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THE ILLNESS FLEXIBILITY MODEL AND SICKNESS ABSENCE

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ABSTRACT

Research on sickness absence has repeatedly been described as theoretically undeveloped. In this thesis the model of illness flexibility is introduced. In this model, sickness absence is assumed to be caused by people's ability and motivation to work. Ability and motivation will in turn be affected by conditions met in and outside work. In the model, five basic components are discerned describing such conditions. *Adjustment latitude* describes opportunities to adjust work to health by e.g. choosing among work tasks. *Attendance requirements* describe negative consequences of being absent that may make a person attend work despite illness. *Absence requirements* are negative consequences by attending work as signals of not being wanted at work. *Attendance incentives* are positive consequences of attending work as stimulating work. *Absence incentives* are positive consequences of being absent as caring for relatives. The overall aim in the thesis is to test predictions from the illness flexibility model on sickness absence and sickness attendance.

In Paper I adjustment latitude and attendance requirements were studied in relation to sickness absence and sickness attendance. In a cross-sectional design data based on self-reports from a questionnaire from inhabitants in the county of Stockholm were analysed. Low adjustment latitude, as predicted, increased women's sickness absence. However it did not show any relation to men's sickness absence and men's and women's sickness attendance. Attendance requirements were strongly associated to both men's and women's sickness absence and sickness attendance in the predicted way. In paper II the aim was to study whether return to work (RTW) after long-term sickness absence is affected by adjustment latitude, and whether this effect differed between those returning full-time and those returning part-time. A questionnaire was sent to salaried employees who had been on sick-leave for at least 90 days in 2000. The year after they received a questionnaire. For both men and women the likelihood to RTW increased, both among those returning part-time and full-time, with increasing number of opportunities to adjust. In paper III some components from the illness flexibility model was studied in relation to sickness absence on longitudinal data. In spring 2004 and in spring 2005 a random sample aged between 25 an 50 years from the Swedish population received questionnaires. The results showed that an intermediate level of adjustment latitude, compared to a high, was associated with an increased likelihood of being absent sick for between 1-6 days and 7 days or more. Work with little stimulation was associated with an increased likelihood of being absent sick for 7 days or more. Low or intermediate scores on attendance requirements on work were associated with an increased likelihood of being absent 7 days or more. Financial attendance requirements and demanding home tasks were not associated with the likelihood of being absent sick. In paper IV the social gradient in sickness absence was studied in relation to some components from the illness flexibility model. The sample is part of a panel originating from 1994 of inhabitants of Stockholm County which received a questionnaire 1994, 1998 and 2002. Only 2002 data was analysed. The social difference found in sickness absence 31 days or more a year decreased by 78% for women and 67% for men by adding characteristics from the illness flexibility model and health.

In conclusion, the model of illness flexibility appears promising in increasing our understanding of sickness absence. Future studies should be directed to theoretical and methodological development of the components as well as future testing of predictions from the model. Such testing should be done with improved design and data as longitudinal design, register-based data of sickness absence, and tested measurements of the components of the illness flexibility model. Testing of the model should also be directed to different actions taken when ill as the inception of sickness absence, length of absence, RTW, and exclusion from the labour market.

Keywords: sickness absence, sickness attendance, RTW, work organisation, flexibility

SAMMANFATTNING

Tidigare forskning om sjukfrånvaro har återkommande beskrivit forskningen som teoretiskt underutvecklad. I denna avhandling introduceras modellen om sjukflexibilitet. I denna modell antas sjukfrånvaro orsakas av människors förmåga och motivation att arbeta. Denna förmåga och motivation antas i sin tur påverkas av förhållanden i och utanför arbetet. I modellen urskiljs fem komponenter som antas beskriva sådana förhållanden. *Anpassningsmöjligheter* beskriver möjligheter att anpassa arbetet till sin hälsa genom att t.ex. välja bland arbetsuppgifter. *Närvarokrav* beskriver negativa konsekvenser av att vara frånvarande som kan göra att människor trots ohälsa går till jobbet. *Frånvarokrav* beskriver negativa konsekvenser av att närvara på jobbet som t.ex. signaler från arbetsgruppen att man är oönskad. *Närvaroincitament* beskriver positiva konsekvenser av att närvara som stimulans i arbetet och *frånvaroincitament* beskriver positiva konsekvenser av att vara frånvarande t.ex. att kunna ge omsorg till anhöriga.

I artikel I studerades relationen mellan anpassningsmöjligheter och närvarokrav i relation till sjukfrånvaro och sjuknärvaro. Självrapporterade data från en tvärsnittsstudie på innevånare från Stockholms län analyserades. Små anpassningsmöjligheter ökade kvinnors sjukfrånvaro men hade inget samband med mäns sjukfrånvaro eller kvinnors och mäns sjuknärvaro. Närvarokrav visade ett starkt samband med både mäns och kvinnors sjukfrånvaro och sjuknärvaro på förväntat sätt. I Artikel II var syftet att studera om återgång i arbetet efter lång sjukfrånvaro påverkades av anpassningsmöjligheter i arbetet och om effekten var olika mellan dem som återgick helt eller delvis i arbete. Data samlades via en enkät år 2001 från privatanställda tjänstemän som hade varit sjukskrivna minst 90 dagar år 2000. För både män och kvinnor ökade sannolikheten att återgå i arbete, både helt och delvis med ökat antal anpassningsmöjligheter i arbetet. I artikel III studerades komponenter från sjukflexibilitetsmodellen på longitudinella data. Våren 2004 och våren 2005 erhöll ett slumpmässigt urval av den svenska befolkningen mellan 25 och 50 år enkäter. Resultaten visade att de med mellanhöga anpassningsmöjligheter hade en ökad sannolikhet att vara sjukskrivna både 1-6 dagar per år och sju dagar eller mer per år jämfört med dem som hade höga anpassningsmöjligheter. I arbeten med låg stimulans fanns en ökad risk att vara sjukskriven sju dagar eller mer. Låga och mellanhöga närvarokrav sammanhängde med en ökad risk att vara sjukskriven sju dagar eller mer. Ekonomiska närvarokrav och krävande hemarbete var inte kopplat till sjukfrånvaro. I artikel IV studerades skillnaden i sjukfrånvaro mellan olika socialgrupper i relation till några komponenter från sjukflexibilitetsmodellen. Urvalet var del av en panel av innevånare i Stockholms län som startade 1994 och som vart fjärde år sedan dess erhållit en enkät. Här analyseras data från 2002. Socialgruppsskillnaden i 31 dagars sjukfrånvaro eller mer per år minskade med 78 % för kvinnor och 67 % för män om hänsyn togs till dels förhållanden från sjukflexibilitetsmodellen och dels hälsa. Sammanfattningsvis förefaller sjukflexibilitetsmodellen att vara lovande för att öka vår förståelse av orsaker till sjukfrånvaro. Framtida studier av modellen bör inriktas på att både utveckla modellen teoretiskt och metodologisk och att fortsätta testa modellens förutsägelser. I dessa test av modellen bör förbättrad design och förbättrade data användas, t.ex. longitudinell design och utprovade mått på sjukflexibilitetsmodellens komponenter. Modellen bör också testas på olika alternativa handlingar vid ohälsa som t.ex. att bli sjukskriven, hur länge man är sjukskriven, att återgå i arbetet och att slås från arbetslivet.

Nyckelord: sjukfrånvaro, sjuknärvaro, återgång i arbetet, arbetsorganisation, flexiblitet

LIST OF PUBLICATIONS

I. Johansson G, Lundberg I. Adjustment latitude and attendance requirements as determinants of sickness absence or attendance. Empirical tests of the illness flexibility model. *Social Science & Medicine*, 2004;58:1857-1868.

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III. Johansson G, Härenstam A, Wikman, A, Lundberg I. Components of the illness flexibility model and sickness absence-a longitudinal study (Submitted)

IV. Johansson G, Lundberg I. Components of the illness flexibility model as explanations of social class differences in sickness absence. (Submitted)

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LIST OF ABBREVIATIONS

RTW	Return to work
SRH	Self-reported health
RAT	Rational action theory
OR	Odds ratio
CI	Confidence interval
ICD-10	International Statistical Classification of diseases and related health problems, 10th revision
WHO	World Health Organization
GP	General Practitioner [allmänläkare]
ITP	Occupational pension system for private sector employees
SN	Confederation of Swedish Enterprise [present abbreviation]
SAF	Confederation of Swedish Enterprise [former abbreviation]
PTK	Federation of Salaried Employees in Industry and Services
NYK	Nordic Standard Occupational Classification [Nordisk yrkesklassificering]
SEI	Swedish socio-economic classification [Socioekonomisk indelning]

INTRODUCTION

BACKGROUND

What causes sickness absence? That is the question discussed in this thesis. Alexanderson & Hensing concluded, after performing a systematic review of causes of sickness absence, that research on sickness absence is surprisingly undeveloped (1). One deficiency mentioned by the authors was the lack of theory. This lack of theory is repeatedly stated in literature on sickness absence (2-4). However, Hendrix & Spencer (5) argued, when discussing the scarcity of multivariate studies on the causes of absenteeism, that this is not due to a lack of guiding theoretical models but to limited research on assessing existing models.

There are indeed theoretical models(2,6-8). However, these are developed to understand work absence/work attendance in general and not sickness absence in particular. As a probable result, health/poor health does not have a focal point in the models. We believe that a model of sickness absence has to acknowledge the dimension of health as a central determinant and propose here an alternative model, the model of illness flexibility, to sickness absence. This model draws on previous theoretical work on sickness absence. All components in the model can be traced in existing literature although the settings or descriptions may differ. What we consider to be new in the model of illness flexibility is the way these components are linked together.

PATTERNS IN SICKNESS ABSENCE

Compared with many other Western European Countries, sickness absence in Sweden has been high since at least the end of the 1980s. Generally speaking, in Western Europe women have a higher rate of sickness absence than men (6, 7). In Sweden, women have had a higher rate of sickness absence than men since 1980. The gap has widened over the past 20 years and in 2002 the sickness rate for women was 77% higher than for men. This difference between men and women is evident in all age groups (8). The diagnostic pattern behind sickness absence does not differ for men and women. Musculoskeletal diseases caused about 1/3 of sickness absence for men and women between 1999 and 2002. Mental disorders are the second most common cause of sickness absence for both sexes(9).

Explanations of sickness absence and of differences in sickness absence

In 1985, it was stated that “Significant relationships between absence and personal characteristics such as sex, age and tenure seem to be (..) universal but extremely poorly understood”(10). This statement, 20 years later, is still true. Another stable finding is that manual employees have a higher rate of sickness absence than non-manual employees. This difference is evident between both sexes but greater among men (11).The socioeconomic difference in long sickness absence appears to diminish

between 1991-93 and 2000-02 as a result of increasing absence among those in higher positions(12).

The social gradient in sickness absence has not been sufficiently explained (13-20). The model of illness flexibility has been developed to explain sickness absence in itself. Explanations of differences in sickness absence between different groups will be found among factors explaining sickness absence. However, the main causes of sickness absence are not necessarily the main explanations of the differences in absence between groups.

STUDIES ON CAUSES OF SICKNESS ABSENCE

A large number of studies have been carried out on causes of sickness absence, the majority of them within a public health tradition, and many determinants studied can be viewed as risk factors for ill health. In such studies, sickness absence is regarded as an indicator of poor health. As a result, most studies of causes of sickness absence rely more heavily on models explaining the development of poor health rather than on models developed to explain sickness absence. Consequently, there is a gap between the empirical studies and the theoretical work on causes of sickness absence.

Studies of causes of sickness absence can be divided, according to Kristensen (21), into five categories: [1] societal conditions (social insurance schemes, economic fluctuations) (22-26), [2] conditions peculiar to a given workplace or organization (personnel policy, size, type of industry etc.)(27-30), [3] the individual's work environment (physical and chemical stressors, qualification requirements, wage system, monotony of work, etc.) (31-44), [4] social conditions (marital status, social network, commuting distance to work, etc.)(45-53) and [5] personal conditions (sex, age, smoking habits, personality type, seniority, etc.)(54-63). Many studies have analysed conditions on several of these levels in relation to sickness absence(19, 64-70). Kristensen state that merely presenting these factors does not provide an *explanation* of sickness absence. For this, an integrated theory that interrelates with existing theories of sickness, sickness perception, sickness behaviour and stressors is needed (21).

HEALTH

Absence inducers

A general assumption, on which the model of illness flexibility is based, is that poor health is the main cause of the vast majority of cases of sickness absence, but that poor health does not always manifest itself in sickness absence. As a result, causes of sickness absence can be associated with health in two different ways. They can either have a direct effect on health by being a risk factor for ill health or they can affect the relation between poor health and sickness absence. Understanding sickness absence as a reflection of health relies on medical and epidemiological models of how poor (or good) health emerges. The model of illness flexibility aims to describe conditions that affect the relation between health and sickness absence.

In the conceptualisation of the model of illness flexibility, poor health can be described as an absence-inducer. But what defines poor health that can have this absence-inducing function? The concepts of "disease", "illness" and "sickness" are often used to distinguish different aspects of poor health. Disease refers to conditions diagnosed by a physician or other medical expert. Illness refers to subjective experiences of mental or physical symptoms to which the subject will react in terms of "I'm in pain" or "I'm not feeling well". Illness can, but does not have to, be caused by a diagnosed (or potentially diagnosed) disease. Sickness refers to the social role a person with disease or illness adopts or is given in society (71) (72). Experiences of illness is probably the ultimate cause of the vast majority of sickness absences. Using illness to describe conditions causing sickness absence is not in accordance with the Sickness Insurance Act in Sweden, which state that sickness benefit will be paid when work ability due to disease is reduced by at least one fourth(73). However, in Sweden no medical certification is needed for the first seven days of sickness absence. It is likely that experiences of illness, with or without a disease, will be the cause of the vast majority of these absences. Experiences of illness will also be the main reason for people consulting a doctor for medical certification of sickness absence. It has been shown that most people applying for such a certificate will also be given one (25).

Prevalence of illness

It is probably common to conceive good health as the normal state and illness and poor health as deviant. Whether this is true depends on the measurements used. Data on reported symptoms do not support the view that good health is the normal state. Data from the county of Stockholm, 2002, showed that 52% of the women and 40% of the men between the ages of 18-64 reported having neck/shoulder/low back disorders and/or suffering mentally (74).

In a random sample of the Swedish population between the ages of 16-84 in 1988 - 2001, 67% (women=72%, men=62%) reported having symptoms such as pain in the neck, shoulder, back, hip, hands, elbows, knees, legs as well as asthma and allergy and sleeping disorders, fatigue and anxiety (72).

Thus illness, measured as pain and suffering, seems to have a high prevalence in the Swedish population. Although sickness absence in Sweden has been high during the last decade, it probably does not reflect all of the illness that exists in the working population. Instead, we can assume that a large proportion of this illness is manifest in sickness attendance, that is, people choose to attend work despite illness.

Sickness attendance

Sickness attendance was common and seemed to increase in Sweden during the last decade. Data from a survey carried out 1997 showed that 38% of the women and 35% of the men had, despite illness, attended work twice or more times during the 12 months preceding the questionnaire (75). A survey carried out in 2000/2001 showed that these proportions had risen to 56% for women and 50% for men. Poor health showed the strongest association with sick attendance twice or more times compared with sick attendance once or less. It was also found that organizational conditions such

as low replaceability, small resources, conflicting demands and time pressure at work were associated with high sickness attendance (76). A British study of GPs and hospital doctors showed that 86% of the GPs and 85 % of the hospital doctors agreed when asked whether they had continued to work when it would have been better to take sick leave. Reasons given for attending work were that work could not wait or could not be delegated. There was also a reluctance to "burden" colleagues with extra work(77).

To work through illness may constitute a risk to health. This hypothesis is supported by a study from Whitehall II in Britain that examined the incidence of serious coronary events among unhealthy employees with regard to their level of sickness absence. Those with low or no sickness absence had twice as high an incidence of serious coronary events as those with moderate levels of sickness absence(78).

SICKNESS ABSENCE AS AN ACTION

Here, sickness absence is considered as an action. This view is in line with one of the requirements that Kristensen (21) put on an integrated theory of sickness absence: *"A theory of sickness absence should consider the individual as a product of his or her environment and, at the same time, as a conscious actor who makes choices within a given social framework".*
To view sickness absence as an action has, according to Brandth (79), several implications:

1. There is a person involved
2. There is a goal or a reason with the act
3. Actions are conditional on a situation
4. The actor has to choose between alternative actions.

Coleman states that the view of individuals as being purposeful and goal-directed, guided by interest (or "values" depending on the theorist) and by rewards and constraints imposed by the social environment has a long tradition in social and political philosophy. It is an orientation that grounds social theory in a theory of individual action.(80). Rational Action Theory (RAT), according to Erola, is the most advantaged and influential version of such orientation in sociology today(81). Goldthorpe, who is the main proponent of RAT, states that it "is not a highly unified intellectual entity"(82). He defines RAT as "any theoretical approach that seeks to explain social phenomena as the outcome of individual action that is construed as rational, given individuals' goals and conditions of action and is in this way made intelligible"(83). Goldthorpe distinguishes RAT in terms of three criteria: They can (i) have strong or weak rationality requirements; (ii) focus on situational or procedural rationality; (iii) provide a general or a special theory of action. He advocates that sociology will be best served by a form of RAT that has rationality requirements of an intermediate strength. This can be understood in terms of subjective as opposed to objective rationality: that is, the idea that actors may hold beliefs, and in turn pursue courses of action, for which they have 'good reasons' in the circumstances in which they find themselves, even though they may fall short of the standard of rationality that utility theory would presuppose. Goldthorpe also advocates a form of RAT that has primarily situational emphasis and does not address questions concerning procedural

rationality at the level of individual psychology. He finally proposes that RAT should claim to be a theory of a special kind and seek to reduce accounts of social regularities in terms of cultural traditions, values and norms as far as possible to accounts given in terms of rational action(82).
This model of illness flexibility resembles Goldthorpe's view on RAT by trying to find the "good reasons" for people's actions when they are ill by focusing on the circumstances in and outside work.

Alternative actions in sickness absence

In sickness absence, it is possible to discern two core actions: to report sick and to terminate sick absence. Both these core actions have alternative actions (Figure 1). Put in an absence-inducing situation (i.e. experiencing illness) the alternative actions are to report sick or attend work. Those attending work can be categorised as sick-attendees. Among those reporting sick the absence can be of very different lengths and end in different ways. One way is to return to work (RTW), part-time or full-time. Another way is to depart from or be excluded from the labour market by becoming unemployed or getting disability allowance. Other ways of ending sickness absence may be, for example, to become a student, to die, and to emigrate.

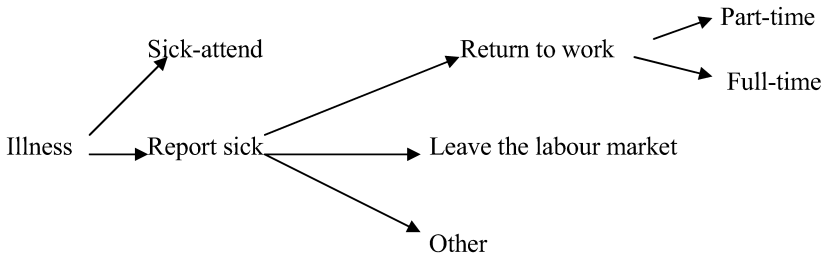


Figure 1 Alternative actions in sickness absence

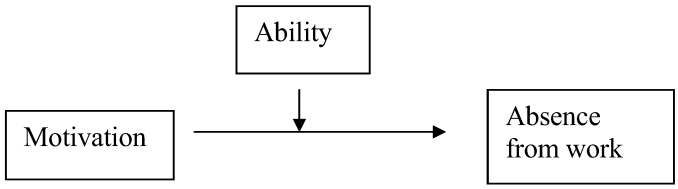
The actor may not choose freely between alternatives. Conditions in and outside work will put limits on the choices available. Sometimes circumstances are such that a person has to choose one particular action.
Causes why people report sick or become sick attendees may be the same as those explaining when people terminate their sick absence and in what way. But these causes may also differ. A model of sickness absence should attempt to explain all these different actions.

ABILITY AND MOTIVATION

The model of illness flexibility is based on two central concepts: ability to work and motivation to work. These concepts have also been central in former theoretical models of absence and attendance from work. Often both concepts are present in such models. Which concept is highlighted and how the concepts are related may then be expressed in at least four different ways (se Figures 2 a-d).

The first two ways to conceive the relation between ability and motivation are to treat them as separate entities. They differ in that one highlights the association between motivation and sickness absence and presumes that that ability interacts with this association (Figure 2 a). The other gives priority to the association between ability and sickness absence and puts motivation as the interacting condition (Figure 2 b). The other two ways of relating ability and motivation are to picture the one as a part of the other. Motivation can thus be pictured as part of ability (Figure 2 c) and vice versa (Figure 2 d). Theoretical models of ability and motivation will be discussed below in relation to these four ways of relating the concepts. Apart from the four ways presented here of ability and motivation to work, there are theoretical models that focus on one and not the other(84, 85).

a)



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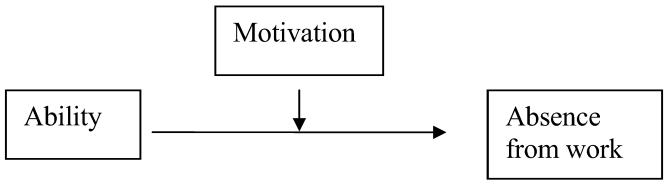

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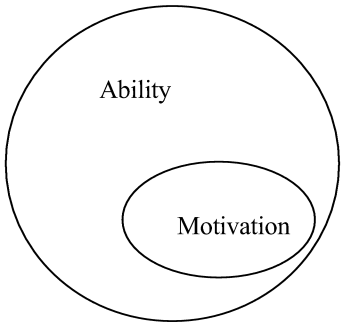

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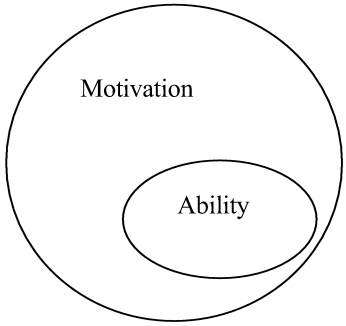

Figures 2 a-d Four different ways in which ability to work and motivation to work can be related
2a Structure in Steers & Rhodes´s, Nicholson's and Ås's models of sickness absence
2b Structure in the model of illness flexibility
2c Structure in Ilmarinen's definition of work ability
2d Structure in Berglind & Gerner's model of RTW

Ability and motivation to work as separate entities

Ability and motivation are central concepts in Steers and Rhodes's (86) model. They state: "An employee's motivation to come to work represents the primary influence on actual attendance, assuming one has the ability to attend". Nicholson (87) reveals a similar basis for his model: "The key feature of the model is that the motivational state of the person determines his or her susceptibility to the potential proximal causes of absence. In the language of the model: The motivational state of the person determines the threshold level on the A-B continuum at which event-occurrence will result in absence". In both Steers and Rhodes's and Nicholson's models "attendance motivation" is the central concept that will determine whether an "absence-inducing event" (Nicholson) or level of "ability to attend" (Steers and Rhodes) will result in absence or attendance. In both models, possible causes of motivation are well developed while the causes affecting ability are not. Ås's model(2) also highlights the motivational dimension. The basic structure in these previous models of work absence and attendance is thus as illustrated in Figure 2a.

Motivation is central as a determinant of sickness absence in the model of illness flexibility as well. However, ability, through its link with health, is supposed to precede motivation in time. The basic structure in the model of illness flexibility is illustrated in Figure 2b.

Ability to work

Ability to work is a central concept in the Swedish Sickness Insurance Act, which states that sickness cash benefit will be paid when work ability, due to disease, is reduced by at least one fourth. It is also central in the Rehabilitation Act, which states that the aim of rehabilitation is to gain work ability for insured persons suffering from disease (73). The legislation is not clear on what the concept of work ability contains. As a result, the meaning of the concept fluctuates with, for example, business cycles (84, 88).

In the late 1990s a definition of work ability was introduced by Ilmarinen. In this definition, work ability is pictured as a process of human resources in relation to work. Human resources are described by [1] health and functional capacities, [2]education and competence, [3] values and attitudes, and [4] motivation. When these individual factors are related to [5] work demands,[6] work community, and [7] work environment the outcome is the individual work ability (89).
We agree with Ilmarinen that conditions such as health, functional capacities, education and competence are central components of work ability and that these components should be related to work.
Ilmarinen's definition of work ability also encompasses motivation and has thus the structure shown in Figure 2 c. Tengland (84) argues that the idea of motivation being part of work ability would have the absurd consequence that a person wanting to stay at home to watch television would have reduced work ability. Ilmarinen's model also encompasses values and attitudes. As values and attitudes will be directed towards aspects like health, competence, work and motivation, it is questionable to distinguish values and attitudes as a separate component.

In Ilmarinen´s model, work is described by "work demands", "work community" and "work environment". How work community and work environment affect work ability is not self evident and is not stated. Work demands have a more obvious connection with work ability and have been proposed elsewhere to be the work-related aspect determining work ability(84, 90). However, we see some problems in allowing work demands to define work ability.

One such problem is that "ordinary" work demands for some groups may differ greatly from work demands when ill, because of opportunities to adjust. Defining work ability on the basis of work demands may therefore not properly describe conditions met at work when ill. Another reason is that the concept of demand is poorly defined. One possible interpretation is that it describes all that has to be performed at work as well as how, when and where it should be performed. Another interpretation is that it describes work tasks that exceed capacity. Regardless of interpretation, tasks affecting work ability are likely to be dependent on diagnosis. A heavy physical work load may, for example, act as a barrier when suffering from low back pain but not when suffering from mental problems. In our judgement, gathering proper data on work demands may necessitate extensive data collection.

An alternative way to describe work is by the opportunities to adjust work to capacity. We therefore propose the concept of "adjustment latitude" as a relevant component at work determining work ability. The concept of adjustment latitude encompasses the work-related conditions described in Ilmarinen´s model, as opportunities to adjust are directed towards work tasks (demands) and work environment and are determined by work organization.

Motivation to work

Motivation, or lack of motivation, is not considered a justified reason for obtaining sickness benefit. However, in the literature on causes of absence from work it is uncontroversial to regard motivation as a determinant. But motivation is not a unified concept in this literature; it is rarely discussed and defined. One exception is in Berglind and Gerner, who discuss the concept in relation to RTW (91).They state that the concept is often defined as people's preferences for what they want. An unmotivated person is regarded as unwilling to work. The authors widen the concept to encompass people´s own perception of preferences, competence and opportunities. Motivation thus encompasses what people want to do, what they think they can manage and what they think they can get. Thus, by including what people perceive they can manage, Berglind and Gerner's concept of motivation encompasses ability and is illustrated in Figure 2d.

Morgan & Herman (85) found a relation between perceived consequences of absenteeism and past and future absence. They divided these consequences into those that were motivating people to be absent from work (e.g. see to family activities and illness; personal business) and those that were deterrent (e.g. loss of wage; co-workers work harder, loss of promotional opportunities). "Motivating" consequences" are coincident with what people want to do and "deterrent" consequences" with what they

think they ought or should do. Morgan & Herman state that conditions in the organisation of work will determine the consequences of absenteeism. An organisation can therefore control absenteeism by changing the contingencies for these consequences.

It is likely that perceived consequences of being absent from (or attending) work will affect behaviour. Such consequences can be either negative or positive. Negative consequences will act as requirements and make people feel that they ought or should behave in a certain way. Positive consequences will act as rewards and will make people want to act in a certain way.

Competing forces
Whether people attend work or are absent has often been regarded as a result of competing forces(79). "Motivational and deterrent consequences" (mentioned above) are one way to describe these forces and "push and pull" another(2). Kristensen's (21) division of causes of sickness absence into positive and negative "presence" and "absence" factors and Fitzgibbons & Moch (92)"incentives" and " pressures" facilitating or inhibiting attendance behaviour exemplify this perspective as well. The view of "competing forces" is evident in the model of illness flexibility as well. Conditions that tend to motivate people to attend work are described as "attendance requirements" and "attendance incentives" Conditions that tend to increase absence are called "absence requirements" and "absence incentives".

THE MODEL OF ILLNESS FLEXIBILITY

Work ability in the model of illness flexibility

As stated above, the model of illness flexibility (Figure 3) departs from situations when a person is experiencing *illness* which is considered to be absence inducing. Often, but not always, illness will affect *capacity*. Capacity denotes general abilities such as bodily movements and postures or the ability to concentrate or interact with people. It is considered a characteristic purely with the individual, not related to specific tasks. Capacity is associated with, but not identical to, work ability. Two other conditions in the model of illness flexibility are assumed to determine work ability at illness. One is *knowledge and skills*. The more competent and experienced employees are, the less effort, both physical psychological, they may have to use when performing tasks. One can thus expect that those scoring high on knowledge and skills will have a lower likelihood to report sick when ill compared with those scoring low. The other aspect assumed to affect work ability is what is required from work. In the model of illness flexibility, this aspect of work is captured by the concept *adjustment latitude*, which describes opportunities to adjust work to health. Some people may be able to choose among work tasks, shorten their working day and work at a slower pace when, for example, they have backache. Others with similar symptoms may have to work fully if attending work. Adjustment latitude is thus the decision authority an individual may exercise to adjust work to illness in order to keep sufficient work ability.
Control at work as a risk factor for poor health is mostly studied in terms of the "demand-control model"(93). In that model, decision authority, the possibility to influence decisions regarding work, has been studied in combination with intellectual

discretion, the opportunity to develop and use skills at work, to form the concept of job control (94).

Thus, using adjustment latitude means applying the decision authority component of the control dimension at work to define work ability. As mentioned above (1.6.2), this deviates from the convention, which is to use work demands to define work ability (89, 90).

Summing up, work ability in the model of illness flexibility is determined by individual factors: health/capacity and knowledge/skills and the work condition: adjustment latitude.

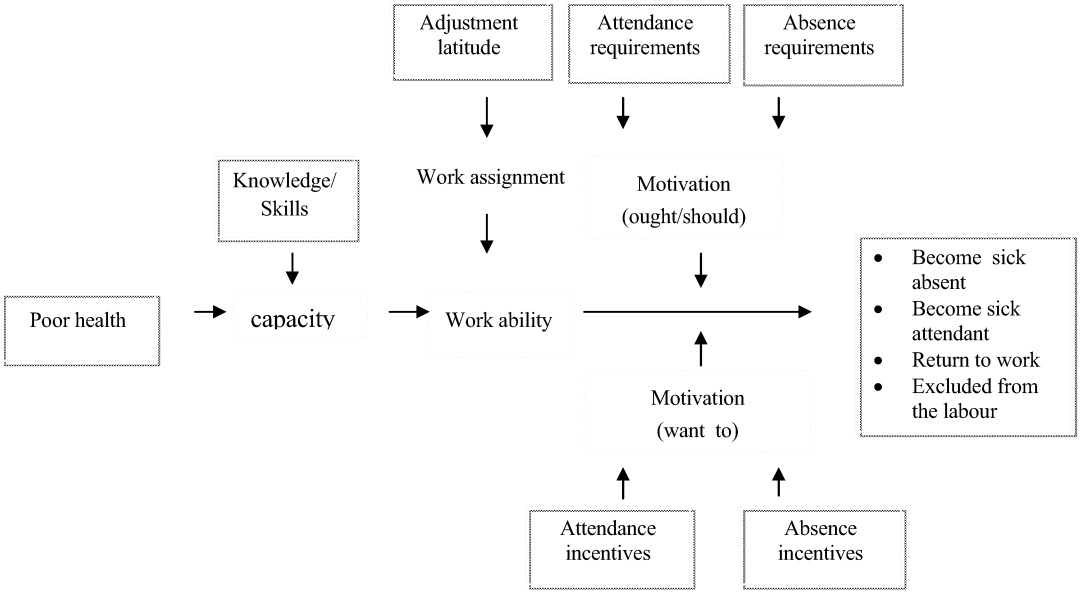

Figure 3 The model of illness flexibility

Motivation in the model of illness flexibility

An assumption in the model of illness flexibility is, as stated above, that people's motivation to act can have two different origins. One is that they act according to what they perceive they ought to do or should do. These are actions in which people are adhering to perceived environmental conditions as other people's wishes and needs,

financial and legal constraints, perceived norms and the like. The conditions are such that non-adherence may lead to negative consequences, which can affect the person making the choice, workmates, or a third party. The rationale for these actions can be anxiety and fear but also altruistic actions such as solidarity and loyalty. Some of these environmental conditions to which people may adhere are such that the requirements are to attend work while others require absence from work.

Attendance requirements describe negative consequences of not attending work that may make a person inclined to attend work despite illness. These requirements can be determined by work organisation so that workmates get an extra burdened, activities have to be cancelled or work piles up if a person reports sick. Attendance requirements may also have other causes. Social security systems that cover income loss poorly may force people to attend work when ill. The fear that sickness absence will be a reason for dismissal may also act as an attendance requirement.

Absence requirements describe negative consequences of attending work which may make a person inclined to report sick when ill. One such absence requirement is the risk of being contagious when having infectious diseases. Another is that workmates and/or management are giving signals of not being wanted at the workplace. It is possible that people suffering from a long-standing illness are met with such signals. This can be a direct effect of their reduced capacity, which may be perceived as troublesome by the work group. For those on long-term sick leave, part of the work group may have changed, leaving no personal bonds with the workplace. Furthermore, potential substitutes may be well integrated into the work group. Processes like these may cause a person struggling with illness to abstain from working.

The other way in which people's actions may be motivated is by what they want to do. People's inclination to go to work or not when struggling with a health problem is likely to vary and to affect whether they attend work or not. A rationale behind people´s wishes to act in a certain way can be the extent to which an action fulfils human needs such as belonging, esteem and self-actualisation (95). Moreover, the way in which needs of time structure, social status and identity (96) are fulfilled may affect the wish to attend. It is possible that such needs may be fulfilled by conditions both in and outside work.

A*ttendance incentives* describe conditions that make people want to attend work despite illness. A stimulating and interesting job may constitute such an *incentive*, that is, people that consider they have these qualities at work will have a greater wish to attend work when ill compared with those that do not consider they have that kind of job. Whether the work climate is supportive and friendly is also likely to affect people's wishes to attend work when ill.

Absence incentives describe conditions that make people more inclined to stay absent when ill. Caring for children, grandchildren or other relatives may constitute such incentives, as may also having a pet. If they are more fulfilling than work, leisure activities may also act as absence incentives.

AIMS OF THE THESIS

The overall aim of this thesis was to test the predictions of the model of illness flexibility on sickness absence and sickness attendance.

The specific aims were:

I To examine whether adjustment latitude and attendance requirements are associated with sickness absence and sickness attendance.

II To study whether adjustment latitude is associated with RTW among those on long-term sick-leave, and whether the importance of adjustment latitude is different for those returning to work full-time and part-time.

III To examine components of the illness flexibility model as determinants of sickness absence on longitudinal data.

IV To examine if components of the illness flexibility model may explain part of the social gradient in sickness absence.

MATERIALS AND METHODS

SAMPLE

Paper 1

The study population includes subjects from two samples. The first was conducted in two steps. . In 1994, about 13,500 randomly selected inhabitants , aged 22-66, from the county of Stockholm, received postal questionnaires, of which 8,539 were returned. In 1998, a new version of the questionnaire was sent to those who answered the original questionnaire in 1994. Exclusion of those who had died, moved abroad or for other reasons were not able to answer the questions gave a net selection of 8,287. Of these , 6,686 (81% response rate: 83% women, 77% men) answered the questionnaire. Information on adjustment latitude and attendance requirements was collected only in the 1998 questionnaire: a longitudinal study design could therefore not be used.
The second study is based on 4,862 subjects randomly chosen from inhabitants in the county of Stockholm aged between 21 and 86 in 1998. Totally, 3,112 subjects (64%) answered the questionnaire. Of these, more women (68%) than men (59%) replied.

Of the 9,798 answering the questionnaire from the two samples, 6,511 were defined as being on the labour market as they had reported being employed, self-employed or on leave of absence. With this definition, 3,551 women (2,562 from the first and 989 from the second) and 2,960 men (2,098 from the first and 862 from the second) were on the labour market.

The groups analysed were further reduced according to two criteria. First, respondents with missing values on any of the variables included were excluded from the analysis. This left 3,201 women and 2,799 men. A further 1,076 persons were excluded as they had reported neither sickness absence nor sickness attendance during the year studied. For the final analysis, 4,924 persons remained.
The questionnaires included questions on the work situation, family life and lifestyle, self-reported health (SRH), sickness absence and sickness attendance. The distribution in terms of education, civil status, housing and socio-economic status was similar in the two samples. However, age was, as expected, higher in the population of the follow-up study.

Paper II

The sample for this study consists of private-sector salaried employees insured by the occupational pension system, ITP, which covers for retirement and long-term sickness. ITP is based on an agreement between the Confederation of Swedish Enterprise (SN, formerly SAF) and the Federation of Salaried Employees in Industry and Services (PTK). At the beginning of 2005, 630,000 working persons were insured by ITP, equivalent to 15% of the Swedish work force.
Those of the salaried employees who had been on sick leave for at least 90 days for one of 16 diagnoses in 2000 were selected. These diagnoses, classified according to ICD-10 (World Health Organization Publications (WHO) 1997), are listed in Table 1.

Psychiatric disorders (including burnout) dominated, representing 65% of the diagnosis among women and 57% among men.

Table 1. Proportion of sample in relation to diagnosis

Diagnosis	Proportion of sample	
	Women	**Men**
F32 Depressive episode	23.5	22.5
F33 Recurrent depressive disorders	.2	.1
F40 Phobic anxiety disorders	.2	0
F41 Other anxiety disorders	3.3	2.8
F43 Reactions to severe stress and adjustment disorders	24.7	18.7
F45 Somatoform disorders	.1	0
F48 Other neurotic disorders	.1	0
Z73 Problems related to difficulty in managing one's life (burnout)	12.8	12.6
I20 Angina pectoris	.8	6.9
I21 Acute myocardial infarction	1.0	7.9
S13 Whiplash injuries	2.3	1.8
M25 Other joint disorders, not classified elsewhere	3.6	3.2
M50 Cervical disc disorders	.3	1.1
M53 Other dorsopathy, not classified elsewhere	9.1	5.2
M54 Dorsalgia	11.2	15.2
M79 Other soft-tissue disorders, not classified elsewhere	7.1	1.9

Altogether 5,590 subjects (3,261 women and 2,329 men) met these criteria. They were 21-66 years old and they represented 44% of the long-term sick among ITP members in 2000. Of these, 3,056 subjects (1,783 women and 1,273 men) returned a questionnaire they all received in May 2001; thus the response rate was 55%.
The criterion of at least 90 days of sick leave in 2000 was chosen to get an even distribution of people who, a year after sick leave, had returned to work, part-time or full time, and were still on sick leave.

Generally, a larger proportion of older people than younger replied. The lowest non-response rate was among men and women aged 51-60. Men aged between 31 and 40 comprised the largest group not answering the questionnaire. The non-response rate by diagnosis varied from 64% among women diagnosed with cervical disc disorders (M50) to 32% among women with angina pectoris (I20).

Paper III

A random sample of 4,929 persons between the ages of 25 and 50 years from the Swedish population was selected for this study. Self-reported data, gathered through questionnaires, were obtained on two occasions. The first was in spring 2004 and the second in the following spring. In both questionnaires, information about work conditions, health and sickness absence and the like were collected.

In both the studied years, data were collected by an initial telephone interview supplemented by a postal questionnaire. In the telephone interview, the respondents were asked whether they had a job, were looking for a job or were not on the labour market and if they were willing to receive the postal questionnaire. Only data from the questionnaires sent to those on the labour market will be used here. 3,579 persons took part in the telephone interview the first year, that is, 72% of those selected. 3,548 agreed to receive a questionnaire, of whom 3,034 were on the labour market. 2,460 questionnaires of those 3,034 were returned in the first year (i.e., a response rate of 81%). In the second year (2005), 3,431 out of the original sample of 4,929 took part in the telephone interview. Of these, 2,934 were on the labour market and 2,310 of these returned the questionnaire. Of those on the labour market, 1,900 answered the questionnaire for both the years studied. Analyses previously carried out on the non-responders revealed that women, those of higher age and people living outside the biggest cities responded to a higher degree(97, 98). The authors concluded that the non-response rate was likely to result in biased estimates of the occurrence of different conditions in the population, while it would affect estimates of associations between living conditions and outcome variables such as sickness absence to a much smaller degree.

Paper IV

This study is based on a panel for which 15,154 persons (men=7,659 and women=7,495), aged 20-64, from the county of Stockholm, were randomly selected in 1994. In that year, the subjects received a postal questionnaire to which 8,539 (56%) responded (men=52% and women=60.5%).The non-responders were younger, and more likely to be unmarried, divorced or widowed, and to be an immigrant compared with responders. Those responding in1994 received a new version of the questionnaire in 1998. In 2002, the 6,519 persons who returned the questionnaire in1998 and had not died or emigrated received a new questionnaire, to which 5,695 (87%) replied (response rate: men=86%; women=88%). The attrition in 1998 was associated with the same variables as in 1994.
Those that had reported being employed or on leave of absence were included in the study. Those self-employed were excluded. After this, 3,364 persons (1,970 women and 1,384 men) were left.
Individuals with neither sickness absence nor sickness attendance were also excluded from analysis since they had not faced the need to decide whether to be absent or not. Information on sickness attendance was collected by asking whether, during the previous 12 months, respondents had gone to work although for health reasons they should have stayed at home. After these exclusions, 2,706 subjects (1,634 women and 1,063 men) were left for analysis.

DATA

Information for all variables in all papers is collected through postal questionnaires.

Outcomes

Sickness absence

Paper I ,Paper IV

The subjects were asked about their sickness absence with the following questions: Have you been sick–listed or reported sick during the last 12 months? If YES: How many days altogether? "1-7 days", " 8-30 days", " 31-90 days" and "more than 90 days".

Paper III

The following question was put to the subjects:
"How many days during the last 12 months have you in total stayed away from work due to your own illness (sick-leave, care, treatment, medical examination)?" "None" "Less than a week", "1-2 weeks", " 3-4 weeks", "1-3 months" and "More than 3 months".

Sickness attendance

Paper 1

Information on sickness attendance was collected through the following question:
"How many times during the last 12 months have you attended work even though for health reasons you should have reported sick?" The four alternative answers were: "Many times", "A few times"," Once" and "Never".

Return to work

Paper II

The following question was put to the subjects who had all been on long-term sickness: "Have you returned to work?" The five alternative answers were: "Yes, full-time", Yes, Part-time", " No, I am still on long-term sick leave", "No, I have got full disability pension" and No, I am unemployed".

The model of illness flexibility

Adjustment latitude

Paper I

Information on adjustment latitude was collected by the following question:
"If you are tired, out of sorts or have a headache, are you able to adjust your work to how you are feeling?" Three alternative answers were available: "Often", "Sometimes", and "Seldom/Never".

Paper II, Paper III, paper IV

Information on adjustment latitude in Paper II was collected by the following question: "In what ways are you able to adjust your work on days when you are feeling worse? (Judge by the work you had before being off sick)". In paper IV the following question was put: " In what way can you adjust work if you feel out of sorts, have pain, have a cold or something similar?" In Paper III, information was gathered by the following question: "What opportunities do you have to adjust work if you do not feel well?" In Papers II and IV, nine ways of adjusting were presented: "1) Can do necessary work and postpone the rest, 2) Can choose among work tasks 3) Can get help from workmates 4) Can work at a slower pace than usual 5) Can take longer breaks 6) Can shorten the workday 7) Can go home and do the work later 8) Can work without being disturbed at the workplace 9) Can work from home". The three alternative answers for each way were: "always" "sometimes" or "never". In Paper III, only the first seven alternatives were presented. In this paper, there were also four alternatives given: "Always", Most of the time", "Mostly not" and "Never".

Individuals description of the adjustment latitude in their work

The nine specific aspects of adjustment latitude were developed from a study based on an open-ended question using data from the Moa-study. MOA is an acronym in Swedish for Modern Work and Living Conditions for Women and Men [Moderna arbets- och livsvillkor för kvinnor och män](99). The study group consisted of 102 women and 101 men at 80 work sites in five different counties in Sweden. The work sites were chosen to get a good coverage of modern working life in Sweden. Data were gathered from a questionnaire between 1995 and 1997. Information on adjustment latitude was collected by the question: "If some day you are feeling e.g. tired, out of sorts, stressed or have pain, do you have opportunities to adjust your work to your health?" In an open-ended question, those that stated they had opportunities to adjust their work were asked "How?" Fifty subjects stated in their answer to a fixed-choice question that they could to a large extent adjust work to their health and 80 subjects that they could partly adjust their work. Altogether 73 subjects responded to the open-ended question "How?" Answers from 12 subjects were excluded as they had given information on either *when* they could adjust (e.g. "if nothing urgent turns up") or *why* they could adjust work (e.g. " I have a free hand in my job"). Answers from 61 subjects remained, which were categorized. Some subjects gave descriptions that fell into more than one of these categories.

Forty-eight out of the 61 subjects reported that they could adjust work to health by doing less demanding tasks. Three different ways of lessening these demands were distinguished. One is that there is an array of tasks to choose from, so when they feel ill, paper work instead of manual work is done, for example. Another way is to do only the necessary tasks and postpone the rest. One subject reported that he avoided tasks that were not necessary to make the customers happy. The third category is that work mates help out. One example is a subject who reported "As there are two of us working together, she (the colleague) can perform the demanding tasks".

Fifteen subjects mentioned that they could control when they work. Two different categories of answers can be distinguished. One way is to shorten the working day, the other is to take time off and do the work later.

The third opportunity reported was to manipulate the pace of work. Only nine of the 61 mentioned this opportunity. One way is to work slower than usual. Another way is to take longer breaks. Four subjects mentioned adjustments that have to do with the place of work. Two types of adjustment can be distinguished. One is the opportunity to work in privacy at the workplace. The other is the opportunity to work from home.

Attendance incentives - stimulating work

Paper III

Stimulating work (attendance incentives) was elicited by 3 questions: (1) Do you have work tasks that catch your attention (e.g. make you curious)? (2) Does work offer opportunities to learn and develop your skills? (3) Do you have work tasks that you feel uncommitted to (make you feel bored)? Five alternative answers to the three questions were given: “every day” “a couple of days per week” “one day per week” “a couple of days per month” “not at all/seldom”. Stimulating work as an index variable was created by summing up the responses to the three questions. For Questions 1 and 2 between one and five scores were given, with five scores given to “every day” and one given to “not at all/seldom”. For the third question the scores were reversed. The scores were summed up in a scale from 3 to 15 (Cronbach´s Alpha =.70).

Paper IV

Information on attendance incentives - stimulating work in Paper IV was obtained with the question: “Does work give you the opportunity to learn and develop your job”. Four alternative answers were available:”No not at all”,”To a small degree”,”To some degree” and”Yes, to a large degree”. The variable was dichotomised by combining “No, not at all” with “To a small degree” and “To some degree” with “Yes, to a large degree”.

Attendance requirements at work

Paper I, Paper IV

Attendance requirements at work in Papers I and IV were elicited with the question: “If you are ill for a couple of days, does your work make it difficult to stay at home?” Three alternative answers were available: “Often”, “Sometimes” and “Seldom/Never”.

Paper III

In Paper III, attendance requirements at work were elicited by asking: ”Imagine a situation where you need to be absent sick for one or two days”…”Will your work be done by someone else?” “Will your work be left for you to do when you return?” “May some of your work remain unperformed?” The four alternative responses to the three questions were “always” “mostly” “mostly not” and “never”. The answers were given scores 1 to 4.. To the first question, the answer “always” was considered to represent small attendance requirements and was given score 1 and “never” was given score 4.. Tn the other two questions the scores given were reversed. The scores were summed up in an index ranging from 3 to 12 (Cronbach´s Alpha = .62).

Financial attendance requirements

Paper III

Information on financial attendance requirements was collected by asking whether the subject could raise 14,000 Swedish crowns (equals approximately 1,500 euros) within a week. Four answers were given: “yes, always” “yes, most of the time” “no, mostly not” “no, never”. A dichotomy was obtained by merging the two “yes” answers and the two “no” answers.

Absence requirements - demanding home tasks

Paper III

Information on demanding home tasks (absence requirement) was collected by a question on whether household tasks were demanding. Alternatives were “always”, “mostly”, “mostly not”, “never”. Those reporting “always” and “mostly” were categorized as having demanding household tasks and the rest as not having demanding tasks.

Socioeconomic position

Paper IV

Socioeconomic position was coded according to the Socioeconomic Index (SEI), which is based on the trade union that normally organises the occupation and on the length of training the occupation normally requires. Subjects were asked to describe their occupation and main work tasks. This information was classified according to the Nordic Standard Occupational Classification (NYK), in which each occupation is coded according to a five-digit classification. Derived from these five-digit occupational codes, SEI is a 2-digit classification comprising 12 codes covering manual workers (4 codes) non-manual workers (5 codes) and self-employed people (3 codes). For the present study, SEI was divided into three categories for analysis: manual workers (codes 11,12,21,22), non-manual workers at low and intermediate levels (codes 33, 36) and non-manual workers at a high level (code 56/57). (100).

Confounders

SRH

Information on health in papers I , III, IV was collected with one question on SRH: “How do you consider your health right now? Is it “very good”, “quite good”, “neither good nor bad”, “quite bad” or “very bad”? This question has proved to be both reliable and valid(101). Those that reported very good or quite good health were considered as having good health and the rest were considered as having poor health. In paper II, a similar question was put: “How has your health been during the past few months?” with five answer alternatives: “very good”, “quite good”, “fair”, “quite bad” or “very bad”. The answers were dichotomised, “very good” and “quite good” representing good health and the rest poor.

Financial attendance requirements
Information on financial attendance requirements in paper I was collected by asking whether the subject could raise 14000 Swedish crowns (equals approximately 1500 euros) within a week. Four answers were given: "yes always" "yes most of the time" "no mostly not" "no never". A dichotomy was obtained by merging the two "yes" answers and the two "no" answers.

Demanding household work
Information on demanding household work in papers I and II was obtained through the question "How demanding are your household duties?" The four alternative answers were "Not at all demanding", "Not that demanding". "Quite demanding" and "Very demanding". The first two answers were categorised as light home burden and the other two as heavy.

Stimulating work
For information on stimulating work in paper II the subjects were asked to indicate on a five-step scale how far the statements "My work is interesting and is a challenge" applied to them. Five indicated total correspondence and one indicated none. Those reporting four or five on the scale were categorised as having stimulating work and the rest as not having it.

ANALYSIS

In all the papers, data were analysed using a multinomial logistic regression model. This model handles nominal outcome variables with more than two levels. The results are presented as odds ratios (OR). For all ORs, 95% confidence intervals (CI) were calculated.

Individuals with neither sickness absence nor sickness attendance

There will be "healthy" individuals that have not experienced an absence-inducing situation during the period studied and who consequently report neither sickness absence nor sickness attendance. Since they have not made the choice, they do not belong to the population for which the model of illness flexibility is valid. Being in good health they may simply have had no reason to consider illness flexibility in their job. We have therefore excluded those reporting neither sickness absence nor sickness attendance. Table 2 displays the groups excluded and included in analysis.

Sickness attendance	Sickness absence	
	No	At least once
No	Excluded	Included
At least once	Included	Included

Table 2 The groups excluded from and included in analysis according to sickness absence and sickness attendance.

Paper I

Separate multiple analysis were performed for the associations between adjustment latitude and attendance requirements and sickness absence/sickness attendance. Men and women were analysed separately. For all associations three models were considered:

(a) An univariate model
(b) A reduced model in which age, health, financial position, and family demands were controlled for.
(c) A full model in which the same confounders as in the reduced model were controlled for as well as attendance requirements when adjustment latitude was analysed and vice versa.

The likelihood of membership was predicted for the categories “absence 8 days or more” and “1-7 days of absence” respectively, compared with “no absence”; and “many occasions of sickness attendance” and “few occasions of sickness attendance”, respectively, compared with “no sickness attendance”.

Paper II

The likelihood of membership was computed for “returned to work full-time” and “returned to work part-time” respectively, compared with “still on sick-leave”. Separate analyses were carried out for women and men.

Paper III

In this study, information on all predictor variables was collected from the first data wave and information on the outcome variable, sickness absence, was collected from the second data wave. The likelihood of membership was predicted for each category “1-6 days of sickness absence/year” and “7 days or more of sickness absence/year” compared with “0 days of sickness absence/year”. Four models were investigated. The

initial models included only each of the components of the illness flexibility model and the outcomes. In the second model, the results were adjusted for sex, age, and SRH. In the third model, the remaining components of the illness flexibility model were added to the second model. The final model also included sickness absence during the year preceding the first data collection.

Paper IV

First, the associations between socioeconomic position and sickness absence were tabulated. Second , socioeconomic position was tabulated against all the potential mediating variables: adjustment latitude, attendance requirements at work , the attendance incentive; stimulating work and SRH. Third, the association between the potential mediating variables and sickness absence was tabulated. The likelihood of membership was predicted for each category “1-30 days of sickness absence/year” and “31 days or more of sickness absence/year” compared with “0 days of sickness absence/year”. Separate analyses were carried out for women and men.

SUMMARY OF PAPERS

A summary of the research questions, samples, design, data-collection, outcome, type of information on prediction variable, factors controlled for, analytical tool and results in the four papers is given in Table 3.

Table 3 Summary of Papers I-IV

	Study I	Study II	Study III	Study IV
Questions	Are adjustment latitude and attendance requirements at work associated with sickness absence and sickness attendance as predicted?	Is adjustment latitude associated with RTW? Does the effect of adjustment latitude differ between those returning full-time and those returning part-time?	Are adjustment latitude, attendance requirements at work, financial attendance requirements, the attendance incentive-stimulating work, and the absence requirements-demanding home tasks associated with sickness absence?	Do components from the illness flexibility model explain differences in sickness absence between socioeconomic positions?
Sample	Random sample of the working population in the county of Stockholm	Salaried employees who had been on sick leave for at least 90 days in 2000	Random sample of working population aged between 25 and 50 from the Swedish population	Random sample of the working population in the county of Stockholm
Design	Cross-sectional	Cross-sectional	Longitudinal	Cross-sectional
Data-collection	Questionnaire	Questionnaire	Questionnaire	Questionnaire
Outcome	Sickness absence • 1-7 days • 8 days or more Sickness attendance	RTW • Full-time • Part-time	Sickness absence • 1-6 days • 7 days or more	Sickness absence • 1-30 days • 31 days or more
Type of information on prediction variable	*Adjustment latitude*: One question *Attendance requirements at work*: One question	*Adjustment latitude*: Index constructed from 9 items of different opportunities	*Adjustment latitude*: Index constructed from 7 items of different opportunities *Attendance requirements at work*: Index constructed from 3 items of different requirements *Financial attendance requirements*: One question *Stimulating work*: Index constructed from 3 items *Demanding home tasks*: One question	*Adjustment latitude*: As Study II *Attendance requirements at work* : As Study I *Stimulating work*: One question *SRH*: One question
Factors controlled for	• Age • SRH • Financial situation • Demanding household work • Attendance requirements (when adjustment latitude studied) • Adjustment latitude (when attendance requirements studied)	• Age • SRH • Stimulating work • Demanding household work	• Age • Sex • SRH • Previous sickness	
Analytical tool	Multinomial logistic regression	Multinomial logistic regression	Multinomial logistic regression	Multinomial logistic regression
Results	Adjustment latitude had a weak association with sickness absence and no association with sickness attendance. Attendance requirements had a strong association with both sickness absence and sickness attendance. The results were similar for both sexes.	For both sexes, the likelihood of RTW, both full-time and part-time, increased with an increasing number of opportunities to adjust	Adjustment latitude, attendance requirements at work and stimulating work was associated to sickness absence. There was no association between financial attendance requirements and demanding home tasks and sickness absence.	A difference found between manual and non-manual employees in high positions in sickness absence 31 days or more /year was decreased by 78% for women and 67% for men by controlling for work characteristics from the illness flexibility model and health.

RESULTS

PAPER I

Low adjustment latitude was, as predicted, associated with an increased risk of being sick absent both 1-7 days (OR=1.3(w) OR=1.1(m)) and 8 days or more (OR=1.5(w) OR=1.3(m)) for both sexes. The association was thus rather weak. For both men and women, attendance requirements at work were associated with both sickness absence and attendance requirements in predicted way. High attendance requirements decreased the risk of being off sick for 1-7 days (OR=.64(w) OR=.45(m)) as well as 8 days or more (OR=.57 (w) OR= .44(m)) and increased the risk of being sick attendant both a few times (OR=3.7(w) OR=5.5(m)) and many times (OR=12(w) OR=18(m).

PAPER II

The odds ratio in the bivariate analysis showed that the likelihood of RTW, full-time or part-time, increased with a rise from 0-3 adjustment opportunities to 4-6 opportunities (full-time: OR=2.5 (w) OR=1.9 (m); part-time: OR=2.6 (w) OR=1.8 (m)), among both men and women. The likelihood of return further increased with a rise in the number of opportunities to 7-9 (full-time: OR=3.3 (w) OR=4.8 (m); part-time: OR=4.1 (w) OR=5.5 (m)). Checking for health reduced the odds ratio for RTW full-time associated with 7-9 opportunities by about 22% among women and 45% among men. Checking for stimulating work and demanding household work only had a marginal impact on the odds ratios for adjustment latitude in both sexes.

PAPER III

The bivariate analysis of longitudinal data showed that an intermediate level, but not a low level of adjustment latitude, was associated with an increased likelihood to be sick absent 1-6 days (OR=1.5(intermediate level)) or for 7 days or more (OR=1.7 (intermediate level)). Work with little stimulation was associated with a higher likelihood of being absent for 7 days or more (OR=2.2) and possibly also for 1-6 days (OR=1.4). Contrary to prediction, difficulty in raising cash was associated with an increased likelihood of being absent for 7 days or more (OR=1.6). Demanding home tasks did not have any association with sickness absence. The components of the illness flexibility model were very little affected by controlling for SRH, sex and age. However, control of these conditions made the association between difficulty in raising cash and sickness absence disappear.

PAPER IV

The sample was divided into three socioeconomic groups: manual, non-manual low/intermediate and non-manual high. The social gradient was evident for both sexes in that the proportion with no sickness absence increased with a higher position while the percentage with 31 days of absence or more in a year decreased with a higher position. Compared with females in non-manual high positions, female manual workers had an OR=2.8 to be sick absent 31 days or more /year. The comparable OR for males was 3.4. The percentages with many opportunities to adjust, with attendance

requirements at work, highly stimulating work and good health increased with higher positions for both sexes.
Checking all work characteristics (adjustment latitude, job stimulation and attendance requirements) explained 56% of the social gradient in many days of absence among women and 63% among men. Adding SRH to the work decreased the difference between non-manual, high-level employees and manual employees in absence from work for 31 days or more a year by 78% for women and 67% for men.

DISCUSSION

In this thesis, predictions from the model of illness flexibility have been tested. The findings can be summarized as follows:

a) Associations between components of the illness flexibility model and predicted outcomes.

Adjustment latitude:

- was associated with sickness absence in the working population. Although the association was in the predicted direction, it was rather weak. This result was found when information on adjustment latitude was collected with one broadly formulated question as well as questioning about several specific opportunities to adjust. The findings were similar in cross-sectional data and longitudinal data (Papers I, III).
- was not associated with sickness attendance when information on adjustment latitude was collected with one question with cross-sectional data (Paper I).
- had a strong correlation with RTW among salary employees the year after they had been long-term sick for at least 90 days (Paper II).

Attendance requirement at work:

- was associated with sickness absence when using both one broadly formulated question and several specific questions about requirements. The association was found in both cross-sectional and longitudinal data (Papers I, III).
- had a strong association with sickness attendance, using one broadly formulated question and cross-sectional data (Paper I).

Financial attendance requirement:

- was not associated with sickness absence, using one question on such requirements in longitudinal data (Paper III).

The attendance incentive - stimulating work:

- was associated with sickness absence when information on such work was collected with three specific questions and in longitudinal data(Paper III).

The absence requirement- demanding home tasks:

- was not associated with sickness absence, using one question on such demands and longitudinal data (Paper III).

b) Components from the illness flexibility model as explanations of the association between socioeconomic position and sickness absence.

Adjustment latitude, attendance requirements at work and the attendance incentive - stimulating work:

- acted independently as explanations of the association between socioeconomic position and sickness absence. Together, these work characteristics substantially attenuated the higher likelihood among manual workers to be sick absent many days a year compared with non-manual workers in high positions (Paper IV).

CROSS-SECTIONAL DATA

Papers I, II and IV are based on cross-sectional data. In such data, associations found can be interpreted in at least three different ways. The first is that they reflect the predicted causality; that is, components from the illness flexibility model determine whether people attend work or not when ill. A second interpretation is that they reflect a reversed causality. Those with, for example, low sickness absence may more often be selected for jobs with high flexibility. A third interpretation is that the associations reflect a recall bias; that is, the memory of subjects will be systematically affected by their behaviour when ill. For example, those with low sickness absence and those who return to work sooner after being long term sick may be more prone to report more flexible or more positive work conditions compared with those with high sickness absence and those who return later.

Paper III presents a longitudinal study of associations between some components of the illness flexibility model and sickness absence. In this study, information on the prediction variables is collected before information on sickness absence. Previous sickness absence is also checked. Although this does not entirely rule out the risk of reversed causality and recall bias, which may also have affected associations found in Paper I, these factors should markedly be reduced.

The association found between adjustment latitude and RTW in cross-sectional data in Paper II may be partly due to recall bias. Among those who reported that they were still on sick-leave, a large proportion had probably not attended work for more than one year. Compared with those who had returned to work, those on sick-leave may both have greater difficulty in remembering work conditions and be more likely to report more negative work conditions. The association between adjustment latitude and RTW should be studied in a prospective design to rule out the possibility of recall bias.

In Paper IV we found, in cross-sectional data, that the association between socioeconomic position and sickness absence was reduced by checking self –reported health and components from the illness flexibility model. These results may be interpreted in terms of both reversed causality and recall bias. For example, those with high sickness absence, which is more common among manual workers, may report more negative work conditions. Those with poor health may be selected for lower socioeconomic positions. Thus, the impact on health and components from the illness flexibility model on the social gradient in sickness absence requires a longitudinal design in which possible selection by health for socioeconomic positions can be checked and reporting bias is minimized.

NON-RESPONDERS

A shortcoming in all studies is the high rate of non-responders. Generally there is a higher response among women and those of higher ages. However, we consider it unlikely that the low participation rate seriously distorted the associations found, i.e. that components from the illness flexibility model could have had different effects among participants and non-participants.

OUTCOMES

Self-reported sickness absence

The studies of sickness absence in Papers I, III and IV are based on self-reported data. Studies of the accuracy of self-reported sickness absence have yielded contradictory results. Van Poppel concluded that that the sensitivity of questionnaires for detecting an episode of sick leave was low. The authors did not recommend self-reports as a valid instrument for sickness absence(102). Severens reported that the accuracy of self-reports seems to be acceptable as no systematic over- or underestimation could be detected. However, the imprecision of self-reports decreases when longer recall periods are used and the authors recommended a recall period of no longer than 2 months(103). Self-reported data have been considered sufficiently accurate for sickness absence related to musculoskeletal morbidity (104)and back pain (105). A study performed on data from Whitehall II comparing self-reported sickness absence with employers' registers has a much bigger sample (2406 women and 5589 men) than the papers referred to above. In this study agreement between self-reported and registered sickness absence decreased with an increasing number of days of sickness absence. However the authors concluded that there was relatively good agreement between the annual number of self-reported and the annual number of recorded sickness absence days for both sexes (106).

In our studies, subjects have been asked to recall sickness absence 12 months back in time as well as the number of days of absence. There is thus a risk that the data do not accurately differentiate between groups with different numbers of days of absence. If the accuracy is low and unrelated to the determinant variables, this has diluted the associations between the determinants and outcome variables. Studies of the components of the illness flexibility model and registered sickness absence are needed.

Return to work

Self reported RTW was the outcome in Paper II. According to Krause et.al., duration of work disability can be defined in three ways: (1) cumulatively, as the duration of all days lost from work, (2) categorically (e.g., RTW ever yes/no;working at time x yes/no), (3) continuously, as time to RTW (e.g. calendar time from date of onset to date of first RTW, or as sustained RTW, to the end of the last missed work day after a series of disability episodes (107). For this study, a categorical definition was used, as

subjects were asked to report whether they had returned to work or not. To the best of our knowledge no study has assessed the validity of this type of data.
The follow-up period between being defined as long-term sick absent and questioning about RTW is rather short in our study, about one year. The effect of adjustment latitude may diminish or become stronger with a longer follow-up period.

Sickness attendance

Self-reported data on sickness attendance was used as an outcome in Paper I. An. inherent problem with the phenomenon of "sickness attendance" is that it is not "visible" in the way sickness absence is. Although it is obviously an important area to investigate, it is difficult to validate the information gathered. The studies by Aronson et.al., often referred to, collected data in the same way as we did (75, 76). In a study from Whitehall II, sickness attendees were distinguished by combining health status and level of sickness absence. Those reporting bad health and having low sickness absence were assumed to "work through illness"(108).
The concept of sickness attendance needs to be developed. For example, the relation between adjustment latitude and sickness attendance needs to be clarified. If, for example, a person works from home when suffering from a cold, just performing the most necessary tasks, should that be regarded as sickness attendance or not? It is likely that the level of adjustment latitude also will affect whether people regard their action as sickness attendance or not. Those with high adjustment latitude may not regard themselves as sickness attendees if they work when ill, while those with low adjustment latitude may do so.

COMPONENTS OF ILLNESS FLEXIBILITY MODEL

Associations between components of the illness flexibility model and predicted outcomes

Adjustment latitude
Summing up the knowledge so far, adjustment latitude is associated with both few and many days of absence. Using a broadly formulated question on adjustment latitude which was dichotomized on cross-sectional data (Paper I) showed a weak association with sickness absence in the predicted direction for both sexes, but it was only significant for women. Using an index based on seven items which was trichotomized on longitudinal data showed a somewhat stronger association (Paper III) with both a few days and many days of absence. However, it was those with an intermediate level of adjustment latitude that had an increased likelihood to be absent and not those with the lowest latitude, compared with those with high latitude. In this study, the sample size did not permit separate analyses of men and women. To further scrutinize the association between adjustment latitude and sickness absence, further studies are required in which adjustment latitude is measured through the index-variable, with a bigger sample size, permitting separate analyses of men and women and of longitudinal data.

Adjustment latitude had a strong association with RTW among long-term sick men and women when measured through the index-variable (Paper II). The sample consisted of salaried employees from the private sector and the period asked for was about one year. One question for the future is whether adjustment latitude is important for RTW among employees in other positions and the public sector. Another question is whether the association will remain if a longer period is studied
Surprisingly, adjustment latitude did not show any significant association with sickness attendance (Paper I). There was rather a tendency towards an opposite association from that expected; in other words, those that had to work fully when ill tended to be sick attendant more than those that were able to adjust work to health. Aronson & Gustafsson studied control over work pace and found a similar opposite association from that predicted (76). One possible way to interpret these results is that adjustment latitude and sickness attendance conflate, as was mentioned in the section on sickness attendance above. Those with high adjustment latitude may not regard themselves as sick-attendees if they have an aching back or a cold. These symptoms are likely to be more evident among those lacking opportunities to adjust and thus having to work fully. Another way to interpret the lack of association is that the data on sickness attendance were non-differentially misclassified. Inability to recall true figures may affect the reporting of sickness attendance. The lack of association may also be due to adjustment latitude being measured through the broadly formulated question. Maybe a predicted association between adjustment latitude and sickness attendance will be found if information on this latitude is measured through the index-variable. The lack of association may, of course, also be due to adjustment latitude not being important or a true option for people in some occupations. A British study asked doctors in an open-ended question in a questionnaire to list reasons for working through illness. Opportunities to adjust were not among the listed reasons (77).

In a qualitative study of 33 men and women with neck or back pain, their decision to be off sick from work was explored. The responses were analysed in relation to components of the model of illness flexibility. In accordance with our studies, it was found that "high adjustment latitude had the greatest effect on early RTW". Contrary to our findings, the subjects reported that lack of adjustment latitude contributed to long sickness attendance periods (109).

Attendance requirements at work
Using a broadly formulated question which was dichotomized in a cross-sectional design, we found an association between attendance requirements and both sickness absence and sick attendance in the predicted direction for both sexes. Having large attendance requirements at work decreased the likelihood of being sick absent, both a few and many days, and increased the likelihood of being sick attendant both a few and many times(Paper I). On longitudinal data, using an index-variable based on three items, attendance requirements were associated with many days of sickness absence (7 days or more) but not with fewer days (Paper III). Several studies have found associations between aspects we consider to be attendance requirements at work and sickness attendance (75-77, 109). To the best of our knowledge, no other study has focused on the association between attendance requirements at work and sickness absence.

We have not carried out any study on attendance requirements at work and RTW. It does not seem likely that having such requirements will push people back to work when they have been away for a long time. Instead, attendance requirements at work may have the opposite impact on the decision to go back to work among long-term sick people. Knowing that work will demand attendance may act as an obstacle to going back.

Financial attendance requirements
We did not find any association between financial attendance requirements and sickness absence on longitudinal data (Paper III). Previous research on sickness absence has predicted and found support for an increased likelihood of being sick absent when there are financial difficulties (18, 51, 64). The suggested rationale behind these findings is that financial difficulties will have a negative impact on health and in turn increase sickness absence. In our study, we checked for SRH, which may explain why our results differed from those of previous studies. The fact that financial situation does not seem to affect people's sickness absence behaviour may indicate that that coverage from the social security system is sufficient to allow people to stay at home when ill. However, it has been shown from Swedish data that people with problems in handling ongoing expenses have a higher likelihood to attend work when sick than people without such problems(76).

The attendance incentive - stimulating work
Those reporting low on stimulating work had a higher likelihood to be sick absent compared with those reporting high (Paper III). We interpret job stimulation as an attendance incentive that makes people want to go to work despite illness. One of the three questions used was originally developed to grasp "skill discretion" (opportunities to learn and develop skills), while the other two are probably closely related to such discretion (whether work catches interest and whether one feel uncommitted to certain work tasks). Skill discretion is assumed to act as a health-promoting factor(110). We assume that checking for SRH will partly adjust for the potential effects on health of the degree of stimulation at work.

Our findings support a hypothesis proposed by Stansfeld, et.al. which found that skill discretion did not predict mental health but showed a strong association with short-term absence for psychiatric reasons. Those authors suggested that "Interesting and varied jobs tend to encourage people to stay at work at the time of mental health difficulties rather than take absence"(111).

The absence requirement - demanding home tasks
The hypothesis that demanding home tasks act as an absence requirement was not confirmed in this study. Instead, there was a statistically non-significant association in the opposite direction. These results do not support findings from a Finnish study of full-time public-sector employees in which long domestic working hours predicted an increase in medically-certified sickness absence for both sexes (53).The use of hours spent on domestic work may be a more valid measurement of home tasks than the

respondent's judgement of whether home tasks are demanding. Unfortunately, this study lacked information on the number of hours spent on home tasks.

Components from the illness flexibility model as explanations of the association between socioeconomic position and sickness absence.

In Paper IV, the social gradient was evident for sickness absence of 31 days or more/ year. No difference in sickness absence between 1-30 days was found between the different social positions. It was suggested that the social gradient in sickness absence can be explained by differences in health and conditions met in and outside work when ill. We found that, when considering health and components from the illness flexibility model, the social gradient in sickness absence of 31 days or more was considerably reduced for both men and women.

Socioeconomic position
Socioeconomic position is described according to the SEI classification. Söderfelt et.al. (8) studied sickness absence in relation to SEI and three alternative ways to classify social position. A conclusion from that study was that there was a marked overlap between different measures of social position. This indicates that the present results would not have been different if an alternative way of measuring social position had been used.

Components of the illness flexibility model
The questions on adjustment latitude and attendance requirements were both developed in relation to the model of illness flexibility. In the questioning, it was made explicit that the working conditions should be described for situations when illness was experienced. As is evident from the above, by using these questions we have also been able to find support for predicted associations.
Stimulating work was elicited with a question developed to grasp "skill discretion", which is assumed to be a risk factor for ill-health. It was thus not explicitly adressing conditions when feeling ill. A Danish study found that skill discretion explained 13% of the social gradient of worsened SRH over a five-year period (112). As we included SRH in the analysis potential, effects on the social gradient in sickness absence mediated through health should be diminished.

THE STATE AND FUTURE OF THE MODEL OF ILLNESS FLEXIBILITY

In this thesis, a novel model of sickness absence, the model of illness flexibility, has been introduced and tested in four studies. Originally, the model had only two components, adjustment latitude and attendance requirements, and this has been

expanded during the completion of this thesis. As a result, we have gained more knowledge of these original components than the others. Three of the four studies are performed on cross-sectional data, which is a weakness. Using cross-sectional data may be justified by the novelty of the model as a first test of the predicted associations.
Our studies have indicated that components from the model of illness flexibility may contribute to our understanding of sickness absence and related actions. We found that conditions which can be mediated through both ability and motivation to work were associated with sickness absence in the predicted way. It is most necessary, however to develop the model and improve its applicability. Such work should address at least three issues, outlined below:

Theoretical and methodological development of the components.

Adjustment latitude and attendance requirements are the most well-developed components from the model of illness flexibility as their practical denotation has been derived empirically. Although we have stipulated possible denotations of absence requirements and attendance and absence requirements, they have not been studied empirically. We intend to carry out such studies. The development of instruments measuring the components and studies of their metric qualities are also needed.

Development of knowledge of the internal relations in the model

We have not studied the internal relations in the model. There are several questions that can be put: Are ability and motivation to work related? Do those with a low ability to work also have a low motivation to work? Are the two dimensions of motivation discerned in the model of illness flexibility (ought/should; want to) associated differently with ability to work?

Both ability to work and motivation have been treated as latent variables and have not been measured directly. It may, of course, be desirable, if possible, to use direct measurements of these aspects and study their relations to the components of the illness flexibility model. Whether ability and motivation to work most effectively is studied directly or indirectly is a question for the future.
The associations between the components of the illness flexibility work are also an area for studies.

Development of knowledge of the external relations to the model

We have found associations with some components from the illness flexibility model and sickness absence. Many questions remain to be answered, regarding both those components that have been studied and those that have not. We know, for example, that adjustment latitude is associated with RTW. But we do not know whether lack of opportunities to adjust is associated to the inception of going sick absent. A study examining this question is in progress. We also know that attendance requirements at work and the attendance incentive of stimulating work are associated with sickness absence. Further questions to be investigated are whether high attendance requirements

and stimulating work act as an obstacle to being sick absent and/or making people RTW sooner.
The components of the illness flexibility model have not been studied in relation to exclusions from the labour market. It is plausible that adjustment latitude will affect whether employees can remain on the labour market or are excluded when feeling ill. It is also plausible that negative signals from management and workmates (absence requirements) will affect an employee's opportunities to remain on the labour market when ill. Other components from the model of illness flexibility may also affect whether people can remain at work or are excluded when ill.
In Paper I, we hypothesized that reporting of adjustment latitude was affected by adjustment latitude. Maybe those with a high adjustment latitude are less likely to report sickness attendance when feeling ill compared with those with a low adjustment latitude. In order to understand sickness attendance, it seems crucial to elucidate whether this conceptual conflation exists.
Concepts from the illness flexibility model may be important not only for actions when there are changes in people's own health. How people act to family demands like sick children, for example, are also likely to be affected by components in the illness flexibility model.

Possible applications of the illness flexibility model

The model of illness flexibility has been developed to explain sickness absence and related actions. However, there are some other areas where it might be possible to apply the components from the model. Knowledge of adjustment latitude at work may be important when judging the need for sickness absence. Depending on this latitude, it may or may not be possible to perform a job when having a certain health problem.
The components from the illness flexibility model may also be useful in vocational rehabilitation back to work. Considering the different aspects in the model may be helpful in structuring potential obstacles and opportunities to RTW.
A further potential application is that conditions in the model can be considered when reorganising work. Changes in work organisation can increase costs for the company if they affect adjustment latitude and absence and attendance requirements/incentives in such a way that sickness absence is increased and reduce costs if they affect these components in the opposite direction.

CONCLUDING REMARKS

The results here indicate that components from the illness flexibility model are promising in increasing our understanding of causes to sickness absence and related actions. Components that affect both ability to work and motivation to work appear to have an affect on sickness absence. Future studies should be directed to theoretical and methodological development of the components as well as future testing of predictions from the model. Such testing should be done with improved design and data as longitudinal design, register-based data of sickness absence, and tested measurements of the components of the illness flexibility model. Testing of the model should also be directed to different actions taken when ill as the inception of sickness absence, length of absence, RTW, and exclusion from the labour market.

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