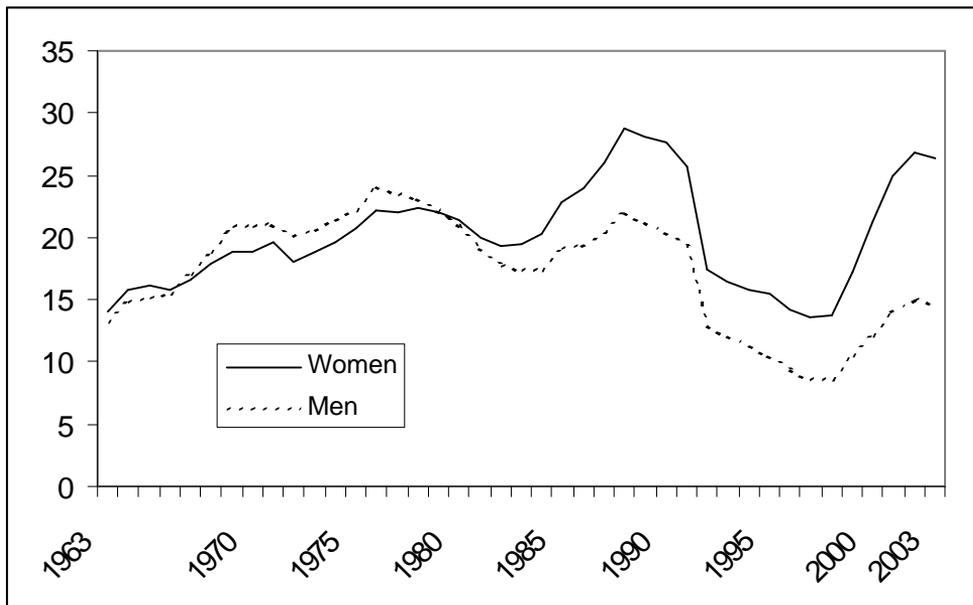


Figure 1. The development of mean number of days per person and year of public sickness benefit ('sjuktalet'), split by sex. (Source: Socialförsäkringsboken 2004, p. 16.)

The second half of the 1990s saw a strong recovery in the economy, eventually leading to a boom around the turn of the millennium. Unemployment rates decreased markedly, but labour market participation did not quite reach the levels characteristic for Sweden

before the crisis of the 1990s. The most worrying trend, however, was a sharp rise in sickness absenteeism, which was due to a large increase in long-term sick leaves (cf. Figure 1). In the figure, it might appear as if the increase at the end of the 1990s is just a return to the values of the late 1980s. However, the drop between 1991 and 1992 was largely due to the introduction of an employer entrance period, i.e. the first days of a sickness absence are no longer paid through the public sickness insurance system. No such simple explanation exists for the dramatic increase around the turn of the century.

The active labour market policy in Sweden

Although a certain level of unemployment is necessary for the smooth functioning of a labour market, it has long been recognised that mass unemployment is a danger both to the individuals concerned and to society as a whole. Unemployment fosters poverty, social exclusion and social unrest.

Already the Roman emperors saw the need for large-scale public programmes to provide employment to the unemployed and dispossessed masses in the cities. In the small-scale rural economy of Sweden prior to the industrial revolution, however, unemployment was a relatively minor problem, since self-employment was the rule. The problem was poverty, not lack of work. It can, however, be argued that the social cohesion from the small-scale rural history provided the basis for the rapid development of active labour market policies when industrialisation and urbanisation made unemployment an issue also in Sweden.

The foundation of the modern active labour market policy in Sweden was laid during the 19th century, when the responsibility for social welfare rested with the municipality or parish, and the development culminated in the massive relief works of the early decades of the 20th century, which were organised by the state (Ohlsson & Olofsson 1998). Contrary to popular belief, this policy did not originate with the Socialist movement, but with the Social Conservative and Liberal movements, stressing the duty to work and the charitable solidarity with the poor. In the post World War II era, the active labour market policy became a cornerstone in the Swedish welfare system, which was promoted by a succession of strong Social Democratic governments in alliance with

major industrialists (the so-called 'Spirit of Harpsund', from talks held at the prime minister's summer residence of Harpsund).

For several decades in the mid 20th century, the active labour market policy worked remarkably well in Sweden, and was seen as a model internationally. A combination of public work distribution, employment training and vocational counselling ensured a smoothly working labour market with internationally exceptionally high labour market participation and very low unemployment rates.

The Swedish active labour market policy came under severe challenge only in the beginning of the 1990s, when the system, despite forced up-scaling, could not cope with the massive unemployment produced by the deep recession and the rapid re-structuring of the labour market (Calmfors *et al.* 2001, Martin & Grubb 2001). The public work distribution system was further challenged by private recruitment firms, which were legalised. As a result, the focus of the active labour market policy apparently shifted from facilitation of a smooth labour market to damage control related to unemployment. When many unemployed could not be offered a swift road back to employment, keeping people employable over the long-term became a major policy goal, and the policies seemed to have decreased the outflow of 'discouraged workers' from the labour force (Johansson 2001).

At the end of the decade, the Government initiated *Kunskapslyftet* ('The Knowledge Lift', alternatively 'The Adult Education Initiative'), a massive programme for further education for unemployed people who lack complete upper secondary education. The effects on the labour market were, however, largely disappointing. Stenberg (2003) found that, although there was a relatively beneficial effect on the incidence of unemployment, the unemployment duration, given that participants did become unemployed when leaving the programme was longer. Albrecht *et al.* (2004) found a positive employment effect for men, but not for women, and no effect on average income for either sex (which would have been expected from the programme objective to raise worker skills).

Until Autumn 2000, people on long-term unemployment benefit were required to fulfil a 6-month activation period after 300 days of open unemployment (450 days for older workers) in order to once more become eligible for unemployment benefit. The activation could be in the form of regular work, but since that is obviously not always an option for the long-term unemployed, most people took part in various public

labour market projects. 'Work Experience Scheme' (ALU, arbetslivs-utveckling). This created a succession of periods of alternating open unemployment and programme participation, which in theory could go on indefinitely. Beginning Autumn 2000, a programme called the Activity Guarantee (Aktivitetsgarantin) was gradually introduced, which meant that individuals who were, or risked to become, long-term unemployed, should be offered continuous activation until they found a job (or left the labour market). A first evaluation showed that participation in the Activity guarantee increased the probability of getting a subsidised job, but not a job without public subsidies (Hägglund 2002).

At the beginning of the 21st century, there is still a broad political agreement concerning the basic principles of the Swedish active labour market policy – that work for everyone in working age is one of the most fundamental policy goals. The practical organisation of this active labour market policy, however, is being questioned, especially by the Non-Socialist opposition.

Aims

The overall aim of the thesis was to investigate health consequences of the changing labour market of the 1990s in Sweden.

Specific aims

The specific aims of the theses were to study the health correlates of:

- re-organisation, downsizing and personnel expansion on those workers who remain employed,
- labour market programme participation for unemployed and long-term sick workers,
- various forms of labour market exit, such as unemployment, disability pension and early retirement.

Theoretical and empirical framework

The present thesis aims to study the health correlates of the changing labour market of the 1990's. This has been done by a multidisciplinary approach, combining methods from epidemiology, psychophysiology, psychosocial work environment research, unemployment and labour market research, psychology, management, life-course research, and basic qualitative research. The following sections do not pretend to cover all these areas, but will give an overview of key issues regarding psychosocial work environment research, unemployment research, labour market participation in a life-course perspective, and different ways of conceptualise and measure health outcome.

Stress theory

Behind the models used in this thesis lies a generalised stress theory. The concept of stress was introduced by Hans Selye in the 1930s to denote the strain reaction in the body when the organism is exposed to stressors, i.e. challenges which require extraordinary energy mobilisation and other forms of adaptation in order for the organism to cope (for an overview, see e.g. Selye 1980). Selye proposed a *general adaptation syndrome* (GAS) which is a general mobilisation of the biological resources of the organism. Selye was originally interested in low-level stress which could lead to everyday complaints such as nausea and fatigue, but his research focussed mainly on experimentally induced acute stress.

Selye's stress concept is in many ways similar to the fight/flight response studied by Walter Cannon already in the early 20th century: there is evidence that human stress reactions are similar to the semi-instinctual reactions of animals that are challenged, for instance by attacking predators. Although Selye's concept of a rather unspecific GAS has been criticised, much of the later thinking in stress research has been based on the idea that stress reactions are phylogenetically old and adapted to earlier stages of human development.

Stress in itself is not a pathological or even pathogenic process, although severe, acute stress may occasionally activate a latent illness.

Quite the contrary – stress is a necessary and beneficial physiological mobilisation which prepares the organism to meet the challenges of the environment. Stress and recuperation are, however, mutually exclusive physiological states, why too much and too prolonged stress can have detrimental effects by hampering regenerative processes, ultimately leading to depletion of biological resources. In a general way, this is how excessive stress is believed to cause illness.

The stressors of modern life are often quite different from those encountered by our hunter-gatherer forebears. We are seldom attacked by lions, who either kill us or give up the chase rather quickly. Instead, we are challenged by symbolic threats, such as worries about job loss or marital problems. These symbolic stressors of modern life are often protracted and of low or moderate, rather than acute, intensity. They are also often difficult to counteract (and end) by actual, physical fight, flight or subordination. The result appears to be that people tend to have prolonged stress reactions, which are not turned into (appropriate and adaptive) behavioural responses.

In the studies included in the thesis, the health effects several symbolic stressors are studied: unemployment and participation in labour market programmes, downsizing, personnel expansion and other organisational changes, and various kinds of labour market exit.

Psychosocial work environment and health

Work is a large part of most adult peoples' lives. It therefore comes as no surprise that work has an impact on health. Hard manual labour, chemical exposures and risk of accidents are obvious threats to health. At the same time, however, work usually provides income, social status and other things, which are conducive, or even necessary for, health and a good life (Jahoda 1979; Warr 1987; Fryer 1986).

Outright physically dangerous jobs have become less common in the Western world, both because technical advances have been able to deal with many of the dangers and because many of the manual jobs have been moved to Asia and Eastern European countries. There are, however, signs that the psychosocial environment may have become more stressful, with more time pressure and higher demands (Landsbergis 2003). Swedish surveys also show a decrease in social support (Statistics Sweden 2001).

The demand-control model

The Demand-Control Model (DCM; Karasek & Theorell 1990) has been one of the most influential models in psychosocial work environment research. It was introduced by Karasek, an American sociologist who worked several years in Sweden. His collaborator Theorell, a physician, contributed to the 'translation' of the model to physiological processes and collaborated for many years with Karasek in the empirical testing of the model in relation to health outcomes, especially cardiovascular morbidity. The Karasek-Theorell model states that the impact of psychological demands on employee health is moderated by the level of decision latitude (job control), creating a two-dimensional model. Later, support from workmates and superiors was added by Jeffrey V. Johnson as a third dimension in the model (Figure 2).

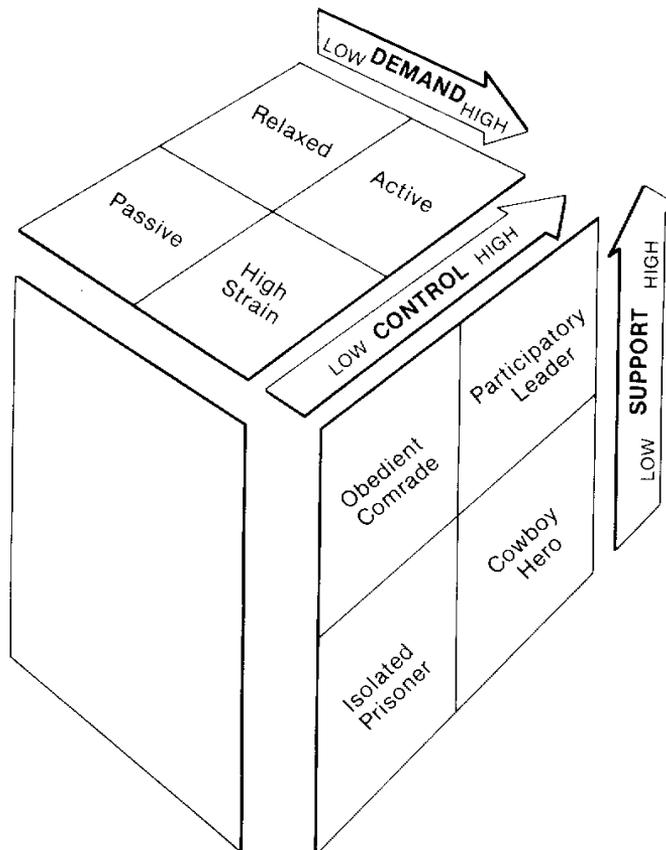


Figure 2. A three-dimensional model of the psychosocial work environment (from Karasek & Theorell 1990, p. 70).

The Demand-Control Model was operationalised by the Job Content Questionnaire (JCQ), which has been translated to a large number of languages. The Swedish Demand-Control Questionnaire (DCQ; Theorell, Perski, Åkerstedt *et al.* 1988), a shortened, translated and modified version of the JCQ, has been widely used in research and work environment surveys. Psychological demands are measured by items such as having to 'work hard' or 'work fast'. Decision latitude comprises both skill discretion ('learning new things' etc.) and decision authority (influence over what to do and how and when to do it). Response options are frequency-based, i.e. 'how often'.

There is a substantial body of research linking 'job strain' – the combination of high psychological demands and lack of decision latitude – predicts negative health outcome. The evidence is especially strong regarding cardiovascular disease outcomes (Belkic *et al.* 2004).

The Demand-Control model (DCQ) is included in Study III together with psychophysiological measures of work strain.

The Effort-Reward Imbalance Model

An alternative, and largely complimentary, model is the so-called Effort-Reward Imbalance (ERI) Model introduced by Swiss-German sociologist Johannes Siegrist. The model is based on the concept of reciprocity in social exchange: Unless efforts spent (at work) are balanced by rewards, creating a reciprocity between costs and gains, the model states that the individual will experience 'a state of emotional distress with special propensity to autonomic arousal and associated strain reactions' (Siegrist, Klein & Voigt 1997). Rewards in the model are of three kinds: money, esteem and status control. Two sources of high effort at work are defined: an extrinsic one – roughly equivalent to the demand dimension of JCQ/DCQ – and an intrinsic one, namely the motivation of the individual worker in a demanding situation. An unfavourable balance can thus be a result of (a combination of) disproportionate demands, low reward or a personal coping style characterised by an excessive need for control and/or too high ambitions. People who have the latter kind of coping pattern are labelled 'over-achievers' and tend to demand more of themselves than the employer does, which often leads to a feeling of not being enough rewarded for the effort spent. The ERI model thus combines sociological and psychological theory.

Although the ERI model has not been in existence as long as the Demand-Control model, it is already backed by a substantial number of studies linking imbalance to negative health outcome. There is also evidence that the effects on health measured with ERI are independent from those measured by the Demand-Control model (Tsutsumi & Kawakami 2004).

ERI is not included in any of the papers in the thesis, but future follow-up studies of the effects of organisational instability will include this model.

Job insecurity, precarious employment, bad jobs and health

Insecure employment is often mentioned as a stressful situation. In the scientific literature, however, the evidence for health effects of employment (in)security is somewhat mixed. There is rather consistent evidence that perceived job insecurity is related to psychological morbidity (Ferrie 2001) and also to deteriorated job attitudes, organisational attitudes and similar factors (Sverke, Hellgren & Näswall 2002).

Low contractual employment security has, on the other hand, sometimes been associated with better health (Virtanen *et al.* 2002). This apparent paradox can perhaps be explained by a combination of reporter bias – those who are negatively affected might tend to report their job security as lower regardless of contractual security because they are worried – and a ‘healthy worker’ effects – people who are basically healthy and/or prefer a more flexible work situation might be selected into some kinds of transient or fixed term employments. When health is studied as sickness absence, there is also the possibility that people in insecure employment might be more reluctant to take sick leave than those in secure jobs (leading to more sickness presenteeism), although a recent study actually seems to indicate the opposite (Aronsson, Gustafsson & Dallner 2000).

Although contractual security is ostensibly more objective than perceived, this may not always be the case. A permanent job can be under great threat, whereas fixed term employments can be fairly stable (and certainly is during the period of the fixed term). A special case of job insecurity is the phase before an anticipated layoff, which has been shown to be extremely stressful (Brenner & Levi 1987).

A phenomenon closely related to job insecurity is on-call work – people who have neither permanent nor fixed term contracts get called in whenever there is shortage of personnel. Most of these people belong to the periphery of the labour market – they are basically unemployed and may appear so in public registers. This type of work became much more common in Sweden during the 1990s, especially in public sector occupations with many women (e.g. health care, elderly care and child care). A study in the United States showed negative health effects of underemployment, which is a slightly broader concept than on-call work (Friedland & Price 2003). In Sweden, there is far less economic hardship related to underemployment than in America, why comparisons are difficult. There is a clear need for more research in this field (Benach *et al.* 2000).

The picture is further complicated by the fact that not all permanent jobs are good ones. Aronsson and Göransson (1999) found that people who were permanently employed, but not in a preferred occupation (28 per cent of a nationally representative sample of Swedish workers) had significantly more headaches and fatigue/slight depression. In a longitudinal study, Winefield *et al.* (1991) found that young people who left school for work in general increased their well-being, but not those who were dissatisfied with their jobs.

Downsizing and health

The changes on the labour during the 1990s often meant that organisations tried to cut costs by downsizing, i.e. by reducing the number of staff (or numbers of hours worked), either absolutely or relative to the production volume. One obvious result of this was that many employees were either forced to change jobs or became unemployed. The health effects of this are discussed under the heading *Unemployment, re-employment, and health* below.

However, even among the survivors of downsizing, who should ideally experience relief and possibly increased job security, many people seemed to react negatively. This has been described in the management and organisation psychology literature (e.g. Brockner, Davy & Carter 1985; Brockner *et al.* 1988 – cf. Thornhill & Saunders 1997 for a review) and was termed *layoff survivor sickness* (Noer 1993). Only relatively recently, however, have the health consequences for survivors of downsizing been investigated epidemiologically.

In a study of absenteeism following downsizing among local government employees in Finland, Vahtera and colleagues (1997) found a significant association between downsizing and medically certified sickness absence (of more than three days). The rate of such absenteeism was 2-3 times greater after major, compared with minor, downsizing. The relationship between downsizing by workplace and short (1-3 days) periods of absence which need not have been medically certified, however, was inverse. The authors argue that this indicates that downsizing increases ill health and reduces absenteeism unrelated to health.

In recent years, several studies have confirmed the association between downsizing and poor health. Kivimäki, Vahtera, Ferrie *et al.* (2001) found that downsizing was a risk factor for musculoskeletal problems, and that much of that risk was attributable to increased physical demands. In a longitudinal study of 31 female hospital staff, Hertting and Theorell (2002) found significantly decreased levels of IgG, apolipoprotein A-I and oestradiol, and a decreased difference between morning and afternoon cortisol. This indicates that protective and anabolic functions could have suffered among the survivors of downsizing. No differences were, however, found regarding prolactin, DHEA-s and apolipoprotein B.

In a prospective cohort study over 7.5 years, Vahtera *et al.* (2004) found not only an association with increased sickness absence among permanent (but not fixed term) employees, but also with cardiovascular mortality.

A possible link between downsizing and health problems could be that survivors are likely to have gone through a period of uncertainty regarding their job, and that they also might perceive that future job security is low. Moore and colleagues (2004) found that repeated downsizing contact was significantly related to lower perceived job security. Grunberg and colleagues (2001) found that job security partially mediated the relationship between type of layoff contact experience and health. In a Swedish study, Isaksson, Hellgren and Pettersson (2000) found that perceived job insecurity predicted distress among survivors at two time points during a downsizing and protracted re-organisation process. However, a study by Kalimo and colleagues (2003) seem to indicate that there are independent effects of past downsizing and expectations of future downsizing.

A study of hospital staff in Sweden showed that perceptions of workload were substantially increased after downsizing, while perceptions of mental energy decreased (Brown, Arnetz & Petersson 2003). Staff perception of the quality of care given did, however, not change significantly. Moore *et al.* (2004) showed that repeated contact with downsizing was associated with increased role ambiguity, job demand, depression and health problems.

In a longitudinal study of municipal workers, Kivimäki, Vahtera, Pentti and Ferrie (2000) found that adjustment for changes in work (for instance physical demands, job control and job insecurity) diminished the relation between downsizing and sickness absence by 49 per cent. Adjustment for impaired social support or increased smoking did, however, not alter the relation. This indicates that part of the association was explained or mediated by work environment changes, but also that a considerable proportion remained unexplained by the factors measured. In a different study, Kivimäki, Vahtera, Pentti *et al.* (2001) found that decreased job control, high job insecurity and increased physical demands in combination appeared to be the linking mechanisms between downsizing and general health.

In a study of absenteeism and cardiovascular risk factors in relation to exposure to downsizing, Theorell *et al.* (2003) found that downsizing was associated with lowered medically certified sickness absence for women. This association was strongest for those who had high levels of risk factors, which suggests that sickness presenteeism could be a pathway between downsizing and severe future morbidity.

Several studies have focussed on the fairness of the downsizing process. Pepper *et al.* (2003), for instance, found that employees who felt that the process was fair and that communication was open and honest reported fewer medical symptoms and more job security than those who did not feel that the process was fair. In a Swedish hospital study, Hellgren and Sverke (2001) found that an active role played by unions in the downsizing process may have beneficial effects on the members' attitudes and well-being, but no evidence that fairness *per se* could moderate the consequences of downsizing. The fairness hypothesis has also received support in experimental studies, where 'layoff' was shown to affect the subjects more negatively in terms of performance if the procedure was based on merit evaluation rather than pure chance (Brockner *et al.* 1988), if the 'laid off' person was included in the subject's

scope of justice, and if there was a low level of caretaking (Brockner 1990).

As described above, Moore *et al.* (2004) found a relationship between repeated exposure to downsizing and health problems. Also Kalimo *et al.* (2003) found that repeated exposure increased psychological problems. This contradicts the hypothesis that people might become resilient from experience of repeated exposure and supports the idea that effects are accumulated over time.

Burke (2003) found that nurses who had left a downsizing hospital reported more job satisfaction, less absenteeism, less psychological burnout and better psychological well-being than those who remained in the downsized organisation. Similar results were found by Kivimäki *et al.* (2003), although only the differences between re-employed leavers and stayers/survivors of major downsizing were significant.

To summarise, there is strong evidence that downsizing tends to have negative effects on those who remain working in the downsized organisation. There is, however, no conclusive evidence regarding mediating mechanisms.

Reorganisation and health

Whereas downsizing can be defined relatively easily, for instance as reduction of number of personnel, reduction in working hours etc, it is much more difficult to operationalise what an organisational change is. Nevertheless, re-organisation appears to have been a major feature of working life during the 1990s.

Very few studies have been done on the health effects of organisational changes which are not accompanied by downsizing, layoffs or closures. Ferrie *et al.* (1998) studied health effects of organisational change in terms of transfer of executive functions of government to executive agencies in the United Kingdom. The authors compared civil servants who had been transferred, who were anticipating transfer, and who answered that no transfer was planned. Both exposed groups, i.e. those who had been transferred or were anticipating transfer, showed significantly deteriorated health status (measured in several ways) compared with unexposed 'controls'. This was not explained by health behaviour, since they tended to favour those in the exposed groups.

Anderzén and Arnetz (1999) found that employees relocating from Sweden to a foreign country on a work-related assignment experienced increased psychological stress as well as negative adjustment as reflected in increasing levels of prolactin and decreasing levels testosterone, worse mental well-being and worsening subjective work environment.

In a prospective study of health during a merger of two large, multinational companies, Väänänen *et al.* (2004) found that decline in job position and weak organisational support was associated with poor self-rated health after the merger. In a longitudinal study of a major re-organisation of a government department in Australia, Jimmieson *et al.* (2004) found a buffering effect of Time 1 self-efficacy on Time 2 job satisfaction.

Unemployment, re-employment, and health

That there is an association between unemployment and adverse health conditions has been known for a long time. In addition, unemployment (at least above a certain level) is also generally seen as having a damaging impact on society as a whole in a number of ways: economic, social, political and moral.

The association between unemployment and poor health can be explained either as a result of causation (unemployment causes ill-health) or of selection (people with poor health and/or belonging to a risk group for health problem are less likely to get a job and/or more likely to lose their job). There has been a vigorous debate between the proponents of causation versus health selection, but there is now ample evidence in the literature that *both* explanations are valid: unemployment tends to cause ill-health *and* there are health selection effects making people with poor health unemployed (Claussen 1999; Dooley *et al.* 1996; Janlert 1997; Hallsten 1997). The relation is, in fact, a vicious circle, where unemployment and health problems tend to maintain each other at the individual level.

There are several alternative or complimentary explanations for the health damaging effect of unemployment. Historically speaking, the most obvious link has been through outright (absolute, not relative) poverty resulting from unemployment, which in turn can easily lead to health problems through starvation, substandard housing etc.

The dominating research tradition in unemployment health research has, however, grown out of Jahoda's classical studies of unemployment in the Austrian village of Marienthal in the 1930s. Jahoda (1979) recognises the importance of material factors, but emphasises the *latent* functions of work, which unemployed are deprived of. According to Jahoda (ibid.), employment:-

- imposes a time structure on the waking day,
- implies regularly shared experiences and contacts with people outside the nuclear family,
- links an individual to goals and purposes which transcend his/her own,
- defines aspects of personal status and identity,
- enforces activity.

In Jahoda's view, employment is necessary in order to provide the individual with these beneficial latent functions. This view has been criticised, and Warr (1987) developed a new list of functions, or 'vitamins' based on Jahoda's: opportunity for control, opportunity for skill use, externally generated goals, variety, environmental clarity, availability of money, physical security, opportunity for interpersonal contact, and valued social position. According to Warr, these 'vitamins' are most readily available through a good job, but they can also be found through other sources, and may not be supplied by bad jobs. Another aspect, which warrants the term 'vitamins', is that high levels of vitamins are generally beneficial with the exception of some vitamins, which may become noxious in too high quantities. Variety is a 'vitamin' of the latter kind – a fair amount is good, but too much becomes confusing and stressful.

Both Jahoda's and Warr's models have been criticised because they do not adequately take into account what unemployment adds in terms of hardships (Fryer 2000), nor pay enough attention to the personal agency of the unemployed (Fryer 1986).

Relatively little research has been dedicated to the harmful effects of that which unemployment adds, rather than takes away from the individual. Of the hardships of unemployment, economic deprivation is probably the most frequently studied. Starrin and colleagues (1997) investigated the combined effects of economic hardship and shame (or more precisely, shaming environments) and found significant interaction effects on health outcome. Waters and Moore (2001) also found negative

effects of economic deprivation on psychological health, which was, however, moderated by solution-oriented coping.

Kieselbach (2003) has studied the risk of social exclusion among young unemployed people in a European perspective. Hammarström and colleagues have studied the health habits of young unemployed people, and found increased tobacco and cannabis smoking (Hammarström 1994; Hammarström & Janlert 2003) and, among men, increased alcohol consumption (ibid.) and sexual risk taking (Hammarström & Janlert 1997b). In a Japanese study, however, Matoba *et al.* (2003) concluded that the life style of a group of unemployed workers were maintained in a good condition, possibly due to their socio-cultural background in the Japanese community.

Being an unemployed job-seeker can in itself be a stressful situation (Frese & Mohr 1987; Fryer 2000). At least in a shorter time perspective, active job-seekers may experience greater mental strain than those who are more resigned (Amundsen & Borgen 1987; Leana & Feldman 1995; Vinokur & Kaplan 1986). This seems to be particularly the case for those who simultaneously experience low situational control (Wanberg 1997).

Unemployment is, however, not an unequivocally bad situation for all individuals. Already in the 1930s, the researchers in the Pilgrim Trust project stated that 'there are unemployed men who not only enjoy their leisure but have found in unemployment the opportunity to develop aspects of their personalities which during employment never had a chance' (*Men Without Work* 1938). In Sweden, Hammarström and Janlert (1997a) found that, although the majority of those exposed to unemployment suffer from it, there are those who are either unaffected or able to utilise the opportunities that freedom from (paid) work gives.

The experience of unemployment tends to conform to a general time sequence. Eisenberg and Lazarsfeld (1938) described the following stages: shock as a first reaction to unemployment; optimism while seeking a new job; pessimism when no new job is found; and finally fatalism and resignation. Also more recently, several studies have given support to a similar phase models of the impact of unemployment on mental health (Amundson & Borgen 1987; Brenner & Levi 1987; Hayes & Nutman 1981; Hepworth 1980; Joelsson & Wahlquist 1987; Warr & Jackson 1984). Arnetz *et al.* (1991) found marked effects during the anticipatory and early unemployment phase on mental well-being, serum cortisol, prolactin, total cholesterol, HDL, cholesterol and

phytohemagglutinin reactivity of lymphocytes. Most of the changes seemed to be of short duration, but some remained also during the second year of unemployment (elevated systolic blood pressure and total cholesterol, depressed HDL cholesterol, and higher GHQ mental strain compared with securely employed workers). Other studies did not find such relationships between length of unemployment and its effects (e.g. Archer & Rhodes 1987; Stokes & Cochrane 1984). Failure to find phases in unemployment could, however, partly be an effect of individual differences in reactions and different adaptation speed masking underlying trends.

The overall picture seems to be that the impact in the later phases of long-term unemployment are qualitatively different from those in the beginning. Over the long-term, individuals seem to either adapt, leading to a recovery in health, or resign, which is often followed by depression (Brenner & Levi 1987). The trend in the long run seems to be an improvement in self-rated health for most unemployed persons (Warr & Jackson 1987). On a group level, however, long-term unemployed tend to have higher prevalence of health problems (especially mental health problems), because of selection effects in re-employment (Claussen *et al.* 1993; Hallsten 1995; Hallsten 1997). People with pre-existing health problems have been shown to suffer most of unemployment in terms of further deteriorated health (Warr & Jackson 1995).

Re-employment is generally believed to be beneficial for the individual. In a longitudinal study of formerly long-term unemployed persons, for instance, Claussen (1999) found substantially reduced prevalence of mental illness among those who had been re-employed. Ginexi *et al.* (2000) found that re-employment predicted declined depressive symptoms, but not an increase in control beliefs. Initial control beliefs did, however, predict re-employment, which initial depression did not. Kessler *et al.* (1989) also reported decreased depressive symptoms after re-employment, but stated that 'it still may be that the unemployment experience had residual [negative] effects'. In a national prospective study in the United Kingdom, Pattani *et al.* (2004) found significantly improved quality of life on all subscales of the SF-36 inventory. However, in a study of health effects of employment status after job loss due to privatisation, also in the UK, Ferrie, Martikainen *et al.* (2001) found that insecure re-employment (as well as unemployment)

was associated with a relative increase in minor psychiatric morbidity and more primary care use.

There is a substantial literature on how people cope with unemployment, and of the health effects of different coping strategies (see Waters 2000 for a critical review). Researchers have used both established coping scales (e.g. Smári *et al.* 1997), and described new types based on qualitative research. Because of the different methods used, the terminology varies, but a consistent finding seems to be that avoidance and withdrawal tends to impair adaptation to unemployment and lead to mental health problems (e.g. Grossi 1999; Patton & Donohue 1998; Smári *et al.* 1997).

On the other hand, some kind of active re-focusing or re-framing seems to help in long-term unemployment. For instance, in a qualitative study of 36 unemployed Swedish women, Starrin and Larsson (1987) found the best quality of life in a group they had labelled 'the refocusers'. This group was characterised by a combination of an active relation to alternative activities and a low commitment to wage labour. Similar results are found in other studies (e.g. Jones 1989; Patton & Donohue 1998; Smári *et al.* 1997). In line with earlier research, Waters and Moore (2002) found that meaningful leisure activities could have a positive impact on mental health of unemployed people. In a somewhat larger longitudinal study, Warr and Jackson (1987) found that reduced commitment to employment and social contact predicted better health outcome.

The analysis of coping is, however, complicated by the fact that coping tends to be situational and not simply a stable trait (Waters 2000), and it has been shown that problem-focussed coping tends to be used more often in situation perceived as manageable, and emotion-focussed in situations which are difficult to control (Hamilton *et al.* 1993; Wanberg 1997).

Fryer and Fagan (1993) takes the argumentation one step further in an analysis influenced by Marxist theory, and state that coping among the unemployed should be seen as a proactive personal agency rather than a passive reaction. They have found the following types of active coping among unemployed persons:–

- *conventional coping*, e.g. reduction of spending to cope financially,
- *system playing*, active adaptation to the unemployment benefit system to maximise personal gain,

- *opportunistic coping*, to take opportunities of income, e.g. through temporary work or black market work,
- *entrepreneurial coping*, organising life as unemployed, e.g. by founding co-operatives together with other unemployed persons,
- *redistributive coping*, cheating with benefit rules, minor theft, etc.

Some of these strategies may involve behaviour which is usually regarded as destructive, immoral or criminal, but the point made by Fryer and Fagan (*ibid.*) is that such strategies may be constructive from the point of view of the unemployed.

In summary, while unemployment is negative for most individuals, and re-employment desirable and beneficial, there are ways to cope effectively with unemployment, which may include finding alternative lifestyles which do not include paid work.

Labour market programmes

As described in the Introduction, Swedish labour market policy has for a long time been characterised by an active approach, whose goal is work for all. This has led to prolific use of active labour market programmes (ALMPs), especially during the severe recession of the early and mid 1990s.

Evaluations of the effects of ALMPs generally focus on re-employment and macroeconomic effects rather than on health effects on the participants. This is understandable, given that re-employment is the main goal of the programmes. Improved health and other positive effects are, in turn, expected from re-employment, rather than from the programmes *per se*. However, since participation in ALMPs frequently does *not* lead to employment, but rather to re-qualification for unemployment benefit under the Swedish system, direct health effects should also be considered.

Studies of ALMPs are far more difficult to generalise than studies of, for instance, the health effects of unemployment. Each programme tends to be unique in its characteristics, and its effects are also likely to depend on numerous extrinsic factors, such as the contemporary local labour market and national rules for unemployment benefit. Furthermore, programme effectiveness is not only dependent on programme design, but also on the implementation process, which is often less than ideal. Probably to a large degree due to these obstacles, there are few scientific studies of the health effects ALMPs in the literature.

Vinokur *et al.* (2000) studied the outcome of a job-search workshop in the United States. Compared with controls, significantly more participants had been re-employed at two year follow up, and their mental health was better. However, it is uncertain if the improvement in mental health was an effect of the programme *per se* or of re-employment. Interestingly, there were interaction effects on mental health outcome between baseline mastery and job-search motivation on the one hand, and participation in the programme on the other.

In a study of a programme tailoring return-to-work plans for people with various disabilities in Finland, Juvonen-Posti *et al.* (2002) found that re-employment was much more common among the programme participants than among controls. For participants, GHQ-12 distress levels decreased significantly during the first 6 months. Though distress increased again at the end of the programme, it was still significantly lower than at the beginning. There was also an increase in perceived competence, but not in Sense of Coherence (SOC). This program thus seems to have had at least a temporary positive effect on mental health independent of re-employment.

A comprehensive Swedish study of an experimental intervention against the negative health effects of unemployment following a plant closure in the 1980s (Hjelm 1987) found no significant effects on physical or mental well-being, despite the fact that the participants judged that most of the activities had positive effects in terms of Jahoda's (1979) latent functions (Arnetz *et al.* 1988).

In a pilot study of the effects of two standard ALMPs in Sweden (ALU and relief work), Grossi and Lundberg (1996) found a decrease in anxiety and depression from beginning to end of the participation period, but no change in locus of control. In a similar study, Grossi and Nilsson (1998) found better health among participants at the end of a Work Experience Scheme (ALU) project compared to a reference group, but six months after finishing, psychological complaints had increased significantly among the former participants. There was also a slight shift from internal to external locus of control.

The studies which are discussed above seem to indicate that ALMP can have positive impact on health, at least temporarily. However, the evidence is far from conclusive, and we cannot even begin to speculate on what kinds of interventions are most effective in terms of health

improvement. The total picture is that there is a substantial need for further research on the health effects of ALMPs.

Labour market participation over the life course

Almost all research to date on the health effects of labour market exposure is either cross-sectional or relies on a single measure of exposure in a prospective design. The 'real' exposure, however, is not a singular event, but a process which develops over the life course.

For instance, Bosma and colleagues (1997) found that job control had a cumulative effect on CVD outcome. Also Landsbergis *et al.* (2003) found some support for the hypothesis of an effect of cumulative burden of exposure to job strain. In a female Swedish population, Wamala *et al.* (2001) found a graded, accumulated association between socioeconomic disadvantage (which is usually related to labour market position among adults) and coronary heart disease. Also in Britain, such a graded, linear relationship was found between accumulated socioeconomic position and health (Singh-Manoux *et al.* 2004).

Also change over time could affect health. For instance, in a case-referent study of myocardial infarctions, Theorell, Tsutsumi *et al.* (1998) found that decrease in inferred decision latitude was associated with increased risk among middle aged men.

Unemployment and precarious employment

As described earlier, lifelong employment in one company or organisation has become increasingly rare. Instead, many people have a 'chequered' working life career, which may include exposures to both good and bad work environments, to both low and high socioeconomic positions, and to both downsizing and rapid expansion. Periods of stable employment may alternate with insecure employment, education, labour market programme participation, and open unemployment. In addition, the work career can be cut short by disability pension or voluntary early retirement.

There are very few studies of health outcome which take these complexities of modern work careers into account. The main reasons are lack of longitudinal life-course data, and the methodological difficulties associated with studies of complex and mixed exposures.

Bartley and Plewis (2002) found that the number of times a man was enumerated as unemployed, or a member of the semi- and unskilled social classes, had a graded relationship to the risk of long-term illness. Power *et al.* (1998) found that health inequalities at age 33 could be explained by a number of factors, including unemployment and psychosocial work characteristics, which spanned from early life to young adulthood.

Disability pension and early retirement

Despite increasing life expectancy, people tend to retire earlier today than they did a few decades back. This is an international trend, which can be very clearly seen in Sweden.

There are several ways in which people can leave the workforce early. The two most common is through voluntary early retirement, and through disability pension. The latter is intended for people who are unable to work because of a chronic illness or disability, but has also been used to 'pension off' older unemployed and sick workers (either for humanitarian or administrative reasons). In addition, people can leave the workforce permanently through unemployment, or through a voluntary staff reduction scheme (where the employer pays older workers to resign).

Studies on early labour market exit (early LME) usually focus on factors, including health, which predict sickness absence, disability pension or early retirement (cf. Allebeck & Mastenkaasa 2004b). Few studies have examined the health effects of early LME, partly because it is commonly assumed that ill health is the cause, and not the effect of LME. However, there is evidence in the literature that (regular old age) retirement *per se* is a stressful life event, which can increase the risk of illness.

In a Danish population, Quaade *et al.* (2002) showed that people who took disability pension had a high relative mortality immediately after retirement, whilst the relative risk of premature mortality for those who took long-term unemployment pension increased with time since retirement. Comparisons of National Health Surveys in Norway, from 1985 and 1995, show that early retirement was associated with poor health at both time points (Dahl & Elstad 2001).

However, there is evidence that early retirement can have positive effects. In a study of British civil servants aged 54–59 years, mental

health functioning was found to have improved amongst the retirees whilst it deteriorated amongst those who continued working. No differences in physical health were discovered as both groups experienced a slight decline (Mein *et al.* 2003). American studies found that retirement was associated with increased participation in sports and exercise (Evenson *et al.* 2002), reduced anxiety, increased positive affect, and, conversely, reduced sense of control (Drentea 2002). Frese (1987) found that people who retired out of unemployment improved in depression in a similar way as those who found a job.

Methods

The papers in the present thesis use a combination of different methods, both quantitative and qualitative, to analyse the health effects of the changing labour market.

Papers I and II are intervention studies which use partly the same quantitative data material. The design was longitudinal – data was collected at the beginning, during, and end of participation in the programme, and at six-month follow-up, in total four measures per individual spanning one year. There was, however, no control or reference group due to practical constraints. Data were analysed with analysis of variance for repeated measures (repeated measures ANOVA) and analysis of covariance for repeated measures (repeated measures ANCOVA).

The intervention was also studied qualitatively, mainly as a formative evaluation. The outcome was further evaluated quantitatively in terms of satisfaction, labour market position at follow-up, and impact on public finances. These studies were partly used in the interpretation of the results presented in Papers I and II, but are not in themselves part of the thesis.

Paper III is based on a prospective, quantitative epidemiological study of risk factors for CVD. Baseline data were collected as part of the WOLF study and consist of physiological measurements and a self-completion questionnaire. In the study presented in Paper III, the material was re-examined with the help of a small qualitative study: Semi-open interviews were conducted with key persons. Based on these interviews, a classification was made of the companies in which the subjects in the WOLF study had worked at the time of baseline data collection.

The classification of the companies was then used to study differences in job strain and physiological risk factors at baseline. The design in Paper III is thus cross-sectional. Basic differences between the categories were examined with ANOVA, Kruskal-Wallis H and chi-square analyses. Since there were substantial differences in background variables (e.g. demographics) between employees in the different categories, it was necessary to control for confounders. The final analyses were thus made with multiple analyses of covariance (MANCOVA), and

results are given both as observed (raw) means and as estimated marginal means (which are based on linear correction for covariates).

Paper IV is based on a large, nationally representative epidemiological database with linked registry data for Swedish workers. The database contains comparable data for each year from 1987 through 1999. A few variables are not available for all of the years, and another few have different response categories during different periods. Census data (e.g. social class) is only available from 1990. Otherwise, the database is longitudinal.

The study presented in Paper IV uses the longitudinal database to create a prospective design, where exposure is measured cumulatively over six years (1991-1996) and outcome during a three-year period (1997-1999). Data were analysed with binary logistic regressions, controlling for age and social class, and in one model also for sex and labour market sector. In contrast to most studies using logistic regression analyses, we did not define any exposure categories, but entered exposure as a set of interval level parameters. This was done in order to account for the fact that people can have a very large number of different combinations of exposures over the years (the 15 most common combinations can be used to describe only little more than half the study population).

Paper V is a study based on the same database that was used in Paper IV, but adds self-rated data on health and occupational position from the biennial Swedish Work Environment Study (SWES). The design uses pooled cross-section samples of workers aged 55–63 years to study the association between labour market exit (LME) and hospital admission. Self-reported baseline data on work-related factors from the 1991, 1993, 1995 and 1997 SWES data collections respectively are used in the different sub-samples. Controlling for baseline data, we analyse the association between LME and hospital admission with binary logistic regressions, both for the sub-samples and the pooled dataset.

Health outcome measures

Health is a difficult concept to define and thus to operationalise in a way which is not controversial and open to criticism. A major issue is whether health should be seen as the opposite of disease/ill-health or as a partly independent concept including aspects such as well-being and resources to withstand threats to the organism. However, in practise, some ways to

conceptualise health have been common both in the scientific literature and in the public debate:–

- Lack of manifest disease,
- subjective well-being and health,
- resources in terms of relative lack of biological, psychosocial and behavioural risk factors and latent disease,
- working capacity as demonstrated by lack of sickness absence and work-related disability,
- health related autonomy, such as lack of disability in relation to activities of daily living (ADL).

From a public health perspective, health is often also measured in terms of longevity and prevalence of major diseases.

In the present thesis, health has been measured in several different ways, which cover all of the areas above except health related autonomy and longevity. Each measurement type is briefly presented below.

Self-rated health and quality of life

A common way to measure health and quality of life in scientific research is simply to ask people about their health, either in questionnaires or through interviews. An obvious advantage is that this is a quick, cheap and relatively non-invasive method. Another advantage is that self-ratings are able to capture aspects which are not easily measured 'objectively', e.g. sense of well-being, perceived symptoms, total life situation, and subjective quality of life.

The major problem with self-rated health is that it is biased by a number of subjective factors, such as individual expectations and different frames of reference, social desirability (a tendency to answer that which the subject believes that the researcher wants to hear), mood/negative affectivity (a generalised tendency to see things in a negative light) and other types of reporter bias (such as a tendency towards the middle or positive, left or right end of a scale). This problem is most pronounced if the goal is to measure a specific aspect of health. There may also be spurious associations if exposures are also measured with self-rated variables, especially in a cross-sectional design.

Not infrequently, however, the vagueness of self-rated measures can also be an advantage. This is most obvious in global ratings of health, which in many studies have been shown to be equally good or even better predictors of future health status than medical assessments,

probably partly because they tend to be the sum total of a lot of different aspects of health, some of which the researcher may not specifically have thought of.

The studies in the present thesis use both global, one item measures, validated scales of specific constructs, and symptom check lists.

In Studies I and II, a visual-analogue scale (VAS) was used to measure individual (or personal) control. The scale consists of a 100 millimetre long line, where the end points are marked with contrasting, fairly extreme alternative answers (Do you feel that it is you who run your own life? No, definitely not – Yes, most definitely). The subject marks his/her rating anywhere on the line at or between the endpoints, and answers are evaluated as millimetres from the left endpoint. The main advantages of this approach is that small nuances can be expressed in a fairly intuitive way which is not bound to specific steps. The disadvantage is that answers, especially mean values of answers, are difficult to interpret verbally (what, for instance, does a value of 67 mean, when 0 and 100 are defined as above?).

The first two papers also make use of several validated scales (in validated Swedish translations) of *anxiety* and *depression* (the Hospital Anxiety and Depression [HAD] scales; Zigmond & Snaith 1983), *hopelessness* (Beck's Hopelessness Scale; Beck, Weissman, Lester & Trexler 1974), *mastery* (Pearlin's Mastery scale; Pearlin, Menaghan, Lieberman & Mullan 1981), and *sense of coherence* (SOC; Antonovsky 1987). These scales were chosen because they are well-known and widely used in studies of non-clinical populations, such as the one we studied (participants in an activating labour market programme). The use of a scale compounded of several questions increases precision by diluting the influence of error variance. Results are also comparable with other studies, since the scales are standardised.

The rationale for analysing HAD was that unemployment research has shown that anxiety and depression are common during different phases of unemployment. Hopelessness and Mastery were used because there is reason to believe that they are related to how actively individuals cope, for instance by job seeking, and also because a successful intervention ideally should increase mastery and decrease hopelessness. SOC was used because the project evaluated in Studies I and II specifically aims to increase sense of coherence in Antonovsky's terms.

Study V uses a symptom check-list, from which indices of physical and psychosomatic symptoms were computed. Each item was first dichotomised: subjects who had never experienced the symptom during the last three months versus those who had. The number of experienced symptoms was then summed. The physical symptoms were neck ache, backache, aches in the shoulders or arms, aches in the hands, and aches in the wrists. The psychosomatic symptoms were upset stomach, feeling tired or restless, headache, and sore eyes.

An index of this kind is imprecise in the sense that it does not differentiate between different kinds of symptoms which have been added, nor does it take the frequency, severity or impact of the symptoms into account. It is, however, useful as a crude indicator of the total 'load' of symptoms. Furthermore, adding different kinds of symptoms from a checklist increases the proportion of 'cases' in the material, which makes it statistically possible to carry out more advanced analyses in a limited study population.

Physiological risk factors and health markers

Physiological measures have several advantages over self-rated ones. From the psychosocial health researcher's perspective, they are important because they help further the understanding of the pathways between psychosocial environment and physical health, because they can indicate bodily dysfunction which may or may not be diagnosed and perceived by the subject, and finally because biological measures can indicate biological risk and pathogen processes before and actual dysfunction occurs. From a societal perspective, they have the added benefit of generally being regarded as more trustworthy measures of health and risk than self-rated ones (Åkerstedt & Theorell 2002).

It can be useful to distinguish between measures, which are indicators of risk versus actual illness, although a sharp line cannot always be drawn. Serum cholesterol is an example of the former – it is known to indicate, and probably in itself poses, a risk for atherosclerosis. Unhealthy cholesterol levels are, however, seldom in themselves results of pathological processes, but rather of lifestyle factors and genetic disposition. High liver enzyme levels within the normal range may also indicate risk, such as threat to liver function posed by excessive alcohol consumption, but pathologically high levels indicate actual liver dysfunction.

All biological measures used in the studies included in the present thesis are used as markers of risk (threats to health), not to define cases in a clinical sense.

In Studies I and II, biological markers were selected mainly to reflect changes in metabolism which may occur as a result of excessive chronic stress. A healthy organism maintains a balance between energy mobilisation (in order both to meet environmental challenges and to effect changes in the environment) and re-generation. These opposing and complementary metabolic processes are called catabolism – destructive metabolic processes by which organisms convert substances into excreted compounds, often accompanied by the liberation of energy – and anabolism – synthesis of proteins and other components of the organism's chemical architecture.

In study III, biological measures were explicitly selected to measure the most prominent cardiovascular risk factors: hypertension, unhealthy blood lipids and fibrinogen.

Description of physiological parameters

The physiological parameters used in the studies are described below, and finally an attempt is made to relate them to each other in a physiological context.

DHEA (dehydroepiandrosterone, $C_{19}H_{28}O_2$) is a steroid hormone that is produced from cholesterol mainly by the adrenal cortex. In the chain of steroids, it is a precursor of sex hormones in both men and women (for instance testosterone and oestrogen). It has been assumed that it has an important function in anabolism (de la Torre 1994). *DHEA-s* (dehydroepiandrosterone sulphate) is the water-soluble form of the steroid and it is distributed in many tissues in the body. Low *DHEA-s* has been shown to co-vary with risk of cardiovascular mortality (Barrett-Connor & Goodman-Gruen 1995; Thijs, Fagard *et al.* 2003), especially in men, although the evidence is not consistent in all studies (Khaw 1996). Furthermore, *DHEA-s* concentrations have been shown to increase when psychosocial work conditions improve (Theorell 1993), and furthermore when elderly people experience improving psychosocial conditions (Arnetz & Theorell 1987).

Testosterone belongs to the same group of steroid hormones as *DHEA-s*, and is the principal and most potent androgenic hormone. Although at very different concentrations, it is present in both men and

women, and has been used as a general indicator of anabolism in psychosocial research (Åkerstedt & Theorell 2002). In longitudinal research, a psychosocial redesign programme was followed by rising testosterone concentrations both in men and women (Theorell *et al.* 1995), and spontaneous decrease in job strain and improved psychosocial working conditions have been associated with rising serum concentrations of testosterone (Theorell *et al.* 1990; Grossi 1999).

Prolactin is hormone secreted mainly by the pituitary gland. It is mainly known for its role in lactation (breast milk production) in women. During later years it has been shown that it is influenced by psychosocial processes that have nothing to do with pregnancy or lactation, both in men and women. For instance, animal research (Henry *et al.* 1977) has shown that when social chaos is created, those animals that have had a dominant position but become losers develop elevated blood concentrations of prolactin. Laboratory stress has in repeated studies been shown to induce heightened prolactin levels also in humans (Biondi & Picardi 1999). Longitudinal studies have indicated that particularly 'powerless' situations are coupled with increasing prolactin blood concentrations (Theorell 1992). However, decreased levels have also been associated with increased arousal and have been observed in patients with functional dyspepsia (Jonsson & Theorell 1999). The incidence of prolactinomas (pituitary tumours) could also be influenced by psychosocial factors (Sobrinho 1998). Accordingly, it is reasonable to argue that no clear distinction can be made between pathological and normal variations in relation to environmental factors.

The biological role of prolactin is not fully understood although it is known that it stimulates the immunological defence systems in particular (Berczi 1997), and some aspects of anabolism in general (Sobrinho 1998). It is of importance to blood pressure regulation (Theorell *et al.* 1993). It could be that prolactin has a phylogenetic role in protecting the organism in 'hopeless' situations, e.g. by increasing stress avoidance and grooming behaviour or reducing pain sensitivity (Drago *et al.* 1989). According to such reasoning, a high prolactin concentration during a 'hopeless' situation is part of a healthy and protective physiological reaction. Prolactin is also related to dopamine and serotonin activity in the brain. Changes in anti-depressive medication could therefore influence changes in prolactin concentrations (Seifritz *et al.* 1996).

Uric acid serum concentration has been used as an indicator of energy mobilisation. It is basically an end-product of catabolic processes. Thus, in a longitudinal study a rising urinary excretion of adrenaline has been associated with rising serum concentration of uric acid (Theorell *et al.* 1972) and during a long rehabilitation treatment a rising serum concentration of uric acid reflected a rising level of psychological engagement and catharsis (Theorell *et al.* 1998).

Immunoglobulin G (IgG) is a class of proteins with importance both to the immune system and to lipoprotein regulation. The variations in IgG concentrations are slow in relation to physiological processes. Low levels of IgG indicate a weak or exhausted immune defence, whereas elevated levels are found in patients with autoimmune disorders. In previous research IgG has been shown to increase during weeks of increasing job strain (Theorell *et al.*, 1993). On the other hand, low concentrations have been observed in subjects who are exposed to long-lasting adverse psychosocial conditions (Ursin 1994).

Serum lipids (*triglycerides*, *cholesterol* and *LDL/HDL* quotient) have been used as indicators of cardiovascular disease risk but also as mirrors of energy mobilisation. Triglycerides and cholesterol are fatlike substances that are used as sources of energy by the body in addition to carbohydrates. LDL (Low Density Lipoprotein) and HDL (High Density Lipoprotein) are lipoproteins, which transport cholesterol in the body: HDL to the liver for excretion in the bile, LDL from the liver to other tissues. All blood lipids have important functions for the metabolism in the body, but excessive amounts of triglycerides and cholesterol, as well as a large LDL/HDL quotient, have been shown to contribute to atherosclerosis (the narrowing of arteries by irregularly distributed lipid deposits, which ultimately leads to fibrosis and calcification).

Triglycerides are known to rise during depressive states (Theorell *et al.* 1972) and in general during arousal (Lundberg *et al.* 1989). Cholesterol has been shown to rise after the onset of unemployment particularly in individuals who have sleep disturbances (Mattiasson *et al.* 1990). The ratio between LDL and HDL cholesterol has been shown to be associated with effort-reward imbalance (Peter *et al.*, 1998).

Fibrinogen is a protein in the blood plasma that is converted into fibrin when the blood coagulates. A deficiency of fibrinogen increases the risk of serious bleeding, whereas excessive amounts can contribute to thrombosis (blood clots), and thus to myocardial infarction and stroke.

Fibrinogen has been shown to increase as an effect of stress, which can be understood phylogenetically as a way in which the organism prepares to deal with possible physical injury. When, however, stressors are of a more symbolic nature, as the psychosocial stress in modern working life, increased protection against bleeding has little meaning. Fibrinogen levels can therefore be used both as an indicator of stress, and as a direct measure of one of the most important risk factors for acute circulatory disease, thrombosis (Tsutsumi *et al.* 1999).

Elevated *blood pressure* has for a long time been known to be a risk factor for cardiovascular disease and stroke, and is routinely measured at health check-ups. There is also massive evidence showing that reduction of elevated blood pressure, both by lifestyle modification and pharmaceutical intervention, decreases the risk of disease. Systolic blood pressure (SBP) is the pressure measured during the contraction of the heart muscle, whereas diastolic blood pressure (DBP) is measured during the relaxation of the heart.

γ -GT (Gamma-GlutamylTransferase, also abbreviated GGT) and ALAT (Alpha Levuline Amino Transferase) are serum enzymes that are influenced by threats to the liver function. Long-lasting excessive alcohol consumption gives rise to elevated γ -GT concentration. ALAT is more sensitive to alcohol consumption and may show elevated serum concentrations already after one episode of heavy alcohol consumption. However, some medications, illnesses and chemical exposures may also influence these enzymes, such as large dosages of psychotropic medication, fatty liver caused by diabetes or advanced obesity and chemical solvents. Therefore it is important to collect information about these possible confounders. If there are significant changes in such exposures during the follow-up, subjects have to be excluded from analysis of liver enzymes.

ASAT (ASpartate AminoTransferase, also abbreviated AST or GOT) is an enzyme which is present in the liver and the heart muscle as well as in the cytoplasm and mitochondria of most cells. The serum concentration is elevated in liver damage as well as in acute myocardial infarction.

Body Mass Index (BMI) is the ratio between weight (in kilograms) and squared height (in metres). This ratio is often used as a measure of

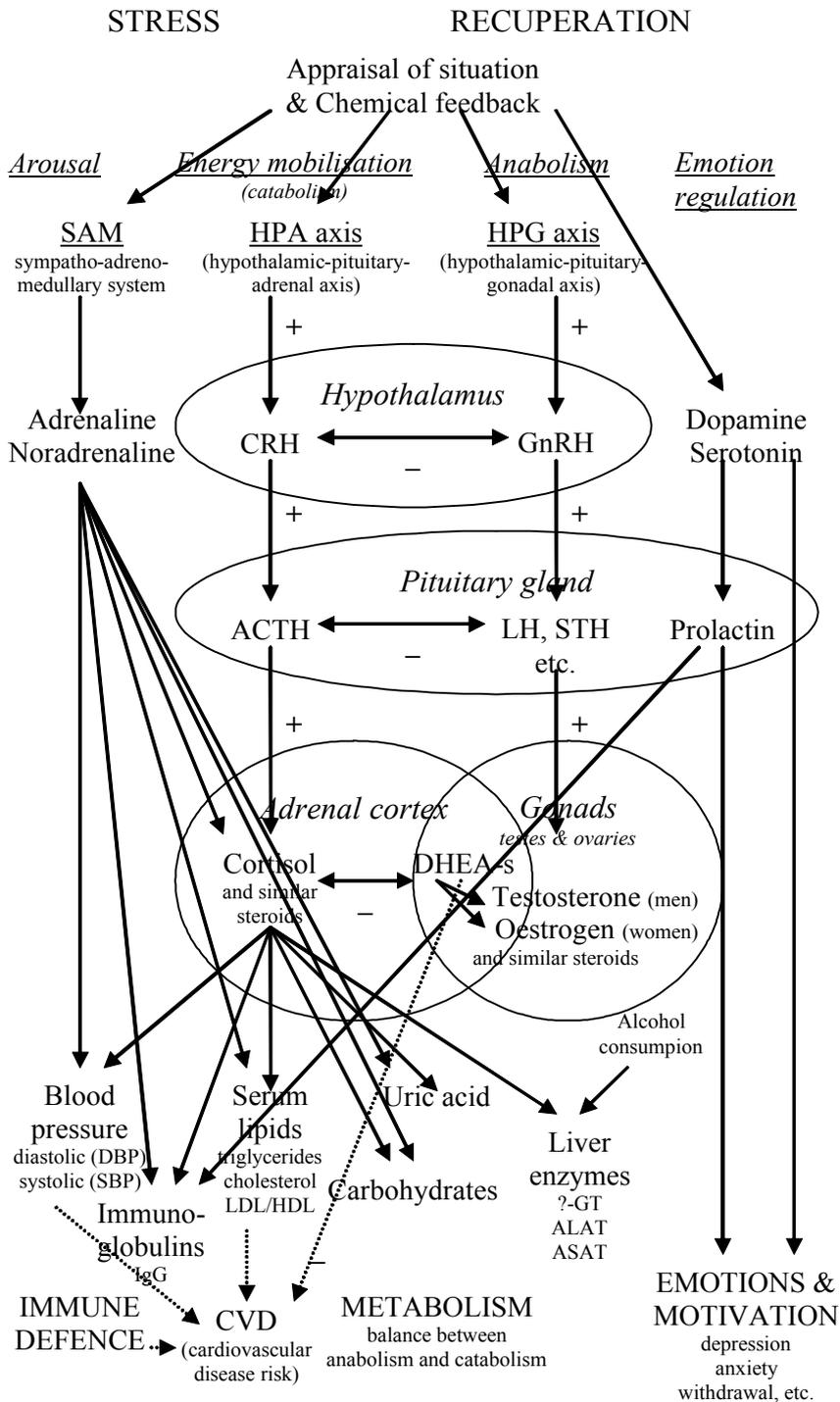


Figure 3. Relationship between stress, recuperation, and biological markers – from hypothalamus to periphery – with particular emphasis on variables studied in the present thesis.

relative body mass, for instance to define conditions of obesity and underweight. As is well known, obesity is an important risk factor for a number of illnesses, including CVD.

Relationship between physiological parameters

Figure 3 is an attempt to relate the physiological parameters which are used in this study to each other and to a physiological context. (It is thus *not* an attempt to present a complete psychophysiological model.) The (psychosocial) environment is appraised at different levels by the central nervous system (CNS). Depending on these appraisals, the organism is prepared for a likely response to the environment. At a very basic level, this readiness can be of two types: either to act on the environment, which may require heightened arousal, energy mobilisation and other physiological changes, or to rest and recuperate. In a healthy organism, there is a dynamic balance between mobilisation and recuperation, which is ascertained by various biological feedback systems.

The need for mobilisation and the opportunity to recuperate is signalled to the various systems in the body by the autonomic nervous system and by hormones circulating in the body fluids. Figure 3 shows some of the more important endocrinologic pathways.

The two central vertical axes in the figure symbolise the major metabolic regulation systems. Energy mobilisation and catabolism is achieved mainly through the hypothalamic-pituitary-adrenal (HPA) axis, whereas the hypothalamic-pituitary-gonadal (HPG) axis increases restorative, anabolic activity (which includes reproductive, i.e. sexual functions). As indicated by the names of the axes, both originate in the hypothalamus and act via the pituitary gland (hypophysis). The hypothalamus is directly connected with many other parts of the brain and its main function is to coordinate information related to the maintenance of homeostasis in the body. It regulates both the autonomic nervous system and the important parts of the endocrine system. The pituitary gland, although structurally part of the brain, is outside the blood-brain barrier. It thus receives information both from the hypothalamus and, as feedback, from hormones circulating in the blood. The pituitary gland, in turn, regulates the secretion of hormones from the adrenal cortex and the gonads.

The adrenal cortex, which is part of the HPA axis, produces cortisol and other similar steroids, which have a major role in energy

mobilisation and general physiological activation. Cortisol increases blood pressure, increases the availability of circulating energy sources (carbohydrates and blood lipids), and suppresses some immune reactions and inflammations. The action of cortisol can also be seen in liver enzymes and metabolites such as uric acid.

DHEA and its water-soluble form DHEA-s are mainly produced by the adrenal cortex as part of the HPG axis. DHEA has independent functions but is also in turn a precursor to the major sex hormones, testosterone and oestrogen.

There is a mutually inhibitory (and partially competing) function of the HPA and HPG axes at all levels described above. Anabolic processes thus tend to inhibit catabolic ones, and vice versa.

To the left of the HPA axis is a summary of the sympatho-adreno-medullary system. The major hormones in this system are adrenaline (epinephrine) and noradrenaline (norepinephrine), two catecholamines which are secreted by the adrenal medulla (mainly adrenaline) and by sympathetic neurones (noradrenaline). These hormones have an arousing effect on the body; they enhance several of the cortisol effects.

On the right hand side in Figure X is a simplified representation of the emotion regulation system. Dopamine and serotonin are both signal substances of the CNS and hormones circulating in peripheral tissues of the body. High levels of free dopamine and serotonin are associated with positive mood, whereas low levels are related to anxiety, depression and withdrawal. There is also a negative association between the levels of these amines in the brain and the prolactin concentrations in blood. Prolactin in turn tends to stimulate the immune system and elicit withdrawal behaviour.

As indicated by the dotted arrows, finally, several of the biological markers used in the study are related to risk of CVD.

Measurement and analysis of physiological parameters

Physiological parameters tend to be sensitive to how and when they are measured, which may complicate the interpretation of physiological data for instance in psychosocial research.

Many physiological functions are cyclical, and may depend on several 'biological clocks'. A diurnal (day and night) rhythm is apparent in many functions, especially related to arousal and energy mobilisation. Cortisol, for instance, peaks in the early morning hours, and contributes

to awakening and to increased blood pressure during the late morning. It is therefore important that measures are taken at the same time of day (or in the same phase of the sleep-wakefulness cycle). Because of this, blood samples were drawn and blood pressure taken between 8 and 11 a.m. in Studies I and II. Subjects were not fasting, and did not rest before the tests. Two measurements of blood pressure (sitting position) were made with a 10 minute intermission. Average values were used in the analyses. In Study III, clinical examinations were made in the morning after a 9 hour fast. Blood pressure was taken on the right arm after five minutes rest in the supine position.

In women, hormones tend to vary also with the menstrual cycle. Information about menstrual cycle was collected, but due to a relatively small sample size it could not be used in the statistical analyses. The variables that were studied, however, are not very sensitive to this source of error.

Finally, there are important variations related to seasonal changes, especially in countries like Sweden, which are far from the equator and are subjects to very pronounced variations between Summer and Winter. Daylight is of special importance for this regulation. The impact of seasonal changes was, however, diminished because recruitment to the studies were distributed across the year in an essentially random pattern.

There are also important differences between women and men, especially in sex hormones. In Study II we therefore decided only to retain women, who were in the majority, in the analyses.

All chemical analyses were carried out at certified laboratories and with standard analysis methods.

Interpretation of physiological data

Physiological data are relatively objective but often difficult to interpret in psychosocial, psychological and ecological terms. A deviation from normal levels can often be explained by a number of conditions and factors, and physiological systems are also interrelated in complex ways, as described below. Physiological data must therefore be interpreted with caution. In the studies used in this thesis, we have examined the pattern of several physiological measures to obtain a more complete picture, and related the findings also to self-rated and qualitative data. Through this kind of triangulation the risks of major misinterpretations of the data are reduced significantly.

In Paper II we went one step further and created two indices which roughly measure anabolic and catabolic processes respectively. This approach is similar to that used by Seeman *et al.* (2001) to measure allostatic load. The anabolic index was created by summing the Z-scores for testosterone and DHEA-s, and the catabolic index by summing the Z-scores for Prolactin, α -GT, ASAT, ALAT and BMI.

Sickness absenteeism and disability pension

Sickness absence and – in chronic cases – disability pension, are some of the most important societal effects of ill health. The total cost of sickness benefits and loss of productivity has a major impact on the public economy (Alexandersson & Hensing 2004). Also for the individual concerned, absence from work has a major impact, which can be both detrimental and beneficial.

Although highly related to illness, however, sickness absence is not equivalent with disease or ill health. From a legal point of view, sickness absence (at least in Sweden) cannot normally be motivated solely by a medical condition. Only when the illness severely impairs the individual's ability to do his/her job, when working would exacerbate or prolong the sickness episode, or when protection of others requires absence (e.g. to prevent spread of infectious diseases), is sickness absence allowed. In practice, however, other concerns may also influence decisions to take or certify sick leave. Thus, people may go to work even when their working capacity is severely restricted by illness (sickness presenteeism), or they may take sick leave for relatively minor complaints. The structure of the benefit system has been shown to have a significant impact on sickness absence behaviour. Other factors, such as work motivation, psychosocial working conditions, cooperation in the workplace, and absence culture are likely to influence the chances that an employer takes sickness absence given a certain condition (Kivimäki, Sutinen *et al.* 2001; Allebeck & Mastekaasa 2004a).

Despite the reservations discussed above, sickness absence has been shown to be useful as a proxy measure for global health. In a population of 10,008 British civil servants (Whitehall II), Marmot and colleagues (1995) found that different measures of baseline health were associated with sickness absence. In general, the longer the duration of absence, the more strongly did baseline health predict rates of absence. Kivimäki, Head *et al.* (2003) found the number of medically certified sickness

absences to be a strong predictor of all cause mortality for both men and women in the same population. In that study, sickness absence appeared to be a better measure of global health than self-reported health indicators. A small amount of short, self-certified absences might, however, be protective and the authors argue that it could represent a healthy coping behaviour. In a similar study, Vahtera, Pentti and Kivimäki (2004) found that long terms sickness absence predicted mortality also in Finnish municipal employees. The protective effect of short spells were not confirmed in this study.

A particular advantage of sickness absence over most other indicators of health is that the measurement itself is completely objective. A person is either present at, or absent from, work. Since employer, employee and insurance bodies all have financial stakes in the matter, registration of presence and absence is also likely to be made as reliable as possible. In Sweden, however, as is likely the case in most countries, these data are not always readily available to the researcher and epidemiologist.

The first days of an absence are counted as an 'employer entrance period', when the sickness benefit is paid by the employer and not the public insurance system. Absences that do not exceed this period – the length of which has varied from 1 to 29 days in the last two decades – are only recorded at the workplace or employer level, and are thus not available in public registers. Getting access to data on short spells of sickness absence is therefore generally restricted to one or a limited number of larger companies, and even that can be cumbersome because of differing registration methods and because the information is classified.

Longer spells of sickness absence, i.e. those exceeding the employer entrance period, are registered in national databases, and can be readily linked to other data through the social security number, which is unique for each individual living in the country. Nationally registered sickness absence is roughly equivalent of medically certified sick leave, since self-certified sick leave is possible for a period of up to one week.

Disability pension, which has been described above, is always recorded in national registers, why data are highly reliable.

In Study IV, we defined long-term sickness absence during a three year period as a total absence from work due to sickness equalling or exceeding 90 days. Since disability pension is almost always preceded by

a long period of sickness absence, all individuals who had received disability pension were regarded as cases. For all others, the total number of days was computed by adding the statutory number of days paid by the employer each year to the number of days of absence recorded in the national database.

This yields a correct number of days for individuals who have had one longer and no shorter spells of sickness absence each of the three years. Short spells of sickness absence, and repeated longer absences during a particular year, will, however, lead to an under-estimation of the true number of days off work. One or more years with no sickness absence will lead to an over-estimation of absence. The cut-off at 90 reduces these problems: Individuals regarded as cases had had either one absence of 33 days (including employer entrance period) or longer, or several of at least 15 days each – and normally more than that, since this minimum requires that all absence was during the last year with the shortest employer entrance period. Individuals regarded as non-cases could have had at the very most one spell of 47 days or several shorter ones. Thus, all cases had truly had at least moderately long absences, and all non-cases were free of long absences, although there could be some misclassification of cases with medium-long absences.

Mortality in registry data

Many of the most severe illnesses, e.g. cancer and severe cardiovascular diseases, have death as the final endpoint, unless a sufficient treatment can be effected. Several other diseases tend to decrease the individual's life expectancy, despite not being an acute cause of death. Mortality is thus an indicator of poor health. Furthermore, a long life might indicate physical resilience, which is an aspect of health according to some definitions. Finally, longevity is seen as desirable by most people, and thus in itself an aspect of health.

The advantages of using mortality data are that the official records are highly reliable for all individuals living in the country, and that the outcome itself is unequivocal – a person is either dead or alive, a fact which is easily ascertained. The disadvantage from the researcher's point of view is that death has a relatively low incidence rate among working age populations, why very large sample sizes or very long follow-up periods are needed in order to get enough cases for reliable statistical

analyses. Mortality has therefore not been used as an outcome in any of the studies in the thesis.

Morbidity in registry data

There are no national registers of illness *per se* in Sweden, and it is highly unlikely that anything like that exists anywhere in the world. Subclinical illnesses are often not even diagnosed, and when they are, usually only noted in the patient record at the clinic where the diagnosis was made. Manifest illnesses are only recorded if and when they are brought to a health practitioner's attention, and then also usually only in the local patient record. The only exception is cancer, which always has to be reported to the National Cancer Registry when diagnosed.

Apart from the National Cancer Registry, and indirectly the national sickness insurance registry mentioned above (where diagnoses are not recorded), there are only two ways in which morbidity data enter national registries: When patients visit a doctor or other health practitioner at a public polyclinic, or when a patient is admitted to (or operated at) a public hospital.

Both validity and reliability are highly questionable for outpatient morbidity data. Only visits to public clinics are recorded, which excludes the large number of cases which are treated by private practitioners and in occupational health care centres. Coding practices vary over time, between regions and between individuals. Errors are allegedly common, and practitioners may even misclassify consciously, for instance to guard the patient's privacy when the true diagnosis could somehow have negative consequences for the individual. A psychiatric or sexual complaint could thus be labelled as lumbago or some other harmless diagnosis, leading to systematic errors. Finally, as mentioned above, small complaints could be diagnosed while major illnesses go undetected, for a number of reasons. Outpatient data have therefore not been used in the present thesis.

Hospitalisation data are much more reliable and valid. Almost all hospital treatments in the country are carried out in public hospitals, and are thus recorded in public registries. In contrast to outpatient treatment, hospital treatment is only available for rather severe medical conditions, and generally only after a reliable diagnosis has been made. People who have been hospitalised are thus highly likely to have had a significant disease, and the diagnoses recorded are usually at least within the right

disease category (especially since hospitals are divided in specialist clinics).

In addition, people eligible for hospital treatment are usually sufficiently ill that they end up in hospital. True cases are thus unlikely to be misclassified as non-cases in hospitalisation data, as long as the illness occurred within the country.

Study IV uses hospitalisation data restricted to diagnoses in the four chapters of ICD-10 which are most likely to be affected by psychosocial conditions: circulatory diseases (I00-I99), musculoskeletal diseases (M00-M99), gastrointestinal diseases (K00-K93), and psychiatric diseases (F00-F99). This diagnosis restriction decreases the error variance in the statistical analyses. Since the number of hospital admissions during the follow-up period was relatively small, data were dichotomised into cases (people with one or more admissions for the above diagnoses) and non-cases (people with no admissions for those diagnoses). Data on the number of admissions would have added very little information, while making the statistical analyses more complicated.

Study V uses dichotomous all-cause hospitalisation both as outcome and as indicator of health prior to change in labour market position. In this case, all-cause hospitalisation was preferred since restriction to the above mentioned diagnostic categories would have yielded too few cases to analyse in the sample, which was restricted to older workers. It can also be argued that all-cause hospitalisation is a better indicator of general health (used at baseline) than hospitalisation for specified diagnoses.

Summary of studies and papers

Below is a short presentation of the five papers included in the thesis. Since the papers can be said to form three groups with different focus, each of these groups of papers is given a background description. In the introduction to the first two papers, there is also a brief description of the intervention studied in those papers.

Labour market programmes and health

The first two papers focus on an experimental active labour market programme (UfE, 'Use for Everyone' or 'Det finns bruk för alla' in Swedish) with pronounced empowerment and (public) health goals. The basic idea of this programme was to mobilise unemployed, people on long-term sickness absence or otherwise outside the active labour force (Westerlund 2000, Westerlund & Bergström 1997, Westerlund & Bergström 1998).

In a first step, a number of persons selectively chosen from the target groups were given a broad introductory course in order to function as "process leaders" or facilitators in the programme. This ten-week course was to a large degree based on scientific theories of health, e.g. Antonovsky's (1987) concept of salutogenesis; healthy work, e.g. the Demand-Control Model (Karasek & Theorell, 1990); and unemployment, e.g. Jahoda's (1979) latent functions. This was combined with more practical parts about, for instance, leadership, social economy and management of small-sized non-profit co-operatives. The course also had a strong ideological message emphasising the equality of all people as well as of all kinds of jobs, where work was presented as a human right rather than an obligation.

In the second step, the process leaders were encouraged to recruit people on unemployment benefit, sickness benefit and social welfare to form working groups around activities which were expected to be beneficial to society without creating undue competition with private companies. Activities varied from recycling and hand-weaving to social work in schools and among elderly. The main objective, however, was not production but mental and physical health gains for the participants themselves. Much emphasis was placed on the participants' own

preferences about what to do and how to carry it out – choice of activity was at least nominally free and the groups were expected to be democratic and create both collective and individual empowerment. The working groups thus turned out very heterogeneous, and the ideals were realised to a widely varying degree. It was therefore possible to divide the activities into more and less well-functioning ones based on qualitative assessments.

The original plan was to let participants remain in the programme for as long as they choose – in line with the idea of work as a human right – thus establishing a kind of alternative labour market. In reality, rules and regulations pertaining to unemployment benefit restricted participation to six months, although with an option to return after about a year of open unemployment. Participants with sickness benefit, however, often could stay longer.

Paper I

Paper I (Westerlund, Theorell & Bergström followed 21 participants in UfE during six months of participation plus a six months follow-up period. Both biological markers and self-rated health were measured at three points in time. The hypothesis was that participation would improve health generally and result in a shift from catabolic to anabolic processes in the body. Although there was a tendency towards an improvement in one of the self-rated scales, the overall result falsified the hypothesis. Prolactin rose significantly ($p=0.0015$) during participation and remained at an elevated level at six-month follow-up. DHEA-s showed a steady and significant decrease over the study period ($p=0.019$). There were also tendencies towards increased diastolic blood pressure ($p=0.072$), γ -GT ($p=0.10$) and ALAT ($p=0.092$) concentrations at follow-up. A possible interpretation of the findings is that the effects of continuing unemployment/sickness absence override any positive effects the programme might have had.

The authors speculate that the rise in prolactin could be part of a protective adaptation to long-term unemployment similar to the cocooning tendencies in maternal behaviour. Specifically, they argue that this could protect against the stress of being in an uncontrollable and 'helpless' situation by facilitating a re-focusing on more private matters as opposed to 'hopeless' job seeking. While being potentially detrimental

for people with fair chances on the labour market, it is possible that such an adaptation may be helpful for weaker groups.

Paper II

Paper II (Westerlund, Bergström & Theorell 2004) expanded on Study I and followed 32 female participants in UfE over one year, including a six month post participation period. The hypothesis was that a shift from catabolic to anabolic processes would be seen in 'better' activities (as deemed by a panel of judges) in the programme but not in 'worse' ones. The physiological parameters were summarised in two indices, one connected with anabolism (made up of testosterone and DHEA-s) and one with catabolism (prolactin, γ -glutamyl transferase, aspartate amino transferase, a levuline amino transferase, and body mass index). In addition, self-rated anxiety, depression, hopelessness and personal control were analysed.

The results indicated that the effect of 'better' activities within the programme was a temporary increase in anabolism, possibly indicating effects of health promotion, and the effect of 'worse' activities, on the one hand, a temporary decrease in the catabolic index, probably reflecting repressed alcohol consumption, and, on the other hand, impaired anabolism. There was also a general but transient decrease in depressiveness measured by the Hospital Anxiety and Depression Scale. The results of both this and the previous study seem to imply that it is difficult to achieve lasting effects through a relatively short participation in a mobilising labour market programme.

Organisational changes and health

The second pair of studies focused on those persons who stay in work after downsizing, re-organisation or rapid personnel expansion. Together, studies III and IV confirm earlier findings by other researchers that personnel downsizing predicts negative health outcome, but add that other types of major organisational change, including prolonged and rapid personnel expansion, can have similar adverse effects.

Paper III

Study III (Westerlund, Theorell & Alfredsson 2004) used self-rated data on job strain and biological markers of cardiovascular risk in 3,904 white-

collar employees from an epidemiological study of work environment, lipids and fibrinogen (the WOLF Stockholm study). The initial aim was to study health effects of lean production and Japanese production management, but qualitative interviews with personnel managers and labour union representatives suggested that another classification of the companies/work organisations in the study would be more reflective of actual differences. The companies formed five categories: Stable, Changing/Growing, Threatened Private, Questioned Public, plus Small Firms. Categories were compared regarding job strain, blood pressure, serum cholesterol, triglycerides, and fibrinogen among employees.

In comparison with the Stable group, employees in Changing/Growing companies had higher job strain ($p < 0.001$). In the Threatened Private group, job strain ($p < 0.001$), cholesterol ($p < 0.05$) and triglycerides ($p < 0.05$) were elevated. The Questioned Public group had higher cholesterol ($p < 0.01$), triglycerides ($p < 0.01$) and fibrinogen ($p < 0.05$). In Small Firms, job strain ($p < 0.001$), cholesterol ($p < 0.001$), triglycerides ($p < 0.001$) and fibrinogen ($p < 0.001$) were elevated. With the exception of lower systolic blood pressure ($p < 0.05$) in the Changing/Growing category, there were no significant differences in blood pressure between the groups. The results indicate that several kinds of 'organisational instability', not only downsizing, might have adverse health effects.

Paper IV

Study IV (Westerlund, Ferrie *et al.* 2004) took the ideas from the earlier study and looked at health outcome for people who had been exposed to various degrees of personnel downsizing and expansion in a nationally representative sample of 24,036 workers. The number of years of exposure to large (>18%) and moderate (between 8 and 18 %) downsizing and expansion respectively during 1991–1996 was related to incidence of long-term sickness absence and hospital admission for specified diagnoses during 1997–1999. Accumulated exposure to large expansion (=18% per year) was related to an increased risk of long-term sickness absence (OR=1.07 [1.01–1.13], $p=0.013$) as well as hospital admission (OR=1.09 [1.02–1.16], $p=0.017$). OR in this context signifies the change in odds for each additional year of exposure, varying from 0 to 6. Moderate expansion was associated with a decreased risk of hospitalisation (OR=0.91 [0.84–0.98], $p=0.012$). Moderate downsizing was associated with an increased risk of sickness absence (OR=1.07 [1.02–

1.12], $p=0.003$). The strongest association between large expansion and sickness absence was found among women in the public sector (OR=1.18 [1.08–1.30], $p=0.0002$), corresponding to an odds ratio of 2.77 [1.62–4.74] between full exposure (all six years) and no exposure.

This study confirms earlier findings that downsizing is associated with health risks. In addition, it shows that repeated exposure to rapid personnel expansion, possibly connected with centralisation of functions, statistically predicts long-term sickness absence and hospital admission.

Labour market participation and health

The final study of the thesis provides a bridge between unemployment research and research on the health effects of work.

Paper V

Study V (Hyde *et al.* 2004) examined the relative effects of different labour market exits (LMEs) on the risk of hospitalisation compared to those who stay in employment using a nationally representative sample of 7,024 Swedish workers aged 55–63 years. The hypothesis was that, compared to a working population, those who are made unemployed or take a disability pension will have a greater risk of hospitalisation, while those who take voluntary early retirement will have a reduced risk. Controlling for previous hospitalisation, sex, age, social class and health at work, the results showed an increased risk of hospital admission following LME for the unemployed. There was also a tendency that those who took disability pension had a reduced risk. These findings confirm the commonly found result that unemployment has negative health effects, but in addition they indicate that withdrawal from bad jobs and/or for persons with pre-existent health problems might have a protective effect on health.

Discussion

The thesis demonstrates that structural changes in the labour market, as exemplified by the major changes that took place in Sweden in the early 1990s, can have a significant and differentiated impact on public health, and that the negative health effects are not necessarily easy to counteract by labour market programmes.

Methodological considerations

General methodological considerations have already been discussed above in the *Methods* section. Specific considerations which influence the interpretation of the findings in the different studies are discussed in the *Interpretation of findings* section below. Other specific considerations regarding the studies are brought up in the papers, which are reprinted in the thesis, and need not be repeated here. Instead, this section focuses on the five papers together in relation to the aims of the thesis.

The overall aim, to study the health consequences of the changing labour market of the 1990s in Sweden, is very broad. To give an exhaustive answer to the question of how the changes affected health is of course impossible, why the ambition must be much more modest: to elucidate *some* health consequences of *some* aspects of the changing labour market.

The thesis uses a number of different methods in three different contexts (a labour market programme, organisational changes, and labour market exit) to achieve this more modest goal. In principle, this combination of methods and contexts should give a more complete picture of the health consequences than a more limited approach could, since several types of exposure are studied. It should also give a more reliable (and possibly also valid) picture, since the different approaches can be used in triangulation. If the same result is found in different ways and in different materials, that result will be more credible.

The use of both self-rated job strain and physiological risk markers in Paper III is an example of how two approaches mutually strengthen each other, and result in more credible conclusions. The qualitative studies of UfE, which are not in themselves included in the thesis but used as a

background when interpreting the quantitative data in Papers I and II, also increase the probability that the conclusions are valid.

However, while the different contexts undoubtedly provide the thesis with a broader perspective, they also dilute the possibilities of triangulation. It can, for instance, hardly be assumed that labour market programmes and organisational changes of workplaces affect health in the same way or even through the same mechanisms. Nor is it reasonable to assume that active labour market programme participation simply acts through a reversal or mirror-image of the mechanisms relating unemployment to health. In fact, Paper V illustrates a similar phenomenon, that labour market exit is not simply the antithesis of continued work.

Another important question is to what extent the results can be generalised. Papers I and II concern a very special, experimental intervention, why the overall results clearly cannot be extrapolated to ALMPs in general. However, it can be argued that the ambitious and experimental nature of the intervention gives an opportunity to test the 'ideal' or 'maximum' potential of such interventions. If the implementation goes well, a comprehensive intervention should achieve more, not less, than a standard programme. Unfortunately, the intervention in question was hampered by implementation difficulties, which make generalisations less viable. Still, since the limitations of the implementation process have been studied extensively, and since the programme did have positive effects on at least some groups, it is to some extent possible to generalise some of the findings.

Another aspect of Papers I and II is that they are based on small samples and lack control groups. This greatly limits the possibilities to use more advanced statistical methods, which could control for confounding factors and make the results easier to generalise. However, the longitudinal nature of the data to some extent compensates for small sample size.

The limitations of the quantitative analyses of UfE in Papers I and II are also to some extent mitigated by the existence of complimentary qualitative and quantitative evaluations of the same programme. Taken together, all these studies provide a certain depth of understanding of the programme, which provides a basis for an understanding also of more general principles which are likely to be relevant also in other ALMPs.

Paper III uses a cross-sectional approach, which makes it impossible to empirically study causation. However, it is highly unlikely that job strain and physiological risk factors among employees should *cause* organisational changes. The obverse, that organisational changes affect work environment and health, is far more plausible. Unfortunately, it cannot be ruled out that the systematic differences between categories are due to confounding factors. To some extent, the influence of confounders is reduced through statistical procedures. However, the latter takes care only of linear effects of known and measured confounders. Since each category in the study is comprised only of a small number of companies, and since the companies in each category tend to belong to the same sector of the labour market, it is likely that substantial, systematic differences remain. The results must thus be interpreted with caution.

Papers IV and V use mainly registry based data in a nationally representative sample, from which relevant sub-samples were drawn. The relatively objective nature of the studied parameters and the nationally representative nature of the data greatly facilitate generalisations. Furthermore, the relatively large numbers of individuals in the studies make it possible both to control for confounders and to analyse more complex relationships, e.g. the effect of accumulation of exposures in Paper IV. Finally, the prospective nature of the data makes causal interpretations more likely, although in no way certain.

When sub-samples, for technical reasons, are drawn, there is cost in terms of generalisability. However, although it may not be possible to generalise from the sub-samples to the entire working population in Sweden, generalisability to the *relevant* total population might actually increase: Study IV concerns the survivors of downsizing and expansion, Study V concerns older workers.

Common to all papers in the thesis are the question of whether the results can be generalised to another time period than the 1990s and to another country than Sweden. All such temporal and geographical generalisations must be made with great caution. Cultural, legal, financial, demographic and a number of other factors might differ and invalidate the conclusions in another context. However, from psychological and physiological perspectives, human beings are very similar across time and across countries. Thus, the basic mechanisms through which the psychosocial environment affects health are likely to

be the same. Because of this, the results should at least be possible to use as a basis for the formation of hypotheses and 'educated guesses' also in other contexts.

Paper II is restricted to women and Paper III to white-collar workers. This makes it more difficult to generalise to men and blue-collar workers respectively. Certain biological mechanisms are profoundly different in men and women, and the work environments of blue- and white-collar workers are systematically different. However, it seems unlikely that men and women react profoundly different to participation in an ALMP, and that people in different socio-economic positions are affected in fundamentally different ways by organisational instability.

The generalisability of the findings is also dependent on the interpretation on the parameters that are measured in the studies. The difficulties in interpreting physiological, self-rated and registry data respectively have already been discussed in the *Methods* section, and need not be reiterated here. However, this problem is common to all empirical studies of psychosocial factors and health, and not a special weakness in the present thesis.

Finally, it should be pointed out that the multidisciplinary nature of the thesis poses a distinct problem: It is simply not possible for one person to have specialist knowledge in all the methods and research fields, which are brought together in the thesis. This increases the risk of errors, both in the execution and interpretation of the studies, and might also lead to superficiality. However, since life is 'multidisciplinary' and not constricted by the division of scientific disciplines, such an approach is likely to lead to results that are more ecologically valid.

Ethics

All studies included in the thesis have been approved by research ethics committees. Although this should minimise the risk of serious transgressions of international ethical standards, it does not mean that the studies are completely free of ethical dilemmas.

Papers I and II are based on an intervention study. All interventions might lead to undesirable results and have negative effects for the participants (and potentially also for others). The intervention in question, UfE, was nominally a voluntary opportunity for unemployed and sick-listed people to be active and productive in a supposedly supportive social environment. In reality, however, many participants

were virtually forced to participate, since there were few alternatives for those who needed to re-qualify for unemployment benefit. Another aspect is that rules pertaining to the unemployment benefit system also forced participants to *leave* the project after six months, which was contrary to what the participants had first been promised. There were indications in the evaluation of the programme that this led to decreased psychological well-being at the end of the participation period. Overall, however, the evaluation indicates that the intervention was of a benign nature and that a large majority of the participants was satisfied. Furthermore, the intervention was not implemented primarily to serve as a basis for research, but to provide meaningful activity to people who are likely to need it. To do nothing would arguably have been far more unethical.

There are also ethical considerations specific to the scientific studies of UfE. People were asked repeatedly to fill out questionnaires, which contained rather sensitive questions. In addition, blood samples were drawn and blood pressure measured. The major problem is that these procedures could pose a threat to personal integrity. A combination of informed consent, rigorous security procedures, de-identified data analysis and data reporting, and the opportunity for the subjects to leave the study at any time should reduce these problems significantly. There was also a very slight risk that subjects could have been harmed by the measurement procedures themselves (physically by blood tests and psychologically by the questionnaires), but there were no indications that this actually happened. Taken together, the ethical problems are hopefully outweighed by the scientific value of the studies.

Papers III–V are based on registry data in combination (Paper III and V) with self-rated data which had already been collected. The latter poses an ethical problem in itself, since the subjects were not fully aware of what the material would be used for when they consented. However, data were used for purposes which were not very different from the original ones, which the subjects had approved of.

Registry studies, where data from many different public registries are combined, can be controversial. People generally do not like the idea that their lives can be ‘chartered’ in detail, and studies of this nature can draw the public attention to these unpleasant aspects of public registers. However, the risks of abuse are already there in the registers and their common key, the unique social security number. No actual risks were

added by the creation of the database used in the studies, or by the studies themselves. All data are de-identified and results cannot be traced to individuals.

Although there are ethical issues about Papers III–V, they are thus likely to be rather minor.

Interpretation of findings

The interpretations of the findings in the different studies are discussed in detail in the five papers included in the thesis. All details need not be repeated here. Instead, this section aims to provide a synthesis of the findings for the general reader.

Labour market programmes and health

Active labour market programmes (ALMPs) have been used for a long time in Sweden. During the recession of the early 1990s, huge numbers of people took part in different such programmes, often without finding a regular job afterwards.

Despite the large number of participants and despite the assumption that the programs should counteract the negative effects of unemployment, virtually no scientific studies have been made on the health effects of ALMP participation. Additionally, since there are likely to be substantial national differences, those few studies that have been made outside Sweden probably have limited validity here.

The evaluation of Use for Everyone (UfE), which is partly reported in Papers I and II, is therefore almost unique in its kind. This means that we had little knowledge to build on when we designed the studies, but also that even rather trivial and uncertain findings can be of general interest, and possibly also have policy implications.

The analysis in Paper I was made before all data had been collected, why it wasn't possible to do any subgroup analyses. A total of 21 participants were followed over one year, with data collection at the beginning (0 months), during participation (4 months), towards the end of the participation period (6 months) and at follow up half a year after most participants left the programme (12 months).

The main result was that prolactin rose continuously and significantly over the four measurements. This was contrary to the hypothesis, since prolactin in earlier studies has been shown to rise

during unfavourable conditions and decrease with psychosocial improvement. There was also a smaller, but still significant and continuous, decrease in DHEA-s, which was also contrary to the hypothesis, and could be a sign of impaired anabolism. Additionally, there were tendencies to changes in diastolic blood pressure (DSP), ALAT and γ -GT, all in a direction indicating deterioration in physiological functioning.

The physiological measures were, however, somewhat contradicted by self-rated data from the same individuals. There was a tendency towards increased individual control (measured by a single VAS) and very slight tendencies to a temporary decrease in HAD anxiety and depression. Such non-significant results would hardly merit attention, had they not been corroborated by findings in other subpopulations from the same ALMP (Westerlund & Bergström 1997).

The analysis in Paper II was made after all data had been collected. Since there are known differences in the physiological measures between men and women, and since there were very few men, the analysis was restricted to only women. A total of 32 women were included in the analysis. The larger population allowed subgroup analyses, which were performed for participants who had taken part in better versus less well functioning groups (assessed by a panel of judges), and who had enrolled earlier versus later. A final modification compared to the first analysis was that we introduced two indices intended to summarise anabolic and catabolic processes respectively.

In Paper II, there was no longer any significant rise in prolactin for the whole group, and instead of a continuous decrease, there was a significant but temporary decrease in DHEA-s levels. The catabolic index showed a slight, significant increase, whereas the anabolic index did not change significantly. HAD depression showed a temporary, marginally significant decrease. Despite a larger sample, the results for the whole group in Paper II were thus weaker, but conformed to the same pattern as in Paper I: A negative development in physiology coupled with signs of a slight and transient improvement in self-rated data.

When the material was analysed with subgroups, however, these results were somewhat moderated. In the 'better' functioning groups, there was a temporary increase in anabolism, possibly indicating effects of health promotion. In the less well functioning groups, on the other

hand, there was a temporary decrease in the catabolic index and possibly a transient impairment of anabolism.

It thus seems that there was indeed some improvement also in physiological functioning in the better groups, which was masked when all groups were analysed together. This improvement was, however, only transient and did not remain after participants had left UfE.

It might seem counterintuitive that catabolism decreased in the worse groups, but this can probably be explained by a restriction of excessive alcohol consumption. Many of the less well functioning groups were characterised by a large number of alcohol dependant participants coupled with a rather strict (and probably necessary) regime.

Taken together, Paper I and II seem to indicate that there are some transient improvements for the participants in the better functioning groups of UfE, but that the long-term trend is a slow deterioration. The evidence is, however, inconclusive.

To better understand how UfE affects the participants, it is necessary to take the other parts of the evaluation into account. The programme was studied qualitatively, mainly as a kind of formative (process) evaluation, for instance by Mårtensson (1997) and by Westerlund & Bergström (1997 and 1998). The findings were summarised in English by Westerlund (2000a).

A main finding of the formative evaluation was that there were substantial problems in implementing the programme goals, which were rather far-reaching and 'revolutionary' in relation to standard ALMPs in Sweden.

The original plan was to let participants remain in the programme for as long as they choose – in line with the idea of work as a human right – thus establishing a kind of alternative labour market. Furthermore, the intention was to convert benefit money to salaries, thus providing real employment, although with a low salary compared to the regular labour market.

In reality, no such conversion of benefit money was allowed. Instead, rules and regulations pertaining to unemployment benefit restricted participation to six months, although with an option to return after about a year of open unemployment. Participants with sickness benefit, however, often could stay longer.

There were also difficulties to achieve collective mobilisation and empowerment in UfE. The 'process leaders' were only meant as

facilitators, who should help participants to get started. Thereafter, the participants were expected to take over and continue in self-governing groups, social co-operatives and possibly new businesses. This did not happen, for a number of reasons, including:-

- Short duration of individual participation, which hampered long-term development and created instability in the groups,
- rules prohibiting unemployed to handle money, which precluded economically viable development of co-operatives and businesses,
- inherent conflicts of interests between the employed process leaders and the participants, who received various kinds of benefits,
- a large number of participants with moderate to severe mental health problems and/or social problems.

Additionally, there was a resistance among the process leaders to using more structured methods, which probably hampered the development. For instance, UfE refused to implement personal action plans and to focus on job seeking, which complicated the collaboration with labour market authorities. At the same time, there were no consistent efforts to build alternative structures (e.g. those used in social co-operatives for mentally disabled in Northern Italy).

Despite these problems, evaluations have shown that a large majority of the participants are satisfied or very satisfied (cf. Westerlund 2000b). This finding comes from telephone interviews with the total population of participants during the first five years – over 1,000 people. This, together with the fact that the interviews were made after participants had left the project, lends credibility to the positive picture of participant satisfaction.

Longitudinal analyses of self-rated psychosocial data additionally indicated some improvements in mental health and quality of life (Westerlund & Bergström 1997, Westerlund & Bergström 1998). However, there are also indications that there might have been rebound effects when participants realised that they would not be allowed to stay in the project (*ibid.*). This is consistent with Juvonen-Posti *et al.* (2002), who in a Finnish study also found a reversal of the positive development in mental health at the end of program participation, although the levels at two-year follow up were still lower than at baseline.

There are also numerous ‘success stories’ – people who in UfE have found a congenial environment, and describe a remarkable improvement in overall quality of life.

Finally, UfE has also been evaluated from in terms of public finances (Westerlund 2000c). The results indicate substantial public savings resulting from people taking part in UfE. The largest improvements were found among participants on long-term sickness absence (approximately US\$ 10,000 per person and year, corresponding to 0.3 years pay-off time), and were explained mainly by decreased need of psychiatric hospital treatment.

	Better functioning groups	Less well functioning groups
Strong labour market position	1. Improvement, possibly during participation and then when re-employment is found	2. No effect of participation followed by improvement when re-employment is found
Weak labour market position & Not allowed to stay	3. Possibly a temporary improvement, but long-term deterioration with continued unemployment/sickness absence	4. Continuous deterioration with continued unemployment/sickness absence
Weak labour market position & Allowed to stay	5. Substantial improvements as long as participation lasts	6. Transient lessening of alcohol abuse, otherwise continuous deterioration (either while continuing to participate or after choosing to leave)

Figure 4. A hypothetical model of the interaction between labour market position, possibility to stay longer than 6 months, and group functioning on the health effect of participation in UfE.

Figure 4 presents a hypothetical model, which might help integrate the seemingly contradictory results of the evaluation of UfE. The basic idea is that participation *does* help those participants who: 1) Need such help, 2) take part in one of the more successful groups, 3) are allowed to stay long enough (which is usually the case for people on long-term sick leave or disability pension). But since many people do *not* need this help (either because they get a new job soon anyway, or because they are socially well integrated in their private lives), who take part in one of the less well functioning groups of UfE, or who are not allowed to stay long enough, there are many who do *not* improve their health, which masks positive results in whole-group analyses.

Figure 4 might also help explain why some measures, notably prolactin in Paper I, actually indicate long-term health deterioration. First let us disregard those who do not really need the intervention (cells 1 and 2). Now, with the exception of those who take part in better functioning groups *and* are allowed to stay (cell 5), participants (in cells 3, 4 and 5) will be more influenced by the exposure to continued unemployment or sickness absence, than by participation in UfE.

As argued in Paper I, an increase in prolactin need not necessarily be negative for health. It tends to rise in stressful and uncontrollable situations, but the main effects are *not* catabolic but rather anabolic. There are also some indications that prolactin helps individuals cope psychologically with uncontrollable stress by facilitating withdrawal and 'cocooning'. If continued unemployment/sickness absence is unavoidable, prolactin could thus be part of a successful psychophysiological adaptation. This is also in line with research presented in the chapter *Theoretical and empirical framework*, which shows that re-focusing strategies can be better than continued, active job-seeking for those who remain unemployed.

Lacking a control group, the question of whether UfE facilitates or just does not counteract such an adaptation to long-term exclusion from the labour market, can hardly be answered.

The overall picture that emerges is that UfE under some conditions can have substantial positive impact on health for some participants. If this is to be the case, participants furthermore need to be allowed to take part long enough. The evidence on health effects must, however, be regarded as inconclusive.

Most ALMPs in Sweden are not as ambitious as UfE by far. Nor do they allow people to stay for prolonged periods. It would thus seem reasonable to assume that standard ALMPs have little or no lasting positive effect on health, unless that effect is mediated by successful re-employment through the ALMP. Bad and unsuccessful ALMPs could even be detrimental to health. It is easy to agree with the economists Martin & Grubb (2001), who, from a European perspective, write that 'active labour market policies are not a magic bullet on their own to solve the unemployment problem'.

The best labour market interventions for improved public health are thus probably not large scale ALMPs for long-term unemployed, but measures which increase regular employment. However, for those

individuals who cannot get or uphold regular employment, programmes similar to UfE offer an opportunity to a more dignified life with substantially improved health and quality of life.

Organisational changes and health

As described in the chapter *Theoretical and empirical framework*, not only those who become unemployed suffer from changes on the labour market. Also survivors of downsizing have been shown to suffer negative health effects, which might seem paradoxical given that they retain that which the unemployed suffer from losing.

Paper III presents a study which was carried out as part of a large research programme called 'Meagre Organisations' ('Magra organisationer' in Swedish). This programme was initiated by the Swedish Council for Work Life Research to elucidate the health effects 'anorexic' work organisation. The original idea was first to study how the ideals and practices of Japanese Production Management (JPM) or Lean Production had penetrated a number of organisations, and then try to relate this to health outcome. To make the study economically feasible, it was decided to use the health and work environment data already collected in the WOLF Stockholm study (which focuses on risk factors for CVD). To this was added a qualitative data collection to get retrospective information about organisational changes at the time of the WOLF study (early and mid 1990s).

The interviews were originally planned as semi-structured interviews with questions about all the 'classical' features of JPM. These questions were to be put to key persons in the organisations: One high-ranking representative of the staff department of each organisation (usually the person who had been staff manager when WOLF was conducted), and one representative from the one or two dominating trade unions associated with the company/work organisation.

After only a few interviews, however, it became obvious that the questions did not capture the salient features of the organisational changes that had taken place. The semi-structured interview format was thus abandoned in favour of open interviews.

Based on the qualitative data collected by interview, the workplaces were divided into three categories:–

1. *Stable* organisations were two public and one private which had not undergone any major changes either during, or for some years before, data collection at the workplace.
2. *Changing/growing* organisations were those that had undergone frequent structural changes, but in a positive climate of good economic development. Not infrequently, these organisations had difficulties in recruiting qualified personnel. All were in the private sector.
3. *Threatened* and *Questioned* organisations were those that were extensively reorganised due to pressure to save money or due to difficulties competing in a globalised and changing market. These organisations were either downsized, or parts of them were outsourced, in addition to other changes. Three of the eight organisations in this category were in the public sector, the remainder in the private sector. As this was the most numerous category, and as the nature of the financial and structural conditions in which the public sector acts differ considerably from the private, it was decided to subdivide this category into *Threatened Private* and *Questioned Public*. These labels reflect the fact that threats to job security in the private sector are largely financial, while the financial dimension is just one part of the political debate and decision-making in the public sector, where the size, ownership and organisational structure have also been questioned.

In addition, there was a large number of *Small Firms* which could not be categorised in the manner described above. It is not quite clear what the 'exposure' in this category would be, but as the data were available, they were included as a comparison. One additional workplace was excluded from the analysis because of the exceptional character of the working conditions.

Employees from the companies/organisations in the different categories were then compared statistically with regard to self-rated job strain, and to physiological risk factors for CVD. Given the evidence for negative effects of downsizing in the literature, it came as no surprise that employees in *Threatened* and *Questioned* work organisations had a significantly worse risk profiles than those in *Stable* companies.

The most interesting finding was that also employees in *Changing/growing* organisations, which ostensibly should work in the best kind of climate, actually also had a worse risk profile than those in

Stable organisation. While superficially counter-intuitive, this result fits well with the stories that had been told during the qualitative interviews: Despite the economic success of these growing companies, they had been very challenging environments for those who worked in them. Understaffing, extreme workload, a large number of inexperienced new employees, too rapid and too frequent changes, and disruption of supportive networks were some of the problems mentioned.

Another interesting finding was that also employees in *Small Firms* had an unfavourable risk profile. The fact that most of these companies were in transport or construction might suggest some explanations, which are discussed in Paper III. However, since it was impracticable to interview representatives for the *Small Firms*, such explanations remain speculations.

The pattern found in Paper III, with the best risk profile for employees in *Stable* organisations, and worse profiles in all other categories, suggest that there could be a general detrimental effect of organisational instability. However, the cross-sectional nature of the study in combination with problems of spurious and systematic differences between categories, make generalisation difficult.

When IPM got access to a large, longitudinal, nationally representative database with different work and health related variables, I therefore decided to test the health effects of 'organisational instability' defined by objective data on year-by-year changes in workforce size at workplace level. Paper IV reports the procedures and findings of the resulting study.

Intuitively, it seems reasonable that one large downsizing could have rather long-lasting residual effects on the survivors. On the other hand, it seems likely that a previously healthy organisation should be able to adapt relatively quickly to one big increase in headcount. This was one reason why I decided to study the effects of accumulated exposure to changes in personnel volume, rather than of one point-in-time exposure. The other reason was that stress theory suggests that the human organism is well adapted to cope with acute stressors, but tends to have problems with chronically stressful conditions.

Following Vahtera *et al.* (1997), it was decided to differentiate between 'moderate' and 'large' changes. For each year, a working person could thus have an exposure to one of the following five types:-

- *large expansion*, i.e. an increase in headcount by 18 % or more,

- *moderate expansion*, i.e. an increase by between 8 and 18 %,
- *stability*, i.e. less than 8 % increase/decrease in headcount,
- *moderate downsizing*, i.e. a decrease by between 8 and 18 %,
- *large downsizing*, i.e. a decrease by 18 % or more.

All of these exposures refer to changes in headcount at the person's workplace since the previous yearly return.

When these exposures are accumulated over six years, a very large number of exposure combinations become possible, 15,625. If exposure to outsourcing and mergers is simultaneously taken into account, the number of combinations grows to 64 million. No researcher has access to enough data to analyse so many exposure combinations, and even if such an analysis would be possible, the results would be so complex as to be nigh meaningless.

Since the number of times exposures occur seems likely to be more important than the order in which they occur, it was decided to summarise the exposures as the number of times that each type of exposure had occurred during the six-year period. Since one and only one exposure to change occurs each year, the sum of all exposure types over the years is always 6. This means that summing all types over the years gives redundant information. Stability all the years was therefore chosen as reference, and only four indices were computed: the number of times each person had been exposed to large exposure, moderate exposure, moderate downsizing, and large downsizing respectively. These four indices, together with the number of years of exposure to mergers and to outsourcing, were then entered as continuous, independent variables in the binary logistic regression analyses used in the study.

This method has two problems. One is that it does not take into account that the order in which exposures occur could in fact be important (it could, for instance, be worse first to lose long-time workmates in a downsizing and then get a large number of new colleagues in an expansion the following year, than to lose people in a downsizing, who had been employed only the year before). The other problem is of a mathematical nature. Even with only four indices of downsizing/expansion, there are restrictions which create dependence between the indices. If, for instance, someone has been exposed to six minor downsizings, all the three other indices must be 0, since the sum can never exceed 6. The latter problem was dealt with by excluding the

relatively few subjects who had more than two years of more than two exposure types (barring stability).

The accumulated exposures during 1991–1996 were then related to health outcome during 1997–1999, creating a prospective design. Outcome was studied in terms of long-term sickness absence and hospital admission (for more discussion of outcome measures, see under the relevant subheadings in the *Methods* chapter). The analyses were also adjusted for a number of confounding variables.

Paper IV lacks many of the weaknesses of the study presented in Paper III. The design is prospective rather than cross-sectional, the sample is nationally representative rather than limited to a somewhat specific selection of organisations in the Stockholm area, individuals are not clustered in groups with dissimilar demographic characteristics, and the outcome measures are of actual health outcomes rather than of risk markers.

In addition to the possible problems with summation of exposures described above, the study in Paper IV has an additional weaknesses. The population, although originally nationally representative, had to be restricted in a number of ways. This reduced the number of subjects from 71,506 down to 24,036. This reduces generalisability somewhat. However, since the study population still consists of a large number of employees from all sectors of the labour market, the results are likely to apply to all those in regular work, who are younger than 65 years of age and working in Sweden, which is most of the Swedish national labour force.

The results in Paper IV were in line with the hypothesis derived from Paper III: Excessive exposure *both* to large expansion *and* to downsizing was related to an increased risk of illness. This lends support to the idea that there is a general effect of ‘organisational instability’.

There were no significant effects of repeated large downsizings. This lack of results should not be interpreted, since the very definition of repeated large downsizing ensures that there are too few remaining subjects for the statistical analyses to produce significant results even for rather large effects. Additionally, there are likely selection effects that make particularly resilient people overrepresented among the survivors of such repeated and large headcount reductions.

For the casual reader, the notion of personnel expansion being harmful to health might seem counter-intuitive or even provocative,

especially since this association is strongest for women in the public sector. It seemingly contradicts the need for more 'hands' often expressed by personnel working in health care. This, however, is a wrong interpretation of the results.

Repeated exposure to *moderate* expansion is actually associated with a *decreased* risk for hospital admission. This suggests that a slow and controlled pace of personnel expansion, possibly related to financial success, is good for health.

It is repeated exposure to large and rapid expansion which is associated with an excess risk for health problems. The probable interpretation of this is that *prolonged* or repeated, intermittent exposure to *very rapid and large* personnel expansions could, at least under certain circumstances, lead to health problems. This fits well with the descriptions of the problematic situation in some *Changing/growing* organisations in the study behind Paper III.

However, since the effect of repeated large expansion is strongest in the public sector, which as a general rule did not expand during the first half of the 1990s, there is also an alternative explanation. What appears as 'personnel expansion' in the data could in reality correspond to centralisation of functions (but *not* outright mergers, which have been controlled for). For instance, it is possible that a large hospital has gradually taken over both functions (work tasks) and personnel from smaller hospitals. The headcount at the large hospital would then grow year by year, but if tasks, and thus work load, is taken over at a higher rate than personnel, it is in fact possible that 'expansion' masks something which could more rightfully be called 'downsizing through centralisation of functions'.

The exact nature of the changes which are defined as expansion and downsizing through registry data can, however, not be ascertained through the rather crude measures available in nation-wide public registers. This is the main disadvantage of large epidemiological studies, especially if they are only based on registry information. To understand the changes and how they affect the employees, qualitative data is ideally needed.

To my knowledge, there are to date no qualitative studies of repeated rapid expansion or similar forms of 'organisational instability' in the literature. However, it is possible that studies of other types of organisational instability could provide ideas to be tested in future

studies. For instance, in a qualitative study of registered nurses in a hospital which had gone through downsizing and major organisational changes, Hertting *et al.* (2004) found the following (and other) sub-themes: 'work goes unrewarded', 'ever-growing demands' and 'split professional functions'. In a quantitative study of work units in the same hospital, Pettersson and colleagues (2004) found that trends of increased hard work, conflicting demands, and lack of time to plan work were accompanied by increased health problems.

The impact of organisational changes on the employees is also likely to be different depending on the character of the changes. In a longitudinal study, Parker and colleagues (1997) found no decrease in employee well-being as a result of strategic downsizing, despite an increase in demands. The authors argue that 'the potential negative effect of high demands appear to have been counterbalanced by improvements to work characteristics that arose from initiatives introduced during that period' (*ibid.*). In a longitudinal study, Anderson-Connolly and colleagues (2002) found that intensification of work had the strongest association with increase in stress and symptoms of poor health. Increased autonomy, increased skills, working in teams, and use of new technologies, however, had different effects on managers and non-manages. In a study of employees in a chemical company in the United States, Hechanova-Alampay and Beehr (2001) found an association between empowerment and safety performance, consistent with recommendations for increased employee empowerment in organisations.

The studies cited above suggest that there could be effective intervention strategies to counteract the potentially noxious effects of organisational instability. Further research is warranted.

Labour market participation and health

Paper V examines the relative effects of different types of labour market exit (LME) on the risk of hospitalisation. As described under the heading *Disability pension and early retirement* in the chapter *Theoretical and empirical framework* above, there are numerous studies which attempt to predict LME by previous health problems, but very few that look at the health effects of LME which has already been occurred.

The study presented in Paper V uses the same, nationally representative database, which provided data to Paper IV, which gives a

large material consisting of high quality 'objective' longitudinal data combined with self-rated data from one point in time (the biennial SWES). For Paper V, we used sub-samples consisting of older workers who had answered the SWES in 1991, 1993, 1995, and 1997 respectively. For some analyses, these sub-samples were pooled.

There is no explicit registry data on type of LME. This had thus to be inferred from other variables, including income tax, unemployment benefit, disability pension and country of taxation. People who had died, moved abroad, or taken sick leave were excluded. Four categories were thus defined: 'Continued working', 'Disability pension', 'Unemployed', and 'Early retirement'. The assignment to 'early pension' could add some confusion, since there is no specific variable for this. Thus, the group could contain some individuals who have exited the labour market some other way, and some individuals whose choice of early pension might not have been wholly voluntary (e.g. if the alternative was likely unemployment).

For each of the four included waves of SWES, the risk of hospital admission during the two years following the survey was related to LME category. Binary logistic regressions were used, controlling for sex, age, staff category, prior hospitalisation, and number of prior physical and psychosomatic complaints at work.

The outcome measure, hospital admission, is quite an extreme measure of morbidity. Hence we are unable to detect any potential differences in the distribution or risk of less severe health effects which might result from LME. The advantage, however, is that the measure is objective and likely to reflect actual illness rather than behavioural factors.

The results show that unemployed had an increased risk of hospitalisation following LME, while those who took disability pension had a reduced risk.

The result regarding unemployment is rather unsurprising, given the massive evidence concerning negative health effects of unemployment. The apparent size of the effect, almost twofold, is interesting, however, since it has sometimes been assumed that some older workers can enjoy LME through unemployment as a kind of paid early retirement.

The result for disability pension is perhaps more thought-provoking. It could have been assumed that people who start out with health

problems should continue to have a worse development after LME. This is obviously not the case.

There are both 'costs' and 'benefits' related to both work and non-work, as described by Johnson and colleagues (2004) in a qualitative study of patients with multiple sclerosis (MS). For people with weak health and/or a demanding job, the costs in terms of, for instance, fatigue can be very high. In a national prospective study, Pattani *et al.* (2004) found that retirees' quality of life improved from baseline to one year after ill health retirement.

Disability pension might therefore be regarded as a kind of 'health investment' for people with weak health and/or who are coming from adverse working conditions. Disability pension could in fact be seen as the extreme opposite of sickness presenteeism, which has been discussed as potential risk factor for serious morbidity (Theorell *et al.* 2003).

Gender aspects

The present thesis did not primarily aim to study health effect of the labour market from a gender perspective. However, since it is known that both the psychosocial environment and some biological mechanisms are systematically different between men and women, sex has been considered in all analyses. In Paper II, men were excluded to get a more homogenous dataset. In the other papers, sex was either controlled for or used as a splitting variable.

Despite the lack of a systematic gender perspective, the results might still be interesting to discuss in terms of gender. In Paper IV, it was found that women, especially in the public sector, had a higher risk for long-term sickness absence, but a lower risk for hospital admission, compared with men. In addition, the effect of organisational instability (repeated large expansions) on sickness absence was strongest among women working in the female dominated public sector.

That women in Sweden for 20 years have had higher sickness absence than men is well known (cf. Figure 1 in the *Introduction*). Higher sickness absence among women can also be found in other Northern European countries (Socialförsäkringsboken 2004). Before 1980, however, men had higher sickness absence than women in Sweden. It also seems that a disproportionate part of the recent escalation of long-term sickness absence is due to an increase of stress-related absence among women employed in the public sector (municipalities and county councils).

A number of explanations for the higher sickness absence among women are commonly discussed (Palmer 2004, p. 46ff.): Double workload and work-family conflict, bad work environment in municipalities and county councils, more part-time sickness absence among women, less income loss for women who take sick leave, and a generally gender discriminating labour market. It has also been found that working in a heavily gender segregated occupations is a risk factor for sickness absence (Hensing & Alexandersson 2004).

However, the discrepancy between sickness absence and hospital admission suggests an additional explanation, namely that women and occupationally related conditions typical of women are not adequately treated. That the hospital admission variable was restricted to four disease types, which are known to be influenced by psychosocial factors increases the plausibility of this interpretation. That women are sometimes subjected to incorrect management, diagnosis and treatment has been observed in other studies (Björkelund *et al.* 2001).

A further explanation for the different development of sickness absence among men and women could be that ergonomic and other hazards have been successfully dealt with in traditionally male occupations in the private sector, whereas demands and hazards have increased for health care personnel, teachers and other occupations with many women.

In summary, gender aspects need to be specifically focused in futures studies of the relationship between labour market exposures and health.

Implications

The studies included in the present thesis demonstrate that the changes on the labour market during the 1990s had a significant impact on health for workers, unemployed people and people who left the labour market early. These effects are, however, in the past, and nothing which can be done today can undo what the changes during the 1990s did to the health of the employees.

However, although the abrupt changes on the Swedish labour market that took place during the first years of the 1990s are not likely to be repeated, there are a number of lessons to be learned from the experiences of the 1990s, which could be used to improve occupational and public health in the future.

Likewise, although the studies focus the changes on the Swedish labour market which took place in the national context of Sweden, it is unlikely that basic mechanisms and relationships between labour market exposure and health are fundamentally different in other countries. The Swedish experiences should therefore, with some caution, also be possible to utilise in other countries.

Policy implications

The studies on an experimental active labour market programme (ALMP) in Papers I and II indicate that the overall effects are slight and unable to override a long-term trend of unemployment adaptation. For certain individuals, however, participation had substantial positive effects. This suggests two policy implications: One is that real employment should not be replaced with substitute work for people who could take an ordinary job. The other is that providing voluntary, meaningful daily activities in an empowering context to those who cannot take ordinary jobs for health reasons is a good investment in health.

The two studies on health effects of structural changes in work organisations show that the volatile nature of present day working life – its ‘flexibility’ – is a new kind of generalised stressor which seems to pose significant health risks. Since we cannot – and should not – stop change itself, we need to find ways to cope with it. And since human beings are not biologically prepared to deal with constantly and rapidly changing rules, individuals cannot be expected to handle the coping on their own. Thus, it is the structures themselves – private companies and public institutions – which have to take responsibility for making life in a flux bearable in the long run.

The final study on different types of early labour market exit for older workers indicates that unemployment had detrimental impact, whereas disability pension could have a protective effect on future health. This suggests two things: One, that vigorous measures to counteract unemployment are warranted also regarding older workers. The other, that allowing older workers with severe health problems to retire can prevent exacerbated health problems.

Suggestions for further research

The studies of an experimental ALMP in **Papers I and II** suggest complex relationships between background factors, intervention type, and health outcomes. This, in combination with the fact that very few scientific studies have been made on the health effects of regular ALMPs, indicates a need for epidemiological studies of labour market programmes.

Using linked national registers, it should be possible to identify long-term unemployed individuals who have taken part in different labour market programmes, and relate participation to health outcome in terms of hospital admission, primary health care use and possibly mortality while controlling for background data.

Two problems associated with such an approach is firstly that registry data from the labour offices are of rather low quality. Secondly that the national rules for unemployment benefit tend to create a situation in which almost all unemployed intermittently are subjected to the same kind of interventions, making comparisons difficult. Both problems could partly be overcome by comparing data from before and after a major policy change.

The studies of 'organisational instability' presented in **Papers III and IV** clearly indicate a need for further research. The different nature of the two studies, with Paper III giving more insight into the background, and Paper IV providing much better evidence regarding outcome, makes it tempting to add more solidity to the study in Paper III and more in-depth insight to Paper IV. There are ways in which this could be achieved.

Paper III could rather easily be followed up by linking longitudinal registry data on mortality and morbidity to the cross-sectional data collected in the WOLF study. Health outcome could then be studied prospectively, and prior registered morbidity could be used to further statically control for the systematic differences between the organisations in the five different change categories.

Paper IV gave evidence for an association between repeated exposure to large personnel expansions and health problems (as well as of downsizing). However, little is known about the nature of these noxious 'expansions'. A follow up study is planned and has recently been funded by the Swedish council for working life and social research. The idea is to identify the individuals who most contributed to the findings by using a

statistical jack-knife procedure. These persons will then be asked to participate in qualitative interviews about their experiences of structural and organisational changes at work. These interviews will then be analysed with the aim to identify themes which could indicate possible pathogenic aspects of rapid expansion and organisational instability in general. A questionnaire will then be developed, combining established instruments with scales constructed on the basis of the interviews with victims of bad expansion. Finally, this questionnaire will be used in a specific longitudinal study of a nationally representative sample, which combines registry data with a retrospective data collection. The sample will be stratified on previous change exposure, and contain both people who have experience expansion, and people who have experienced downsizing.

There is also need for intervention studies, which attempt to counteract the negative health effects that organisational instability often seems to have. Especially in the management literature, there are suggestion of how such interventions could be designed. What is lacking is scientific studies of the health effects of such interventions.

The study in **Paper V** gave interesting results regarding the differential effects of different labour market exits (LME). However, the restrictions necessary for the analyses left too few cases to allow more complex analyses of who benefit and who suffer from early retirement, disability pension and continued work respectively. A new study based not on a nationally representative sample, but on the total Swedish population in the relevant age groups would offer much better possibilities to study differential effects.

Conclusion

Taken together, the thesis demonstrates that structural changes in the labour market, as exemplified by the major changes that took place in Sweden in the early 1990s, can have a significant and differentiated impact on public health, and that the negative health effects are not necessarily easy to counteract by labour market programmes. More research is called for, especially regarding effective interventions to protect health during structural changes at workplaces and in working life as a whole.

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