TEMPORARY EMPLOYMENT AND ILLNESS

Anna-Karin Waenerlund

Department of Public Health and Clinical Medicine
Umeå University, Umeå, Sweden 2013
‘There is no justice, you just have to adapt’
Table of Contents

Abstract .................................................................................................................. 3
Sammanfattning på svenska ............................................................................... 4
Original papers..................................................................................................... 6
Background ........................................................................................................... 8
  Public Health framework .................................................................................... 8
    Concepts of health and illness ........................................................................ 8
  Employment status and illness .......................................................................... 9
    Views of the labour market ............................................................................. 10
    Overview of research on temporary employment and illness within the field of public health ............................................................... 13
    Factors of relevance for temporary employment and illness ....................... 14
    Work related factors ....................................................................................... 15
    Socio-demographic factors .......................................................................... 15
    Health selection .............................................................................................. 16
Aims of the thesis .................................................................................................. 17
  Overall aim ......................................................................................................... 17
  Specific aims ....................................................................................................... 17
Methods .................................................................................................................. 18
  Setting ................................................................................................................ 19
    Temporary employment in a Swedish context ................................................. 19
    The Northern Swedish Cohort ....................................................................... 21
Population ............................................................................................................. 22
Quantitative data collection ............................................................................... 23
Qualitative data collection .................................................................................. 24
Measures ................................................................................................................. 24
  Exposures .......................................................................................................... 24
  Outcome and indicators of health-related selection ......................................... 26
  Background variables ....................................................................................... 26
  Possible mediating variables at age 42 (paper I) ............................................ 27
Analysis .................................................................................................................. 28
  Statistical analyses ............................................................................................ 28
  Qualitative analyses .......................................................................................... 28
Ethical considerations ........................................................................................... 30
Results ..................................................................................................................... 31
  1. Differences in socio-demographic measures and previous health status between temporary and permanent employees ..................... 31
  2. Is temporary employment related to illness? ............................................... 31
    Distribution of illness in exposed and non-exposed group ......................... 31
    Findings in unadjusted logistic regression ...................................................... 32
    Significant findings from adjusted logistic regression analysis .................... 32
3. What social conditions can help understand the relationship between temporary employment and illness ........................................ 35

   Possible mediators .................................................................................. 35
   Labour market situation ............................................................................ 36
   Gender ...................................................................................................... 37

Discussion ..................................................................................................... 38

Is temporary employment related to illness? ........................................... 38

   Various measures of temporary employment ........................................ 38
   Qualitative research .................................................................................. 40
   How could different measures and methods of temporary employment help understand the relationship to illness better? ............... 40

Social conditions surrounding the relationship between temporary employment and illness ..................................................... 42

   Experiencing job insecurity and having a low cash margin .................. 42
   Unemployment- a part of being temporarily employed ......................... 43
   Selection into temporary employment .................................................... 44
   Women more often in temporary employment but affected similarly to men ................................................................................. 44
   Socio-economic status .............................................................................. 45
   Family situation ........................................................................................ 45

Methodological considerations .................................................................... 46

   Overall strengths ..................................................................................... 46
   Sample and generalizability ..................................................................... 47
   Selection bias ............................................................................................ 47
   Information bias ........................................................................................ 48
   Analysis .................................................................................................... 51
   Qualitative study ....................................................................................... 52

Conclusions .................................................................................................. 54

   Public health policy and implications for future research ...................... 54

Acknowledgements ....................................................................................... 56

Gratitude! ...................................................................................................... 57

References ..................................................................................................... 60
Abstract

Background: It is debated whether temporary employment compared to permanent employment entails an elevated risk of illness or not, as the empirical studies have not shown a unified picture. Since a significant part of the Swedish workforce is currently working under temporary employment contracts, it is important for public health research to pay close attention to what the implications in terms of illness might be. Therefore the aim of this thesis was to explore the relationship between temporary employment and illness.

Methods: This thesis was based on data from the Northern Swedish Cohort, consisting of all pupils in grade 9 in Luleå in 1981 (n=1083). The cohort was followed with extensive questionnaires. The latest follow-up was performed in year 2007, when 94% participated. To analyse the quantitative questionnaire data, logistic regression and trajectory analysis were used. A qualitative method, Grounded Theory, was also applied in this thesis to analyse interviews performed in 2011, with a strategic selection of 12 participants from the cohort.

Results: Quantitative data showed that temporary employees had overall higher odds ratios for illness in terms of psychological distress and non-optimal self-rated health compared to permanent employees. This general difference in odds ratios was evident irrespective of how temporary employment was measured as well as after control for earlier health status and confounders. The qualitative analysis gained insight into temporary employment as social processes of: underling the driving force for employment; working hard for a job. The structural conditions emerged in terms of, being used and exploited on the labour market and these conditions were related to the individual strategies of adaptation and coping. In the intersection of agency, structural conditions and adaption, emotional and bodily reactions emerged, such as being worn out, worried and wrathful.

Conclusion: Illness is unevenly distributed between temporary and permanent employees, with temporary employees being the unfavourable group. Striving for good and evenly distributed health conditions in the population, policy makers should aim at reducing the number of employees working in temporary contracts. In addition, there is a need to improve surveillance of the health situation among temporary employees and to reduce unfavourable conditions, such as job and financial insecurity and unemployment, among temporary employees.
Sammanfattning på svenska

Bakgrund: En debatterad fråga är om tillfälliga anställningar i jämförelse med tillsvidare anställningar innebär en förhöjd risk för ohälsa eller inte, något som tidigare forskning inte kunnat ge ett enhetligt svar på. Eftersom en betydande del av den svenska arbetskraften för närvarande har tillfälliga anställningskontrakt, är det viktigt att uppmärksamma möjliga hälsokonsekvenser inom folkhälsoforskningen. Därför är syftet med denna avhandling att undersöka sambandet mellan tillfälliga anställningar och ohälsa.


Resultat: De kvantitativa analyserna visade att tidsbegränsat anställda hade generellt högre oddskvoter för ohälsa i form av psykiska besvär och icke-optimal självskattad hälsa jämfört med tillsvidareanställda. Denna generella skillnad i oddskvoter var oberoende av hur den tidsbegränsade anställningar mättes liksom av tidigare hälsotillstånd och bakgrundsvARIABLEN. Den kvalitativa analysen gav inblick i hur tillfälligt anställda upplevde sin situation. Analysen beskrev drivkrafterna för intervjupersonernas sysselsättning, och hur de arbetar hårt för att få ett jobb. De strukturella förhållandena var relaterrade till anställningen och bidrog till att intervjupersonerna hamnade in en situation där de kunde bli utnyttjade av arbetsgivaren. I analysen framkom också hur de anpassade sig till situationen och vilka individuella strategier som användes för att överleva. I skärningspunkten mellan drivkrafterna, de strukturerade villkoren och deras anpassningsstrategier utmynnade känslomässiga och kroppliga reaktioner i form av oro, ilska, trötthet att de kände sig utslitna.

Slutsats: Ohälsan är ojämnt fördelad mellan tillfälligt och tillsvidareanställda. Det finns behov av att följa utvecklingen av hälsoläget bland tillfälligt anställda samt att minska ojämnsamma förhållanden, såsom anställnings- och ekonomisk otrygghet och arbetslöshet bland tillfälligt
anställda. För att sträva efter en god och jämligt fördelad hälsa i befolkningen, bör politiska beslutsfattare ha som mål att minska antalet anställda som arbetar i tillfälliga kontrakt.
Original papers

This thesis is based on the following papers:

I    Waenerlund AK, Virtanen P, Hammarström A.
     Is temporary employment related to health status? Analysis of the
     Northern Swedish Cohort

II   Waenerlund AK, Gustafsson PE, Virtanen P, Hammarström A.
     Is core-periphery labour market structure related to perceived
     health? Findings of the Northern Swedish Cohort
     BMC Public Health. 2011; 11:956

III  Waenerlund AK, Gustafsson PE, Hammarström A, Virtanen P.
     Are changes in labour market attachment over 12 years related to
     health status? An analysis in the Northern Swedish Cohort
     Submitted

IV   Waenerlund AK, Hammarström A, Wiklund M.
     “Worn, worried and wrathful”: Experiences and illness in an exposed
     position as temporarily employed
     Manuscript

All published papers are reprinted with permission of the copyright holders. An overview of the papers in the thesis is presented in Table 1.
<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th><strong>Paper I</strong></th>
<th><strong>Paper II</strong></th>
<th><strong>Paper III</strong></th>
<th><strong>Paper IV</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim</strong></td>
<td>To investigate whether temporary employment is related to health status after adjustments for health status at age 30, and to analyze possible mediators (job insecurity, low cash margin and high job strain) of this relationship.</td>
<td>To examine whether accumulation of time in peripheral employment is associated with psychological distress and poor or average self-rated health and whether it is different among woman than men.</td>
<td>To use trajectory analysis to measure employment status over 12 years and to examine whether employment tracks relate to perceived health.</td>
<td>To analyze experiences of temporary employment among women and men with a specific focus on aspects of health and eventual illness.</td>
</tr>
<tr>
<td><strong>Data source</strong></td>
<td>Questionnaires</td>
<td>Questionnaires</td>
<td>Questionnaires</td>
<td>Interviews</td>
</tr>
<tr>
<td><strong>Exposure measure</strong></td>
<td>Concurrently with the outcome: Temporary employment.</td>
<td>Accumulation over 12 years: Peripheral employment Score.</td>
<td>Labour market trajectories over 12 years.</td>
<td>Experience of temporary employment over life course.</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td>Temporary employment was associated with psychological distress and non-optimal self-rated health, even after adjusting for sociodemographic variables and earlier health status. Job insecurity and low cash margin could partially mediate the association.</td>
<td>There was a gradient particularly in psychological distress along with the core-periphery structure accumulated over 12 years. Sociodemographics, unemployment and being out of labour market and previous health status did explained the results to a large degree.</td>
<td>Compared to those with permanent attachment, higher probability of psychological distress and partially for non-optimal self-rated health in the three non-permanent tracks. Differences were partially attributed to previous health status and also sociodemographic variables.</td>
<td>Experiences of temporary employment were related to illness. Being used and exploited and accepting and adapting was related becoming worn out, worried and wrathful and an unhealthy living and working situation.</td>
</tr>
</tbody>
</table>
Background

Public Health framework
This thesis is grounded in public health science, which has been defined in the Acheson report (Acheson, 1998) as society’s responsibility to prevent disease and illness and prolonging life through organized efforts from society and to give the prerequisites for a healthy life. In public health science, practice and research are equally important. A goal in public health research is to identify and address factors in the social environment that may be related to health outcomes (Berkman and Kawachi, 2000). To move towards this goal in public health I have chosen to focus on social inequalities in health by studying whether the distribution of illness in the population is dependent on labour market position.

From a public health view it is important to maintain and improve health in a population as well as promoting equity in health (Pellmer and Wramner, 2001). If resources in a population are unevenly distributed this can result in health inequalities. I have used a social epidemiology approach, which entails studying social determinants of health (Berkman and Kawachi, 2000) and their distribution in a population (Krieger, 2001). I was interested in knowing whether labour market position (e.g. type of employment contract) was a determinant of health and whether resources (job security, cash margin and control and demands) were evenly distributed regardless of labour market position.

Concepts of health and illness
The word health comes from the Old English word hælþ, which means being whole, wholeness or being sound. Health has been defined in many different ways (World Health Organization, 1948, Antonovsky, 1987, Pörn, 1984, Nordinfelt, 1993, Boorse, 1977). Two common approaches are the biostatistical and the humanistic approach. The biostatistical approach suggest that health is absence of disease and that health is the opposite of disease (Medin and Alexanderson, 2000). The humanistic approach views health as something more than just the absence of disease. The human is thought of as an active actor in her/his own life. There is an interplay between the human and the social context in which the human lives (Medin and Alexanderson, 2000). It is the latter of these approaches that is embraced in this thesis. I have a holistic view of health suggesting that this concept includes both physical and psychological well-being. A holistic view of health implies that the ability
to act upon basic goals and health, is created in close relation to the context that the human is living and acting in.

During the course of writing this thesis, however, I have realized that my main focus is not on health but rather ill-health. Therefore, towards the end of writing this thesis I have chosen to apply the concept of illness instead of health status—even though I have used health status in the quantitative papers. Illness is described as an undesirable subjective state of health and is often referred to as symptoms defined by the individual (Hofmann, 2002). The measure of illness in the quantitative studies of this thesis is based on the subjective experience of one’s illness, which represents an emotional part of an individual’s health experience. In the qualitative study the informants were free to express their own interpretations of health- and illness-related experiences, which is therefore a wider interpretation ranging across many dimensions compared to the quantitative papers. The concept of illness is used in the cover as a collective label for the various health measures in this thesis, including both health complaints in the measures and what was described as health experiences in the interviews.

**Employment status and illness**

Work is an important social determinant of health (Marmot et al., 2008). Work is not only a source of income but also gives life structure, a greater purpose, sense of coherence, and it engages people, affects self-esteem and creates a feeling of participation in society (Naidoo and Wills, 2000, Acheson, 1998, Jahoda, 1981). But employment can also impose risk especially if the workplace is a hazardous or a stressful environment. In research the traditional medical focus has been on occupational health, typically risk of accidents or exposure to hazards such as chemical substances. In the last few decades, though, there has been an increased interest in the psychosocial work environment. For example, it is well established that high demands in combination with low decision latitude can lead to job stress and heart disease (Naidoo and Wills, 2000, Karasek and Theorell, 1990).

While the work environment thus can entail both physical and psychosocial risk factors for health (Raphael, 2009), work also fills an important function in people’s lives, such as time structure, social contacts, and regular activity (Jahoda, 1981). Because of this, having a job is by itself promotive of health, while the reverse situation of being unemployed involve health risks. For example, it has been known for a long time that unemployment can have harmful health effects (Jahoda, 1981), e.g. mortality (Åhs and Westerling,
2006), depression (Jefferis et al., 2011) and high alcohol consumption (Mossakowski, 2008). The existing body of research is in agreement when it comes to the relationship between unemployment and poor mental health (McKee-Ryan et al., 2005).

For a particular group on the labour market, the temporary employees, some of the hazards of both work environment and unemployment intersect. Temporary employment contracts share some traits with standard employment but also increase the risk of unemployment between the contract periods. In addition, temporary employees generally work under worse psychosocial conditions than permanent employees (Aronsson et al., 2002). Therefore, it might not be enough to differentiate between employment and unemployment, as health status may also vary depending on the type of employment contract (Aronsson et al., 2000). In the research on this topic, though, it is debated whether these temporary contracts are related to illness or not; this is the point of the departure this thesis.

As research on temporary employment is shaped by ideas about the labour market, I will first give an overview of the labour market theories of particular relevance for the field and this thesis.

**Views of the labour market**
As a reflection of the changes that have occurred on the labour market in recent decades, theories of the labour market have also evolved over time.

In the early 1970s Doeringer and Piore (1971) presented the dual labour market theory suggesting that there are two segments in the labour market. The primary labour market is characterised by good working conditions, pay, development opportunities and a secondary segment with poor working conditions, pay and career advancement.

In the 1980s Atkinson presented the flexible firm model and suggested a development from the dual labour market theory. Atkinson suggests that the focus on the dual labour market can be criticised, as the same firm can have both a core group of employees with stable conditions and a peripheral group with less stable conditions. Atkinson exemplifies that in a bank there is often a core group of stable, career-oriented, male-dominated bankers that co-exists with clerical workers which have high turn-over and little career progression (Atkinson, 1985). This is often referred to as the new flexible labour market. The workforce employed with temporary contracts are supposed to work as a buffer, in terms of ‘numerical flexibility’ and can be
exploited in a range of alternatives to make sure that the type and number of workers are the exact amount required at any given time (Atkinson, 1985). This increased flexibility for the employer results in less job security and career opportunities for the employee (Atkinson, 1985).

A more recent development of Atkinson’s flexible firm theory has been done by Aronsson (Aronsson et al., 2000). Aronsson suggest that Atkinson’s theory can be applied on an individual level and be used as a structure principal for studies of work environment. Aronsson describes a centre or core with permanent full-time employees with good working conditions, high job security, development opportunities and pay. Around the core is another circle of individuals with time-restricted contracts who serves the employer with flexibility during production peaks and dips. Aronsson describes how dichotomizing employees into temporary and permanent might not be enough, as the group of temporary employees is rather heterogeneous in terms of work environment and working conditions (Aronsson et al., 2002). Aronsson therefore suggests a hypothetical ranking order in relation to employment status reaching from the core to the periphery.

The developments of labour market theories are also reflected in the sometimes confusing terminology used in temporary and illness research. An overview of some terms relevant for the present thesis is given in Table 2.
Table 2. Concepts of non-permanent jobs (Waenerlund, 2010)

<table>
<thead>
<tr>
<th>Type of employment contract</th>
<th>Definition</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary employment</td>
<td>On a temporary basis either for a short time on fixed-term contracts (which have a fixed end-point determined by completion of task or date) or on-call basis</td>
<td>(Kalleberg, 2000)</td>
</tr>
<tr>
<td>Atypical employment</td>
<td>Temporary and part time employment</td>
<td>(Bardasi and Francesconi, 2004)</td>
</tr>
<tr>
<td>Precarious employment</td>
<td>All employment that does not have a permanent contract. The main categories of workers in precarious employment are those with fixed-term or temporary contracts, both full-time and part-time</td>
<td>(Bartley and Ferrie, 2001)</td>
</tr>
<tr>
<td>Contingent employment</td>
<td>Refers to work with unpredictable hours or of limited duration (limited duration contracts, self-employment, temporary work, agency work)</td>
<td>(Polivka and Nardone, 1989), (Bergström, 2001)</td>
</tr>
<tr>
<td>Permanent, fixed, atypical</td>
<td>Permanent: Wage-earners with permanent contract and all entrepreneurs, the self-employed and farmers. / Fixed: Including deputizing, locum and fixed-term employment e.g. all those whose contract was going to expire at a given point in time. / Atypical: A residual group comprising temporary (hired), freelance, probation, seasonal, on-call, apprenticeship, and other non-permanent workers</td>
<td>(Virtanen et al., 2003)</td>
</tr>
<tr>
<td>Non-standard employment</td>
<td>Part-time, temporary employment or contract work</td>
<td>(Kalleberg, 2000)</td>
</tr>
<tr>
<td>Alternative employment</td>
<td>Permanent part-time, fixed-term and on-call work</td>
<td>(Bernhard-Oettel et al., 2005)</td>
</tr>
</tbody>
</table>

The divergent results of associations between temporary employment and illness (described below) may be attributable to the lack of consistency in how to define and measure temporary employment.

The development of a flexible workforce is grounded in the economic incentives; as demands for productivity have increased over the past few decades, increasing the number of temporary contracts is seen as a way of cutting costs. However, it has been suggested that workers flexibility could take a toll on their health. For example, work and insecure working
conditions are considered as important social determinants of health (Marmot et al., 2008, The Swedish National Institute of Public Health, 2011). In the same vein, fair employment and decent working conditions reduce social inequities and improve well-being (Marmot et al., 2008).

Overview of research on temporary employment and illness within the field of public health

The empirical evidence lacks in consistency as to temporary employment is related to illness or not. Nevertheless, temporary employment has shown to be associated with poor mental health according to two reviews on the topic (Ferrie et al., 2008, Virtanen et al., 2005). A recent review suggests that health effects may depend on welfare regimes and that temporary employees in Scandinavia report better or equal health compared to their permanent counterparts (Kim et al., 2012). In contrast, one Finnish study suggests that temporary employees who experience insecurity or who are involuntarily employed on a temporary contract had a higher risk of mortality compared to permanent employees (Nätti et al., 2009). Yet another Finnish study also suggests that temporary employees have a higher risk of mortality than permanent employees and that a change from temporary to permanent contract entailed a lower risk of mortality compared to permanent employees (Kivimäki et al., 2003).

Most previous studies have found little evidence that temporary employment is related to poor self-rated health (Bardasi and Francesconi, 2004, Virtanen et al., 2003, Virtanen et al., 2002, Kompier et al., 2009), although there are some contrasting results suggesting that there is an association with poor self-rated health (Kim et al., 2008b, Kim et al., 2008a, Tsurugano et al., 2012). Some evidence suggests that only more peripheral types of temporary jobs such as on-call or casual jobs are related to poor mental health (Bardasi and Francesconi, 2004, Virtanen et al., 2003, Artazcoz et al., 2005), although one study reported no difference regarding poor mental health between casual and permanent employees (Keuskamp et al., 2013). Previous research has found no association between working on fixed-term contracts and poor general health or poor mental health (Bardasi and Francesconi, 2004, Virtanen et al., 2003, Artazcoz et al., 2005, Virtanen et al., 2002). However, there are some contrary studies suggesting that temporary employees were more likely to experience poor mental health than permanent employees (Kompier et al., 2009, Tsurugano et al., 2012) especially women (Virtanen et al., 2002, Kim et al., 2008a, Inoue et al., 2010).
A difficulty in this area of research is determining how to measure temporary employment most accurately. The many different ways of measuring temporary employment could possibly be one of the explanations for the diverging result in the studies mentioned above. One recent study has adopted a new way of avoiding measuring temporary employment in terms of contract and has instead focused on the health-damaging dimensions of temporary employment. This study has found a dose-response association with poor mental health and more unstable and vulnerable working situation (Vives et al., In press). I have dedicated part of my work to reflecting on and testing different ways of measuring labour market situation. Previous research has voiced the critique that measures of labour market situation are often too crude. To avoid this critique I have applied different measures of temporary employment in all my papers.

**Factors of relevance for temporary employment and illness**

While the focus in the present thesis was on the possible association between temporary employment and illness, a person’s employment situation cannot be viewed in isolation from the overall life circumstances. Temporary employment can be both a result and a cause of other life conditions, which in themselves may be related to illness. Other social determinants of health are therefore of interest for understanding the relationship between temporary employment and illness.

Kubzansky and Kawachi (2000) describe how the social environment can affect health. The social environment, such as the working environment, is an external factor that can affect internal factors, such as health. A path from the external environments to internal health is through emotions (which in turn result in biological responses). Emotions are an individual’s response to events that are meaningful for the individual. Kubzansky and Kawachi suggest that studying emotions helps to understand how societal conditions gets under our skins (Kubzansky and Kawachi, 2000). Emotions could affect health both in terms of biological processes as a response to emotional states, as well as through behaviours (DeSteno et al., 2013). Previous research on temporary employment and illness has not considered emotions to any great extent; therefore little is known about the emotional aspects of temporary employment. In my qualitative study emotions were considered as potential link between the working situation of temporary employees and illness.
**Work related factors**

A common model for investigating psychosocial work environment is using Karasek and Theorell’s Job Demand/Control (JDC) model developed in 1979 (Karasek, 1979). The key of this JDC is that having low control over ones work situation or experiencing high demands at work is not enough by itself to cause illness; it is rather the combination of low control and high demands that could imply a risk of negative health consequences. Being in a work situation with low control and high demands is described as a having high strain. Temporary employees could be more exposed to job strain as they more frequently are exposed to poor working conditions, and experience low control (Goudswaar and Andries, 2002) and have little possibility to influence decisions (Aronsson et al., 2002) compared to permanent employees. Therefore job strain could mediate the relationship between temporary employment and illness.

Financial hardship has been shown to be related to illness (Tucker-Seeley et al., 2013). Previous studies have suggested that temporary jobs often are low-income jobs (Van Lancker, 2012). It could thus be of important to consider some measure of financial strain as a possible mediator between temporary employment and illness (Aronsson et al., 2005).

Job insecurity has previously been measured by subjective measures such as experience of risk of involuntary job loss or how secure one feels in the present job (Ferrie et al., 2005, Ferrie, 2001). Previous research has found job insecurity to strongly be associated with illness (Ferrie et al., 2002). It is important to consider that job insecurity could mediate the relationship between temporary employment and illness, as the type of contract is likely to be related to experience of job insecurity.

**Socio-demographic factors**

Previous research has shown that more women than men are in temporary jobs (Aronsson et al., 2002). It has not been clear whether temporary employment is a risk for both men’s and women’s health. Some research suggests that women’s health is at greater risk (Vives et al., In press), while some research suggests that there are gendered patterns (e.g. gender-specific working conditions, high levels of gender segregation and discrimination) in relation to how temporary employment may affect illness (Kim et al., 2008a).
Previous research has suggested that partnership and parenthood may be delayed due to perceptions of insecure working arrangement, especially among men (Artazcoz et al., 2005, Golsch, 2003), which could affect social aspects related to illness (Artazcoz et al., 2005). As family situation has been shown to be an important indicator of the life factors linked to illness (Ringbäck Weitoft, 2003), marital and parental status could be important to consider in studies of temporary employment and illness, especially as people living alone often face higher risks of illness in terms of anxiety, poor self-rated health, severe morbidity and mortality (Ringbäck Weitoft, 2003, Floderus et al., 2009). Also, marriage may be beneficial both to health and in relation to financial resources (Waldron et al., 1998). Living with children has been shown to be both harmful and beneficial for health status (Krantz et al., 2005, Månsdotter et al., 2006).

Socio-economic position strongly influences health status (Siegrist and Marmot, 2004, Black et al., 1980, Marmot et al., 2010, Lynch and Kaplan, 2000). As temporary employment contracts have been shown to be more common among manual workers (Artazcoz et al., 2005) it is vital to consider socio-economic position as a possible confounder when studying the relationship between temporary employment and illness.

**Health selection**

Studies of temporary employment have suggested that there could be a health selection effect in relation to labour market attachment, meaning that healthy employees are more likely to become more attached to the labour market, while less health employees are more likely to become less attached to the labour market (Wagenaar et al., 2012, Virtanen et al., 2006). If the possibility of health selection is not considered when studying temporary employment and illness, there is a possibility of drawing faulty conclusions regarding the causality of the relationship.
Aims of the thesis

Overall aim

The overall aim of this thesis was to explore the relationship between temporary employment and illness.

Specific aims

1. How do temporary employees differ from permanent employees with regard to sociodemographic measures and previous illness?

2. Is temporary employment related to illness?

3. What social conditions can help understand the relationship between temporary employment and illness?
Methods

Papers I-III are based on questionnaire data from the Northern Swedish Cohort and paper IV is based on in-depth interviews with a sub-sample drawn from the same cohort (see Table 3).

Table 3. Overview data collection and methods for papers I-IV

<table>
<thead>
<tr>
<th>Paper</th>
<th>Population</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper I</td>
<td>The Northern Swedish Cohort</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Paper II</td>
<td>The Northern Swedish Cohort</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Paper III</td>
<td>The Northern Swedish Cohort</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Paper IV</td>
<td>A strategic sample from the Northern Swedish Cohort</td>
<td>Interview</td>
</tr>
</tbody>
</table>

In papers I-III, questionnaire data from the Northern Swedish Cohort was analysed. In paper IV a strategic sample was drawn from the Northern Swedish Cohort and data from 12 interviews was analysed.
Setting

Temporary employment in a Swedish context
In the wake of the recession during the 1990s the rate of temporary employees rose from the lowest 9.9% in 1991 to peak in 2007 with 17.1% of employees being hired in temporary contracts as shown in figure 1. In more recent years the temporary employment rate has seemed to stabilize around 14-15% (Statistics Sweden, 2013a) which is comparable to 2011 rates in Europe as a whole, 14.5% and in Canada 13.7% but lower than in Spain, 25.3% (OECD, 2012). Temporary employment contracts are more common among women than men and also among younger than older workers (Statistics Sweden, 2013a). Sweden has historically high union trade membership with the highest numbers in the mid nineties 83.9%, but with a rapid decrease to 53.9% in 2011 (OECD, 2013) which is similar to the neighbouring Nordic countries but higher membership rates than the USA 11.3%, Spain 15.9% 2009, Australia 17.9% and Canada 28.8% (OECD, 2012). The Swedish Institute of Public Health suggests in a report from 2010 that job insecurity is factor influencing health in working life and states that women are disproportionally affected by the most insecure contract types. Having a low cash margin increased the worry about becoming unemployed (The Swedish National Institute of Public Health, 2011).

Figure 1. Proportion (%) of temporary employees in the working population in Sweden between 1987 and 2012 (Statistics Sweden, 2013a)
Figure 2 shows that most temporary employment contracts are in health and social care and service, standing for almost 20% of the temporary contracts. Temporary contracts vacancies are also common in education, accounting for 14% of the temporary employment contracts. Finance, business and sales also offers a lot of temporary jobs (Statistics Sweden, 2012).

![Share of temporary employees by industry displayed in percent](image)

Figure 2. Share of temporary employees (minimum 5%) by industry in Sweden, in percent (Statistics Sweden, 2012).
However, when looking at share of temporary employees within each individual industry a slightly different pattern can be seen, due to the different number of people employed in each industry (Figure 3). In hotels and restaurants more than 40% of the employees are hired on temporary contracts and 27% in personal and cultural services. About 20% of employees in agriculture, forestry and fishing, work abroad, education and health and social care are temporary (Statistics Sweden, 2012).

![Share of temporary employees within each industry, as percent](image.png)

Figure 3. The ten industries with the highest share of temporary employees in Sweden, in percent (Statistics Sweden, 2012).

**The Northern Swedish Cohort**

The initiator of the Northern Swedish Cohort was Anne Hammarström, who formed the cohort due to the lack of research on the health consequences of youth unemployment. All 9th graders in the municipality of Luleå in Northern Sweden were chosen for inclusion in the cohort. Norrbotten was considered to be an appropriate starting point as the unemployment rates among youth and adults were the highest in Sweden at that time (Hammarström and Janlert, 2012). Luleå is a middle-sized industrial town, comparable to Sweden as a whole on a range of different socio-demographic measures such as socio-economic status (Hammarström, 1986), today’s unemployment rates and average income (Regionfakta, 2013).
The largest employers in Luleå are the Norrbottens County Council, Luleå City Council, the Armed Forces, Luleå Technical University and the steel company SSAB (Regionfakta, 2013). The population the municipality of Luleå today is 75 000, which makes it the largest municipality in Norrbotten and the 27th largest in Sweden (Statistics Sweden, 2013b).

Population
The population of the Northern Swedish Cohort is a total of 1083, of whom 506 were girls and 577 were boys. All were 9th graders in Luleå municipality in 1981, or those who belonged to that year but had left school before the study (n=11). The majority of the cohort were born in 1965 (95%). The attrition-rate in 2007 was 5.4%. Of the still alive (n=1071) cohort 1010 participated in 2007. Regarding ethnicity, 85% had both parents born in Sweden, 14% one or both parents born in Finland and 1% had parents from other European countries.

In paper IV 12 participants from the Northern Swedish Cohort were selected to participate in in-depth interviews in 2011 when the participants were 46 years old. The selection of participants to invite was primarily based on their experience of being a temporary employee. From the Northern Sweden cohort, those with a medium duration of being hired on temporary basis were selected. To increase the variation in the experiences both women and men were invited representing both white- and blue-collar occupations. All had experience of temporary employment for a minimum of a few years. Not all were currently employed on a temporary contract; some had permanent employment some were unemployed or self-employed.
All samples for papers I-IV were drawn from the Northern Swedish Cohort (see figure 4). Paper I was based on all participants who were employed in 2007. Paper II was based on all those who had ever been employed between 1996 and 2007. Paper III was based on all those with labour market data between 1996 and 2007. Paper IV, was based on a strategic selection of twelve participants with a medium exposure to temporary employment between 1996 and 2007. The samples varied with regard to current employment situation, past experience of employment, education and gender.

Quantitative data collection
In 1981 the first data collection took place in Luleå. The participants were invited to respond to a questionnaire regarding unemployment and their health status. Since then another four follow-ups have taken place, in 1983, 1986, 1995 and 2008. The principal investigator (PI) Anne Hammarström visited all schools in 1981 and described the study and the purpose, and the questionnaire was distributed during school hours. Those who were not attending when the questionnaire was distributed were given opportunity to participate later. The PI did thorough work to find all participants which resulted in a high response rate and only three persons declined to answer in 1981.

n=1005 response rate=94%

n=985
All who were ever employed between 1996 to 2007

n=969
All with labour market attachment data

n=12
A sub-sample of 6 women and 6 men with experience of temporary employment

1981 n=1083

2007

Paper I
n=907
All with temporary or permanent employment in 2007

Paper II
n=985

Paper III
n=969

Paper IV
n=12

Figure 4. Overview of study populations
1981 (Hammarström and Janlert, 2012). The PI invited all participants to their former school in 2007 to participate in the study; those whom did not attend were mailed the questionnaire. Thereafter reminders were sent out. Those who did not respond were given the opportunity to answer the questions as a structured phone interview. The ambition to reach all participants was set high, even those who were e.g. living abroad or had some social problems.

**Qualitative data collection**

The PI of the Northern Swedish Cohort contacted potential informants by phone, telling them about the aim of the study and assuring them that participation was voluntary. If the potential informants were interested in participating, I sent out an invitation by e-mail or post to give further information about the study and their rights as informants. I rang the informants to decide on a time and place to meet for the interview. All interviews were performed in secluded group rooms at public libraries, except one interview performed in the informant’s home. All the informants who initially contacted by the PI agreed to be interviewed. On the day of the interview I sent out a text-message to remind about the interview. In each of the interviews I asked whether the informants agreed to be recorded on a digital dictaphone, which they all did.

An open thematic interview guide was created, consisting of one overarching question about life as temporarily employed and five related themes: at work; social life and relations; financial situation; possibilities and difficulties; and feeling good or bad. Each interview was transcribed verbatim.

**Measures**

**Exposures**

Concurrent employment status with the outcome: *Temporary employment* (paper I) at age 42 was measured with one question, ‘In what type of employment are you engaged?’, with the possible answers: self-employed, permanently employed, temporarily employed: project, substitute, probationary, on-call, seasonal or other temporary employment. The self-employed and permanently employed were coded as 0. Those reporting some kind of non-permanent employment were called temporary employees and coded as 1. Eleven respondents who had both permanent and temporary employment were regarded as permanent.
Accumulated employment status: *Peripheral employment Score* (paper II) variable was derived from a matrix included in the 2007 questionnaire, regarding the respondent’s labour market position over the last twelve years, using 24 columns with each column representing a six-month period with fixed response options.

To order type of employment contract a modified version of Aronsson’s core-periphery model (Aronsson 2000) was used for each six-month period from the most central to the most peripheral. The response option was given a score according to the centre-periphery structure: permanent (coded as 0), self-employed (=1), project/object employed (=2), probationary (trial period of maximum 6 months after which employer decides whether the employee gets hired permanent or is let go) (=3), substitute (temporary replacement of ordinary employee, e.g. filling in while an ordinary employee is on parental leave) (=4), seasonal (=5), on-call (to meet emergency requirements) (=6), active in labour market programme (=7) and other temporary employment (=4; the mean score among temporary employment contracts). Although being in a labour market programme is not considered employment per se, it might share some important aspects with peripheral employment more than with unemployment (e.g., regarding latent functions of employment), and was therefore included in the exposure. If more than one option per column was marked, the alternative closest to 0 was used. The mean of peripheral employment score across all 24 six-month periods was used as the final index of cumulative temporary (or ‘non-standard’) labour market position (range 1-7), thus considering both duration and degree of exposure to peripheral employment. The variable was divided into four groups: 0= no experience of temporary employment; with experience of temporary employment or self-employment divided into tertiles of exposure, separately by gender: tertile 1= 'low exposure’, tertile 2= ‘medium exposure’, tertile 3= 'high exposure’.

Trajectories of employment status: This variable has similar coding to paper II but in reverse order, with the exception that substitute and probationary employment have switched places in the ranking order. Also in this variable unemployment, out of labour market and in employment policy measure are integrated. *Labour market history* (paper III) Participants’ labour market position from 1996 to 2007 was measured the same matrix described above consisting of columns representing half year periods and rows representing different labour market positions. The respondents were prompted to choose between 11 response options for each six-month period: ‘permanently
employed’ (coded as 10), ‘entrepreneur’ (9), ‘employed in project’ (8), ‘substitute’ (7), ‘probationary employment’ (6), ‘on demand worker’ (5), ‘seasonal worker’ (4), ‘temporary employee for other reasons’ (3), ‘in employment policy measure’ (2), ‘unemployed’ (2), ‘out of the labour market’ (1), unemployment and participation in policy measure were merged, and the options were coded, to a variable that expressed the strength of labour market attachment (LMA) on a scale from 10 to 1. In the case of ‘out of labour market’, a continuum of five or more periods (i.e. 2.5 years) was required: if this was less than five, all periods were coded according to the last labour market position. These operations thus yielded a score of the strength of LMA for each of the 24 successive half-year periods. The scores served as the data for the trajectory analysis.

**Outcome and indicators of health-related selection**

As a proxy for health-related selection, previous health status at age 30 has been used.

*Psychological distress* was measured at age 30 and 42. The respondents were asked if they had experienced symptoms of psychological distress (restlessness, concentration problems, being worried or anxious, palpitations, anxiety or panic or other nervous problems) during the last year. The response options were ‘yes’ or ‘no’. The 75 percentile was used as the cut-off. Reporting one or more of the six symptoms was coded as 1 and none as 0, dichotomized according to the 75th percentile (paper I and III). In paper II reporting 0-1 symptom was coded as 0 and 2 or more as 1 at both age 30 and 42 for women only. The question was derived from the ‘Survey of living conditions’ (Statistics Sweden, 1980).

*Non-optimal self-rated health* at age 30 and 42, was obtained with one question, ‘How do you rate your general health?’, with response options: good, average or bad (Statistics Sweden, 1980). The responses were dichotomised into the quartile with the worst health (average or bad) coded as 1, and the rest (good) coded as 0 (paper I-III).

**Background variables**

*Socioeconomic position (SEP) (paper I-III).* Occupation at age 42 was used as an indicator of socioeconomic position, which was classified according to the Swedish socio-economic classification of occupational categories (Statistics Sweden, 1983). Upper-white collar and self-employed were coded
as 0, lower white collar workers were coded as 1 and blue-collar workers were coded as 2.

*Unemployed and out of labour market age 31-42 (paper II)* was obtained from the same matrix described in the section *Accumulated employment status* above. Each period of unemployment and being out of labour market was summarized into a continuous measure or unemployment of being out of labour market.

*Parental status at age 42*, was coded as 0 when having children and as 1 for those without children (paper I-III).

*Marital status at age 42* was obtained by following question: ‘Are you married or co-habiting?’ Yes was coded as 0 and no as 1 (paper I-III).

*Gender*, women were coded as 0 and men as 1 (paper I and III).

*Possible mediating variables at age 42 (paper I)*

*Job insecurity* was obtained by asking a question: ‘How high is the risk that you might involuntarily become unemployed?’ with four response options: high risk, some risk, low risk or no risk. The responses were dichotomized, into, 0= low or no risk and 1= high or some risk.

*Low cash margin* was elicited by asking a question about the ability to get hold of approximately 1500 euro (asked in 2007, follows consumer price index) within a week, with the possible answers: Yes, by loan, yes by one’s own assets, yes by other means, or No (Statistics Sweden, 1980). Yes was coded as 0 and No as 1.

*High job strain* (Karasek and Theorell, 1990) was obtained by asking six questions regarding decision-latitude (e.g. ‘Can you influence what you do at work?’ ‘Is your work repetitive?’) and six questions regarding psychological demands (e.g. ‘Do you have to work very fast?’). The questions had a four-grade ordinal scale. The median of the score was used to dichotomize demand into two groups and control into two groups. High demands in combination with low decision latitude were considered as ‘high job strain’ and coded as 1; all others were coded as 0.
Analysis

Statistical analyses
In papers I-III logistic regression was used to analyse the relation between exposure to temporary employment and the outcomes psychological distress and non-optimal self-rated health. Permanent employment was used as the reference category in all analyses. Background variables were considered in the analysis and included in stepwise analysis. Health status at age 30 was also included in the analysis. Possible mediating variables were also considered (paper I). Adding variables in different steps made it possible to determine what set of variables reduced the odds ratios. In paper II analyses were made separately for women and men, in paper I and III women and men were analysed together and gender was considered as a background variable. SPSS version 17.0 and 19.0 was used to perform all logistic regression analysis. Due to small sample size, gender-stratified analysis was only possible in paper II where I used the accumulative measure of temporary employment.

In paper III trajectory analysis was performed using the software Mplus statistical package program. Trajectory analysis was performed to reveal patterns of employment and to specify mobility on the labour market and how groups of individuals move between different labour market positions. The Mplus program advised that data from up to twelve time points could be included in the analysis. Counting back from 2007 every second half of the year was used to avoid systematic error in terms of seasonal variations in employment. In the trajectory analysis the solution with eight trajectories was considered to be the best fit with regard to the information criteria functions and variations of the trajectories.

Qualitative analyses
Grounded theory was used to perform the analysis in paper IV. At the end of each interview I summarized what had been said in order to clarify whether anything was misunderstood or to see if the informants had anything more to add. After each interview I wrote memos to summarize the main features of the interviews. In the memos I also wrote my initial thoughts and ideas. These memos were an initial step of the analytic process. After the interview had been transcribed verbatim, the material was read thoroughly and coded in the coding software Open Code. The coding process was performed parallel with co-writer Maria Wiklund (MW) and then codes were compared in order to increase the credibility of the data and to make sure that our interpretations were reasonable. Ideas from one interview were carried on to
the next in order to deepen the understanding of the experience. After initial coding of the text the codes were clustered into different domains. All through the process I drew maps, trying to gain a deeper understanding of how the clusters and codes were linked together. Links were found between codes in different clusters and sub-categories were starting to take shape. In this step the coding process focused on the aim and only codes relevant to the aim was formed into sub-categories. The sub-categories were then merged into categories. Throughout the analysis process I went back to check how the categories formed represented the raw text.
**Ethical considerations**

All four studies included in this thesis were performed according to the ethical principals approved by The Regional Ethical Review Board in Umeå, Sweden [Dnr 07-057M]. In accordance with Swedish law the participants in the study are regarded as giving their consent when responding to the questionnaire and sending it in. The participants were informed about confidentiality and secrecy meaning that no one would be recognized in the final papers and that only the research group would have access to the data. They were given the information that it is voluntary to participate and that they have the right to withdraw their participation at any time without being required to give any reason. The same principles were applied when asking the participants about being interviewed; they were also informed that the interviews were going to be recorded and transcribed but that it would not be possible to identify participants in the published papers.
Results

1. Differences in socio-demographic measures and previous health status between temporary and permanent employees

My results showed that being exposed to temporary employment seems to imply an overall disadvantaged life situation. Further, with a more severe exposure to temporary employment, the overall situation seemed worse than among those less exposed to temporary employment. Those who had been exposed (age 30-42) or were exposed to temporary employment at age 42, were more likely to have experienced psychological distress at age 30 and non-optimal self-rated health at age 30 compared to permanent employees and they were also more frequently single (paper I, p 535, paper II, p 5, paper III, p 6).

Women were more exposed to temporary employment than men and also had a different history of peripheral employment than men, as seen in the higher frequency of women in the group with high accumulation (paper II, p5) as well as in the strengthening and poor tracks. Between age 30 and 42, 49% of the women and 38.9% of the men were exposed to temporary employment. At age 42, a total of 67.5% of the temporary employees (paper I, p. 535) were women.

There was no difference regarding parental status between the groups (paper I, p. 535, paper II, p. 5, paper III, p. 6). Regarding socio-economic position it was not conclusive whether it differs depending on type of employment contract. In the cross-sectional examination no significant difference in socioeconomic status could be seen between temporary and permanent employees (paper I, p. 535). However, when using the measure of accumulated temporary employment over 12 years there were significant differences between the groups with blue-collar occupations being more exposed to temporary employment (paper II, p. 5).

2. Is temporary employment related to illness?

Distribution of illness in exposed and non-exposed group

Cross-tabulations in paper I-III showed consistency regarding the distribution of psychological distress and non-optimal self-rated health in relation to temporary employment (paper I, p. 535, paper II, p. 5, paper III, p. 6). When comparing cross-sectionally I found that experiencing psychological distress and non-optimal self-rated health was more common
in the groups with experience of temporary employment (paper I, p. 535). What was also clear was that the share with experience of non-optimal self-rated health and psychological distress was greater in the groups with more severe exposure to temporary employment (paper II, p. 5, paper III, p. 6). For example, psychological distress was about twice as frequent among those who had been most peripherally employed (high accumulation and poor level attachment) compared to permanently attached/employed (paper II, p. 5, paper III, p. 6).

Findings in unadjusted logistic regression
Summarizing the unadjusted analysis of paper I-III it was clear that temporary employment was significantly related to psychological distress and non-optimal self-rated health regardless of which type of exposure measure for temporary employment was used. When measuring temporary employment (accumulation) with regard to both time in contract and type of contract the odds ratios increased along with higher accumulation (paper II, p. 6).

Significant findings from adjusted logistic regression analysis
Selected results from the quantitative papers (I-III) with significant (p<0.05) or borderline significant (p<0.10) adjusted associations between different exposures to temporary employment and psychological distress and non-optimal self-rated health are described in Table 4. In this table different measures of the exposure are presented in relation to crude and adjusted logistic regression analysis in each paper. Note that the results concerning the mediator analyses in paper I are described further below Aim 3.
Table 4. Summary of the main results for papers I, II and III, presented as four independent sets of logistic regressions in relation to psychological distress and non-optimal self-rated health.

<table>
<thead>
<tr>
<th>Measure of employment status</th>
<th>Crude</th>
<th>Adjusted</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological distress as outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concurrent with the outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent employment (ref.)</td>
<td>1.00</td>
<td>1.00</td>
<td>I</td>
</tr>
<tr>
<td>Temporary employment</td>
<td>2.88</td>
<td>1.78-4.68</td>
<td>2.20¹</td>
</tr>
<tr>
<td>Accumulated temporary employment (among men)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent employment (ref.)</td>
<td>1.00</td>
<td>1.00</td>
<td>II</td>
</tr>
<tr>
<td>High exposure</td>
<td>3.28</td>
<td>1.86-5.79</td>
<td>2.18²</td>
</tr>
<tr>
<td>Trajectories of LMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent track (ref.)</td>
<td>1.00</td>
<td>1.00</td>
<td>III</td>
</tr>
<tr>
<td>High level attachment</td>
<td>1.55</td>
<td>1.06-2.30</td>
<td>1.54³</td>
</tr>
<tr>
<td>Poor level attachment</td>
<td>3.14</td>
<td>2.10-4.70</td>
<td>2.52³</td>
</tr>
<tr>
<td>Non-optimal self-rated health as outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concurrent with the outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent employment (ref.)</td>
<td>1.00</td>
<td>1.00</td>
<td>I</td>
</tr>
<tr>
<td>Temporary employment</td>
<td>2.31</td>
<td>1.44-3.70</td>
<td>1.86¹</td>
</tr>
<tr>
<td>Trajectories of LMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent track (ref.)</td>
<td>1.00</td>
<td>1.00</td>
<td>III</td>
</tr>
<tr>
<td>Poor level</td>
<td>2.26</td>
<td>1.53-3.34</td>
<td>1.65³</td>
</tr>
</tbody>
</table>

¹ Adjusted odds ratios for health status age 30, socio-demographic variables (sex, socio-economic position, marital status and parental status).
² Adjusted odds ratios for health status age 30 and socio-demographic variables (socio-economic position, marital status and parental status), number of periods of unemployment and out of labour market.
³ Adjusted odds ratios for health status age 30, socio-demographic variables (sex, socio-economic position, marital status and parental status).

Crude logistic regression analysis showed that those who had temporary employment concurrently with the outcome had higher odds ratios for psychological distress and non-optimal self-rated health (Table 4 for psychological distress, see paper I p. 536 for non-optimal self-rated health). This association remained significant even after adjustments for health status age 30 and socio-demographic variables (sex, socio-demographic position, marital status and parental status).

Crude logistic regression analyses suggested an association between accumulated temporary employment and psychological distress and non-optimal self-rated health: the association was significant in the high exposure group and displayed a significant trend across the exposure groups, in both women and men (paper II, p. 6). The association with psychological distress was also significant for women in the low and medium as well as high exposure groups. The association remained significant after adjustment for periods of unemployment and out of labour market, for both women and men in the high exposure group. After adjustments for sociodemographic
variables (socio-economic position, marital status, parental status) and health status at age 30 high exposure to peripheral employment was related to psychological distress for men but not women (Table 4). The fully adjusted model (health status age 30, socio-demographic variables and periods of unemployment and out of labour market) yielded a significant relation between high exposure to peripheral employment and psychological distress among men (paper II, p. 6). In addition, p-value for trend was significant throughout all the models between accumulation and psychological distress (except for women in the final model after adjustments for health status at age 30, socio-demographic variables, periods of unemployment and being out of labour market (paper II, p. 6).

Paper III displayed associations between poor trajectory and psychological distress and non-optimal self-rated health in the fully adjusted model. The association in relation to psychological distress was also significant regarding high attachment in the final model, as shown in Table 4.

Experiences of illness in the qualitative study
Findings from paper IV highlighted a connection between experiences of temporary employment and feelings of worry, anxiety, stress, sleeping problems, and a risk of developing deteriorated health habits.

Four categories were identified in relation to experiences of temporary employment and illness. The first category: Working hard for a job (conceptualizing agency) describes the incentives that lead informants to have temporary employment. The second category concerns the experience of being used; Being used (conceptualizing structural conditions) represents some of the difficulties on a more structural level that temporary employees meet, in terms of psychosocial work environment problems such as lacking influence. The third category, Accepting and adapting (conceptualizing coping) reflects how the informants deal with being hired on temporary basis. The fourth and final category, Worn, worried and wrathful (conceptualizing emotional and bodily reactions), highlights the emotional and bodily expressions closely linked to the social process of being temporarily employed.

In the intersection of the three categories; Working hard for a job, Being used and Accepting and adapting the category Worn, worried and wrathful emerged.
This category contains reactions mainly on an emotional level but also physical reactions linked to the informant’s insecure labour market position. These reactions vary in terms of “intensity” and also “nature”.

Feeling “worn out”, always being tired and starting to feeling old were described as a result both of periods of working hard to get a secure position on the labour market, and of being used and exploited. Informants could express how they felt they were being used but also how they could do little to change the situation.

Financial worries were described as a major source to worry. Tight financial margins combined with low pay and unstable employment, gave room for “inner nagging feelings of stress” and worry. Striving for a renewed contract put them in an exposed position with small margins to oppose to any situation perceived as unfair. The unfair treatment and the lack of benefits were interpreted as a source of anger and feeling wrathful.

3. What social conditions can help understand the relationship between temporary employment and illness

In addition to temporary employment, other life circumstances were taken into consideration in relation to illness, in order to see whether they played a role in the relationship between temporary employment and illness. In paper I, possible mediators were examined. In papers I-III other social conditions were also included in the analyses as explanatory variables, which could be viewed as either mediators or confounders. In paper II, gender was included as a stratifying variable to see whether the relationship between temporary employment and illness was valid for both women and men. Many of these social conditions were also brought up by the participants in the qualitative paper IV.

Possible mediators
Potential reasons as to why temporary employment was related to illness were analysed in paper I and IV. In paper I, job insecurity, low cash margin and high strain were proposed mediators of this relationship. A closer examination of this issue revealed that job insecurity was the most important variable explaining the relationship (paper I, p. 535). In paper I, 62.3% of the temporary employees experienced some or great risk of becoming involuntarily unemployed and the equivalent figure among the permanent employees was 17.0%. Paper IV supports these results, as feelings of uncertainty were a dominant topic in the interviews.
Further, having a low cash margin was also more common among the temporarily employed (18.4% vs. 5.9% among permanent employees), and this also helped explain the difference in illness, as adding low cash margin to the model resulted in an attenuation of the OR (paper I, p. 536). The results in paper I were reinforced by paper IV, where reflections regarding the financial situation and problems such as varying income and low income were described as a cause of sleeping problems and worries. The interviews (paper IV) described how having a strained financial situation made the situation as a temporary employee worse. Some informants described how getting aid from the state such as housing benefit and child benefit was necessary to make ends meet, which could be interpreted as showing that the financial margin was small.

High job strain was another proposed mediator, but high job strain did not differ significantly between the group of temporary and permanent employees (paper I). In paper IV the experiences of high demands and low control varied; some described how they experienced fewer demands in terms of not having to attend work place meetings and participate in planning and organizing work. There were however also contrasting stories about how, if you were employed on temporary contract, you were expected to work harder than your permanently employed colleagues. Regarding control at work, interviews revealed that temporary employees might experience less control than permanent employees. Informants described how they lacked influence at work and some spoke of fear of raising any objection, as the contact might not be renewed.

**Labour market situation**

Paper II suggests that unemployment could be a possible explanation why temporary employees more commonly experienced psychological distress and non-optimal self-rated health than permanent employees. Having experience of unemployment was more common among those with experience of temporary employment. Among the permanent employees 10% of the women and 12% among the men had some experience of unemployment during a 12-year period; the equivalent figures among the temporary employees varied between 24.3 and 60.0% for women and men. In the group with the highest exposure to temporary employment 50.6% of women and 60.0% of the men had experienced unemployment (paper II). In paper II, after adjustments for periods of unemployment and being out of the labour market the OR were reduced, but the association remained significant. Intermittent unemployment was also an issue that was brought up in the interviews by the participants (paper IV), who described how the
gaps between contracts and knowing that one contract will end without a new contract being lined up was perceived as difficult and stressful (paper IV).

**Gender**
The association between accumulated temporary employment and illness was similar among women and men (paper II). The overall pattern suggested that higher exposure generated higher odds ratios for non-optimal self-rated health and psychological distress. Although among women even low exposure to accumulated temporary employment was associated with psychological distress (paper II, p. 6), this was not the case among men with low exposure (paper II, p. 6). In the final model when adjustments were made for health status at age 30, socio-demographic variables and numbers of periods of unemployment and out of labour market, the association between accumulated temporary employment and psychological distress was only significant among men, see Table 4. None of the exposure groups differed significantly from the unexposed group regarding non-optimal self-rated health in the final model for either women or men.
**Discussion**

In summary I found that temporary employment was associated with illness. Job insecurity and low cash margin could be seen as possible mediators of the relationship. This thesis also gave support to the idea that there is a core-periphery structure in relation to type of employment contracts, which combined with time in temporary employment was related to illness. This thesis also revealed some interesting tracks of LMA history, and showed that there was an association between LMA history and illness. The individual experiences of temporary employment were further explored by interviews, which added further complexity and understanding to the topic of temporary employment and illness. The interviews revealed some structural problems related to temporary contracts, some of which were linked to experience of illness and negative emotional states such as worry.

**Is temporary employment related to illness?**

*Various measures of temporary employment*

The results from the epidemiological papers (I-III) showed higher odds ratios for psychological distress among temporary employees (concurrent with outcome, accumulation and trajectories of LMA) compared to those with experience of only permanent employment, which is in line with reviews on the topic (Virtanen et al., 2005, Ferrie et al., 2008) as well as some original studies (Flint et al., 2013, Bardasi and Francesconi, 2004, Virtanen et al., 2003, Artazcoz et al., 2005). Concurrent temporary employment with the outcome was related to poor health status after adjustments for earlier health status and sociodemographics (Paper I). As a dichotomous division of permanent and temporary employees in relation to illness generated significant results, this opened up thinking that a the idea of primary and secondary labour market is still somewhat relevant 40 years after the idea was out forward (Doeringer and Piore, 1971).

Paper II showed increasingly higher odds of psychological distress among those with higher exposure to cumulative peripheral employment over a 12-year period, suggesting that there was a health gradient in relation to a centre-periphery structure of labour market status. This gradient has been suggested in some previous studies (Aronsson et al., 2002, Virtanen et al., 2003), but the present thesis additionally demonstrates how the gradient accumulates over time. My results are similar to a Spanish study that finds a dose-response pattern gradient between employment precariousness and poor mental health (Vives et al., In press). Wagenaar et al. (2012) suggests
that those who remain in temporary employment over an extended period of time also are more likely to be affected by negative aspects of temporary contracts such as job insecurity and lower quality of working life, which could imply a deterioration of health (Wagenaar et al., 2012). Similar findings have been shown in a German sample, showing that those who remained in temporary contracts over two years were more likely to report poor health status than those who remained permanently employed (Rodriguez, 2002). The paper supports the idea that it is relevant in public health research to consider ordered temporary employment contracts in a core-periphery structure, as previous research has suggested (Aronsson et al., 2000).

Paper III found a higher probability of psychological distress among three tracks of non-permanent LMA history over 12 years compared to permanent attachment, which supports the findings of Flint et. al. (2013). The relations in paper III could partly be explained by previous health status and also socio-demographic variables. However, the overall contribution of LMA history in paper III remained significant in the adjusted model. These results corresponded to an earlier study suggesting that negative career changes over a two-year period were associated with stress-related symptoms such as anxiety, palpitations or stomach problems (Mauno et al., 2011). Conversely, they are in contrast to another study that did not detect any clear deterioration regarding general health in down-ward employment trajectories over one year (Wagenaar et al., 2011). The study by Wagenaar however points out that future studies should measure trajectories over a longer time span (Wagenaar et al., 2011), which the results of paper III shows the merits of. In the group with strengthening attachment I found that psychological distress was more common than in the permanently attached, despite having a favourable LMA at the time when the outcome was measured. A possible explanation for these findings could possibly be seen in a paper by Flint et. al (2013), where they found that the mental health benefit of an upward transition in LMA is not as great as the negative effect on mental health of a downward transition. This could be interpreted as showing that periods with poor LMA cannot be fully compensated by periods of permanent LMA.

For paper I-III results regarding non-optimal self-rated health are similar to the results on psychological distress but generally display a weaker association. Although the reasons for this discrepancy are obscure to me, it is possibly explained by social environment impacting on health through emotions (Kubzansky and Kawachi, 2000) which psychological distress might be more directly related to than self-related general health is.
Qualitative research

A qualitative Canadian study describes how precarious employment may impact health in terms of stress and anxiety as result of an uncertain employment situation (Clarke et al., 2007). This study supports the findings from paper IV which also found experiences of stress and worries among temporary employees. Paper IV suggests that temporary employees puts their life on standby due to the uncertainty in temporary contracts, which corresponds to an Australian interview study showing similar findings and suggests that lack of autonomy is a possible health hazard (McGann et al., 2012). The uncertainty in temporary employment weakens the possibility to plan and control their lives, which entails a health risk, as they postpone future plans and holidays and delay health care because their future income is uncertain (McGann et al., 2012). The results of paper IV are partly in accordance with the flexible firm model; exploiting numerical flexibility results in less job security for the temporary employees (Atkinson, 1985).

Previous research in Sweden has linked worries about personal finances to sleeping problems among temporary employees (Aronsson et al., 2002), and my qualitative findings support this research. The low and uneven income and the uncertainty about future contracts are part of the way finances can be strained among temporary employees (paper IV), and these aspects seem to relate to worry, stress and sleeping problems. This notion is in line with a Canadian qualitative study (Clarke et al., 2007).

How could different measures and methods of temporary employment help understand the relationship to illness better?

In the four papers that this thesis comprises, temporary employment has been measured in four different ways:

- First, a dichotomy between temporary and permanent employment contracts (concurrent with the outcome).
- Second, as accumulation of contracts over 12 years while also considering the degree of how peripheral the type of contract is considered.
- Third, as trajectories over 12 years of time considering level of labour market attachment.
- Fourth, interviews about experiences of temporary employment.
As mentioned above, I found a relationship between temporary employment and illness regardless of the type of measure or method used to analyse the relationship between temporary employment and illness. However, the different measure helped to deepen the knowledge to understand the phenomenon of temporary employment better. The dichotomous measure of temporary vs. permanent employment concurrently with the outcome helped to establish that there was a relationship between temporary employment and illness. Paper I stated the importance of dividing labour market attachment into at least two categories: core and periphery workers (Doeringer and Piore, 1971). Moving forward from the first paper, I found it valuable to consider labour market history, suggesting that current health status could possibly be determined by more than current labour market position. Measuring accumulation in terms of time in temporary contracts and how peripheral the contract was considered gained the understanding that not only dichotomous employment status concurrently with the outcome matters for current experiences of illness. Also, labour market history and how peripheral the type of contract was added complexity to the picture of the relationship. This indicates that the health implications of temporary employment could be dependent on the total time of exposure and that there is a health gradient in the relationship in line with the assumed core-periphery structure of the labour market. Measuring trajectories of labour market attachment gave the possibility to understand e.g. that labour market history is related to health status. It also suggested that temporary employment is not a bridge for all temporary employees to permanent employment. As seen for the poor trajectory in paper III, one group seemed to be trapped in an unfavourable labour market situation. Last, the informants’ own experiences helped show the complexity and gave an understanding of the life situation as a whole instead of viewing temporary employment as an isolated event. The interviews revealed paths between health experiences and temporary employment e.g. the feelings of insecurity related to the contract were a cause of worry and anxiety. The low and uneven pay among temporary employees could result in worry and sleeping problems.

When measuring temporary employment from different angles, the level of complexity rises and one is getting closer to understanding the association between temporary employment and illness. However, as implications and contract types might differ depending on culture and context it could be valuable to also measure elements of vulnerability and precariousness (e.g. contract duration, salary, capacity to cover regular or unexpected expenses, right to have parental leave, vacations) (Vives et al., In press) as a complement to type of employment contract. However, if giving up
measuring the type of contract, and instead focus on aspects of precariousness, this would also limit the possibility for surveillance of the topic, which is important from a public health perspective.

**Social conditions surrounding the relationship between temporary employment and illness**

To understand the relationship between temporary employment and illness a range of social conditions has been considered in the analytical process. The analysis in all papers in this thesis has revealed some details helping to understand the relationship between temporary employment and illness better.

*Experiencing job insecurity and having a low cash margin*

In paper I job insecurity and low cash margin (but not job strain) were significantly more commonly experienced by temporary employees than among permanent employees. That job insecurity was more common among temporary employees compared to permanent employees is in line with previous research (Sirviö et al., 2012, De Cuyper et al., 2008). But there are also contrasting findings suggesting that job insecurity only imposes a risk of illness for permanent employees (Bernhard-Oettel et al., 2005). One previous study linked job insecurity to low self-rated health and minor psychiatric morbidity (Ferrie et al., 2002). However, a Dutch study suggests that differences in health depending on employment contracts are not explained by job insecurity (Wagenaar et al., 2011). In opposition, in paper I a clear reduction in the OR can be seen when job insecurity is added to the model, suggesting that job insecurity can be seen as part of the social conditions that explain why a higher proportion of temporary employees experience illness.

In paper IV I found that financial insecurity was regarded as an important issue for the temporary employees. This finding connects to the results of paper I which showed that temporary employees more often experienced having a low cash margin. Concerning financial insecurity, temporary employees described in the interviews how they sometimes have low wages and combine work with days being unemployed, which affects their financial situation negatively. It has been suggested that financial insecurity could be a pathway between temporary employment and illness (McGann et al., 2012). Previous studies have suggested that low income levels are a common trait among precarious workers (Sirviö et al., 2012). The interviews revealed that money was a common source of worries, and personal finances were a
broad topic. Income could vary and many would not get a raise, as they would not bother to negotiate pay for a short period of time. Some relied on a partner and some tried to limit expenses and live a simple life. There were also experiences where informants had to borrow money from friends and family to get by and resort to cash in hand jobs to survive. Previous research supports our results and suggest that seeking financial help from family is more common among employees in unstable jobs than in stable jobs, and that having to ask for money reduces well-being (Green and Leeves, 2013). Further, paper IV showed that the informants could feel guilt in not affording to give their children the same clothes and things as the children’s friends. These feelings described above are closely linked to research by Starrin et al. (2009) suggesting that as emotions arise from the combination of financial stress and shaming could be a pathway to illness.

Paper I showed no significant differences between temporary and permanent employees with regard to high job strain. Our results could possibly be understood in light of the fact that temporary employees have lower autonomy (Wagenaar et al., 2011, Olsen, 2006) than permanent employees, but also face lower demands (Wagenaar et al., 2011), which doesn’t put them at risk of a high-strain situation. Some of the results in paper IV indicated that temporary employees had less influence than permanent employees due to their insecure and time-limited contracts. Informants even feared to criticize the organisation, feeling that they might jeopardize future employment possibilities. It has been suggested that it might be difficult for temporary employees to voice criticism to the employer, as temporary employees wants to make a good impression to strengthen their future chances of employment (Markowicz, 1997, Aronsson and Göransson, 1998).

Unemployment- a part of being temporarily employed
Unemployment was integrated in the world of temporarily employees: worrying about becoming unemployed, not working full-time weeks, and enduring the time between contracts. Interviewing informants regarding their experience of temporary employment shows that, rather than seeing unemployment as something separate from the temporary employment it could be seen as a well integrated part of the process of temporary employment.

Unemployed increases the risk of being affected by mental illness (McKee-Ryan et al., 2005). Paper II showed that unemployment could partially explain the association between accumulated temporary employment and illness, especially among men. This could be interpreted as unemployment
being a partial mediator; that some of the effect of temporary employment on health is explained by temporary employees having a greater risk of becoming unemployed. This is in line with previous research suggesting that temporary employees are exposed to a higher incidence of unemployment (Green and Leeves, 2013), and that it is the experience of unemployment that has direct negative health effects. It is also possible that temporary employment could be a consequence of previous unemployment and subsequent difficulties reaching a stable position on the labour market, i.e., that previous unemployment leads to both later unemployment and temporary employment. In this situation, unemployment could be indicative of confounding. This illustrates the entanglement of temporary employment and unemployment, and the difficulties in isolating effects on health in the complex dynamics of labour market histories.

Selection into temporary employment

The results of this thesis suggest that there could be some degree of health selection into temporary employment contract as more people exposed to temporary employment experienced psychological distress and non-optimal self-rated health already at age 30. This could be interpreted as showing that people with illness are less likely to become permanently employed (discrimination) (West, 1991, Virtanen et al., 2013) or that their health status already had been compromised by previous labour market experiences (including temporary employment). However, the association between temporary employment and illness remained even after adjustments for previous health. Thus, the exposure effect seems to be greater than the selection effect.

This is also in line with a Dutch study which suggested that temporary employees with poorer health are more likely to remain in temporary contracts or have a downward employment trajectory (Wagenaar et al., 2012), while good health increases the chances of gaining permanent employment (Virtanen et al., 2002a, Wagenaar et al., 2012).

Women more often in temporary employment but affected similarly to men

The disproportionate burden of illness associated with temporary employment among women could be due to the higher prevalence of temporary contacts among women compared to men (LaMontagne et al., 2012, Aronsson, 1999, Sirvio et al., 2012), which is alike the findings in my thesis. It could be that the unequal exposure to temporary employment
between women and men is connected to the labour market structure; with temporary employment contracts being more frequently used in women-dominated sectors, as 20% all the temporary employment contracts in Sweden are within health and social care (Statistics Sweden, 2012). This thesis is in line with LaMontagne’s research as I found similar results among women and men exposed to temporary employment (paper II). Also, the qualitative study indicates similar experiences of health and illness among women and men working under similar conditions.

**Socio-economic status**
Some previous research suggests that effects on mental illness among temporary employees can depend on socioeconomic position (Artazcoz et al., 2005). In this thesis there were no clear socio-economic differences in relation to type of employment contract. Adjusting for the socio-demographic variable only resulted in minor attenuation of the odds ratios. In the interview study women and men with different socio-economic status were interviewed. However, the interviews did not bring clarity as regard the role socio-economic position could play in the relationship between temporary employment and illness. However, some informants had a university degree but had a job that did not match their qualifications. Also it was problematic to analyse the importance of socio-economic status (based on occupation) because many of the informants had experiences of many different jobs (sometimes several jobs at a time), representing both blue- and white-collar occupations. Thus, there is a future challenge in how to tackle the issue of socio-economic position in research on temporary employment and illness.

**Family situation**
Temporary employees were more commonly single in this study. Previous research suggests that temporary employees may be more commonly single due to delayed partnership formation (Artazcoz et al., 2005) and also that they sacrifice life projects such as getting married (Lozza et al., 2013). Paper IV nuanced this picture and suggested that temporary employees who have a partner who also has a temporary contract or who is unemployed might have a more strained financial situation. This financial strain was described as strain on the relationship and could possibly be a contributory factor to a separation. As family situation has been shown to be important for health status, where single marital status is related to illness in terms of anxiety, poor self-rated health, severe morbidity and mortality (Ringbäck Weitoft,
2003, Floderus et al., 2009), it would be relevant to consider family status as a possible pathway between temporary employment and illness.

**Methodological considerations**

**Overall strengths**

A strength of this thesis was the use of both quantitative and qualitative methods. By combining methods the potency of the research could be enhanced. This gave insight into the statistical relationship and helped to understand experiences and context. Thus, the combination of methods was chosen in order to expand knowledge about individuals’ experiences during their lives, as well as to generate generalized knowledge about temporary employment and illness to a wider population. The quantitative method gave possibilities both to generalize the results to a greater population and to transfer them to different contexts. For example in papers I-III the relationship between temporary employment and illness was established and also possible explanations as to why this could be in terms of unfavourable social conditions and e.g. job insecurity. In paper IV the knowledge was deepened by the life stories of the informants and details about what life was like as temporarily employed.

One of the strengths of the quantitative studies of this thesis is the use of longitudinal data, which improves causal inference by enabling sequential measurement of exposure and outcome (in paper II-III), as well as adjusting for previous health status (paper I-III, discussed below). Another strength is the detailed data on labour market status, including type of employment contract over a period of 12-years; this allowed refining the exposure measure and also seeing patterns of mobility in the labour market over time.

An additional strength is the extraordinarily high participation rate, which helped to maintain the sample size and thus the power of the statistical analyses. The high response rate also protects against attrition bias, which is a risk in long-term prospective cohorts. The high response rate was achieved through the rigorous work of finding all participants. Furthermore, participants who did not respond to the questionnaire were given the option to answer through a structured phone interview, which improved the response-rate. Also, the size of the cohort has been a benefit in terms of the ability for the project leader to keep a close relation to the participants, meeting the participant during follow-ups, interviews and health check-ups. The personal relationship has increased willingness to participate in the study.
Regarding the qualitative study all the informants who were invited chose to participate in the study. The data collection was carried out during a time span of 6 months, which gave the participants plenty of time to find a time that was suitable to them, and as some of the informants were currently working on temporary contracts with insecure hours, I always kept flexibility in mind, in case of a changed schedule to accommodate the informants.

Sample and generalizability
The sample of papers I-III comprised all school leavers in the municipality of Luleå in 1981. Compared to more recent cohort studies, the sample size is rather small. However, when the data collection was first initiated, over 1000 individuals was considered a high number and also analytic techniques to handle large datasets was not as refined as at present time.

Comparisons regarding a range of socio-demographic background data such as labour market structure, socio-demographics and illness have shown that the NSC is comparable to Sweden as a whole (Hammarström and Janlert, 2012). However, the cohort does not mirror today’s diversity with regard to ethnicity. In 1981, when the cohort study collection began, the principal working immigration was from Finland and only a small part of the participants has parents from other countries inside and outside of Europe. Due to these changed demographic patterns in Sweden, the cohort can be viewed as representative of similar closed birth cohorts of Sweden, but not as readily comparable to the similarly aged population of Sweden today. As temporary contracts are more common among immigrants, this would be expected to lead to an underestimation of temporary contracts in the cohort as compared to the general population of Sweden. Moreover, the participants in this study were quantitatively investigated between age 30 and 42. Although this controls for any confounding of age by design, it also decreases the representativeness of the sample and potentially limits the generalizability (external validity) of the findings to other age groups.

Selection bias
In this study all school leavers in 9th grade in Luleå municipality or those who for some reason had left school in advance were included in the study. Thus, the selection process minimized a selection bias. As noted above, the fact that attrition was low also reduces the possibility of introducing selection bias. It is of major importance to have a high response rate in longitudinal research, as responders tend to be healthier than non-responders. A comparison between the Northern Swedish Cohort and a
younger cohort from the same area showed that non-responders had a more unfavourable labour market situation and financial situation as well as higher alcohol consumption (Novo et al., 1999).

Selection bias can also be introduced by pre-existing conditions such as health selection, whereby individuals with poor health are steered towards insecure employments. There is no consensual praxis in how to avoid drawing faulty conclusions due to health selection, but there are ways to reduce the possibility that the results are merely a consequence of previous health status. To address this issue the main analyses were adjusted for previous health status. In some analyses there were indications of health selection influencing the relationship, although this did not explain the relationships entirely. Adjusting for previous health status thus reduced the possibility of reverse causation.

An important question in a longitudinal study is which age to use. Base line health (age 16) could be ideal due to the lack of labour market exposure among a group of school leavers but was not possible to use due to the long time span to the endpoint. Thus, I chose to adjust for health status at age 30. It should also be noted that, since temporary employment tends to continue across life, even baseline health could be influenced by prior unmeasured, exposure to temporary employment.

There are also other factors that could lead to selection bias and thus limit the validity of the inferences. For example, the members of Northern Swedish Cohort were exposed to high unemployment rates early in their working life which could possibly influence health status later in life and also possibly the exposure to temporary employment. In paper II I found that the group with the highest exposure to peripheral employment also had the greatest exposure to unemployment, which is a previously known risk factor for illness (Hammarström et al., 2010). Thus, early experience of unemployment could be a factor leading to selection bias.

**Information bias**

Paper I-III are based on questionnaire data from the Northern Swedish Cohort. The questions are derived from well-known and validated questionnaires and due to the longitudinal design of the study most of the questions have been kept intact since 1981. Keeping questions intact over time is necessary in longitudinal studies as it enables making comparisons over time. However, keeping questions intact does also mean that more
modern measures (of e.g. illness) cannot be included and that some phrasing in the questionnaire feels dated and old fashioned.

Temporary employment measurement
Previous research on precarious employment has criticized measuring type of contract in relation to health outcomes and suggested that there are temporary jobs with non-precarious conditions (Vives Vergara, 2010), suggesting that temporary employment can be beneficial and lead to permanent employment. However, few studies have had the possibility to use the heterogeneity and to differentiate between different types of temporary contracts. Instead a crude differentiation e.g. fixed vs. permanent has often been used. In papers II-III of my thesis, a gradient in relation to working conditions along with different type of contracts was taken into consideration when formulating the exposures.

The measurement of temporary employment in papers II-III was done retrospectively based on a matrix of past employment contracts each half-year. As this retrospective recall spanned as much as 12 years, one can question the precision and validity of this measure. It is conceivable that the reports of labour market history involve a degree of random measurement error, e.g. that participants randomly misreport their exact type of contract and/or the time they held the occupation. Such random error in the exposure would lead to downward bias of the estimated associations with the outcome, and thus increased the risk of type II error. In addition to random error, systematic error could also be introduced in the measures. For example, if questions about employment history were to be perceived as stigmatizing this could lead to a general underreporting. However, as the prevalence of temporary employed in this study (8.5%) corresponds to register data on the national prevalence in the same age group (age 33-44, 8.8%) (Statistics Sweden, 2009) this indicated that possible underreporting would be small. Also, a previous study that tested register data vs. self-reported data on occupational history found a high correspondence between the two, which suggests that self-reported occupational data may be of good quality (Wärneryd et al., 1991). In addition, there is limited register data available in Sweden on labour market attachment and therefore most studies in the field rely on self-reported data.

The trajectory analysis was useful for discovering different paths of employment over an extended period of time. However, there were some limitations regarding this analytic method: only 12 time points could be entered into the programme, which was only half of the time points that the data offered. To minimize bias due to seasonal variations in temporary
employment, spring and autumn were alternated during the 12 years. Also, choosing the best fitted solution could result in bias, though the 8 class solution was chosen as it offered rich detail and variation between the tracks. Despite the limitations, trajectory analysis offers a unique possibility to handle retrospective data on labour market attachment, yielding knowledge about mobility patterns in relation to health outcomes.

**Health measurement**

Non-optimal self-rated health is a frequently used outcome measure in public health research (Emmelin, 2004). Like all other self-reported health measures, it has been criticized for being a subjective measure. But the measure has also been proven to be associated with future mortality and morbidity (Idler and Benyamini, 1997). Psychological distress is a measure that reflects health status in relation to emotions (Mirowsky and Ross, 2003). Negative emotions such as perceived nervousness and anxiety have been shown to be related to future mortality and morbidity (Weitoft and Rosén, 2005). This could possibly be understood as showing that emotions are related to bodily expression and can affect social life (Dahlgren, 2011).

Self-reported data on health status could be influenced if respondents perceiving a lack of confidentiality or privacy, in combination with questions being perceived as stigmatizing, therefore decline to answer truthfully, which could introduce response bias (Brener et al., 2003). Non-optimal self-rated health and psychological distress prevalence is higher in the NSC than in the national ULF study (Statistics Sweden, 2007). Part of this discrepancy could possibly be due to the difference in attrition rate (NSC 5.4% vs. ULF 26.9%)(Statistics Sweden, 2008). Moreover, in the Northern Swedish Cohort rigorous work has been expended to maximize the confidentiality and privacy of the participants, as the only one with access to identification is the PI. The PI has made sure that the participants are aware of that their integrity is a high priority for the research team. All data used by the team of researchers is anonymous and stored on encrypted units. Since the study has been running for a long period of time the PI has demonstrated that she safeguards the participants’ privacy and the high response-rate may be seen as a confirmation of this.

The reliability of self-assessed health status is an important question. It is debated whether a subjective measure such as self-assessed health status really can measure an individual’s health accurately. A limitation regarding our measure of self-rated health is that the question offers a three-scale response, in contrast to the five-scale response option commonly used today.
If a five-scale response option had been available the results would have been more directly comparable to other studies.

**Analysis**

In paper I, exposure and outcome are measured at the same time, which limits the possibility to draw conclusions about causality. Efforts to reduce the risk of reverse causality were made in the present thesis; adjustment for previous health in papers I-III, and in papers II and III also measuring exposure before the outcome, by retrospective assessment.

To address confounding in this thesis a number of covariates have been included in the analysis. Although this increases the validity of the results, there is still the possibility of residual confounding due to absent confounders. As mentioned above, early unemployment could be one possible confounder selecting individuals into temporary employment in later life and also potentially impacting on health. Other possible confounders not included in the analyses due to lack of data are income, household income, contract duration, occupational sector (Virtanen, 2003) and employability (Berntson and Marklund, 2007).

Another related issue is the fact that the variables treated as confounders in the present thesis do not necessarily represent true confounders, but they could be an effect of temporary employment. For example, marital and parental formation could be delayed by the financial insecurity of temporary employment. It is also possible that the career is hampered by temporary employment, and thus that later socio-economic position is a result of prior periods of temporary employments. In addition, unemployment is often described as an integral part of being temporarily employed, and separating their independent effects may therefore be difficult. In summary, several of the variables treated as confounders in this thesis could potentially also represent mediators, and therefore adjustment for them could involve overadjustment and risk of underestimating the strength of the relationship between temporary employment and health.

The comparatively small sample size limited the number of covariates that could be included in the analysis. There could be a risk of type II error due to the sample size. The sample size also limited the possibilities to stratify analyses. It would have been interesting to stratify all analyses for gender in order to examine possible differences of the experience among women and men. However, as the sample and exposed group is rather small this was
only possible in paper II, where comparable associations were found among both women and men.

**Qualitative study**

To increase trustworthiness I used the method called member checking (Burr, 2003). At the end of each interview I summarized what the informant had said and asked him or her to interrupt if they did not agree or if they would like to add something. The purpose of this was to make sure that I understood what was said was correctly. Also, triangulation was applied in the coding and categorization process to increase the credibility and check whether the same interpretations were made, when the co-authors had different opinions the final product was negotiated until both parties felt content. A strength here was that the co-authors had different points of departure in relation to the topic. Two were familiar with the research field while another was new to it, which provided an insider/outsider perspective. I used an audit trail to allow the reader to follow the steps from the original text of from the interviews to the final steps of the analysis, which could be seen as a way to increase trustworthiness (Burr, 2003).

In order to increase the transferability efforts have been made to describe the context of this research in the paper, to give the reader all information needed to judge whether the results can be transferred to various contexts.

It is also important to reflect upon the position of the researcher (Burr, 2003, Richards and Emslie, 2000), and I have asked myself how the interviews would have differed if someone else had performed them. This is of course impossible to answer, but I would like to give some insight on who I am, to enable the reader a possibility to make their own judgement.

The informants were given my name and the background information about me as a PhD student in Public Health Science. I was 30 years old and a woman. During a course in interview methodology I was advised to dress neutrally and always look neat and respectable, to make informants comfortable. The interviews were performed between June 2012 and January 2013, during which period I was pregnant. During the interviews I tried to use the informants’ own words and not use scientific language.

What I felt in most of the interviews was a growing trust between me and the informants, that they became increasingly comfortable and spoke freely about their life and experiences, even about emotional and sensitive information. A personal reflection and interpretation on how this happened
was that many informants initially asked how long the interview would take, and some said that they did not have all the time in the world. I usually responded that it would depend on how much they would like to tell but I also described the time range of previous interviews. Some said that they had a specific time when they had to leave. I interpreted this as a safety precaution in case they wanted to leave, but when the interviews had started no one (but me) seemed to pay attention to the time at all; they got involved in telling their story and they wanted to tell it to the end.

I was younger than the informants which could be helpful in terms of distribution of power and possibly reduce the chance of the informant feeling subordinate to the interviewer. I felt that both the woman and men could tell their stories to me. Finally most of the informants could tell that I was pregnant (apart from the two first interviews performed in June). It is difficult to say whether this affected the situation; if anything I believe that it was disarming and that they saw me as a human being with a life, not just a researcher. However, one informant described her family situation and having no children of her own. Possibly she felt that she had to stand up to that choice since it was obvious that I was pregnant. It is also important to note that I as a researcher am part of the study, as the researcher can never be objective and disregarded in the interviews (Charmaz, 2006). However, as I entered the interviews I had already worked and read about previous research on temporary employment and illness, but I tried to set aside my previous knowledge and be open-minded to new views on the topic and not just confirm previous knowledge.
Conclusions

This thesis has expanded the knowledge about temporary employment and illness by supporting a number of conclusions.

First, the thesis highlights that temporary employees are not a homogeneous group in terms of working and social conditions, but rather that the conditions for temporarily employed differ in terms of how peripheral they are on the labour market as well as in relation to a person’s history of temporary employment and a hierarchical order within the group of temporary employees. This thesis therefore suggests that inequality exist both in relation to permanent employees and within the group of temporary employees.

Second, the thesis shows that temporary employees are at risk for poor health status compared to permanent employees. This conclusion can be drawn from the results of papers I-III because of the consistent associations between various measures of temporary employment and illness. The thesis also shows that both total time in temporary employment and how peripheral on the labour market the contract is, matter for one’s health status.

Third, the results furthermore show that this health risk among temporarily employed remains after adjustments. The results are not completely explained by other life circumstances and previous health status. This is consistent with the idea that temporary employment by itself may have a negative impact on health status. In addition, the thesis suggests that poor working and social conditions, such as job insecurity, low cash margin and unemployment, could be partial explanations as to why there is a health-gradient in relation to the core-periphery structure.

Public health policy and implications for future research

Three policy implications can be drawn from this study. First, for primary prevention, the number one priority should be to prevent illness by reducing the number of people working on temporary contracts and by promoting stable and fair employment conditions. Second, central agencies should establish adequate surveillance by developing nationwide register data about individuals’ employment contracts (including different types of temporary contracts) in order to increase the possibilities of monitoring by governmental authorities as well as performing longitudinal research on the topic. It would also be valuable, to investigate the total economic and health-
related costs of temporary employment and job insecurity. Third, for secondary prevention, the aim should be to reduce the detrimental health effects among people in temporary employment by improving working and social conditions among temporary employees and the occupational health services for these groups.

Research on temporary employment within the field of public health is rather limited, especially concerning longitudinal studies that differentiate between various temporary contract types, and this field would therefore benefit by expanding the number of studies with high methodological quality. Further, more qualitative studies are needed to expand the understanding of how temporary employment is linked to illness. New knowledge could also be gained by analysing variations within the group of temporary employees in relation to gender, socioeconomic status, age and ethnicity in various contexts. Future research could also evolve by examining mechanisms e.g. considering the role of marital status and how well the partner is attached to the labour market. Paper IV revealed that health habits and sleeping can be disrupted by temporary employment; future research could consider these as well as a broader range of health conditions as potential outcomes. Also, it would be interesting to examine conditions of temporary employment depending on sector, as interviews revealed that conditions in women-dominated sectors might be worse than other sectors. I suggest that the research field could benefit and move forward by shifting towards a new focal point; Which specific characteristics in temporary contracts risk damaging health? Is poor quality of working conditions specific to a certain sector or more connected to a specific type of contract?
Acknowledgements

Jag vill börja med att tacka alla deltagare i Luleå kohorten och ett speciellt varmt tack till alla intervjudeltagare, som delade med er av era liv till mig.

Tack till finansiärerna som möjliggjorde denna avhandling: Forskningsrådet för hälsa, arbetsliv och välfärd samt den Medicinska fakulteten vid Umeå Universitet.
**Gratitude!**

Från en flicka från en liten ö, långt bort i ingenstans med en sjökapten till far, som berättat alltför många sagor, kommer här mitt tack!

Nu när detta gamla skepp till sist nått sin slutgiltiga destination, långt bortom möjigheternas horisont. Då vill jag såklart hylla alla som gjort resan möjlig.

Först ut, Kapten Anne Hammarström vid rodret med sin gedigna kunskap om hur man navigerar ett skepp, och håller besättningen motiverad att fortsätta jobba även när det stormar som allra värst.

Förstestyrman Per Gustafsson, som hållit ett stadigt grepp i repen när jag skall ta mig ner från masten och andra höga höjder och simträningen i fall man skulle falla överbord. Och för alla gånger när du hjälppt mig hissa segel, då de känts på tok för tunga för att dra upp på egenhand. Du har varit den klapp i ryggen som varit nödvändig för att orka fortsätta framåt.

Andrestyrman Pekka Virtanen, med sin totala vishet och orubbliga lugn har lärt mig om hur man läser vindarna, och har utan att stressa suttit ned och förklarat och gjort saker tillsammans, lagt sin tid på att hjälpa mig och bjudit på varmande Libbsticks-soppa.

På fördäck står den kreativa kvall-kanonen Maria Wiklund; energi, positivitet, nytänk och en superpedagog. Pang! Så skjuts jag i väg framåt!

Navigatörerna Liudmila Lippiäinen och Tapio Nummi som gjort det mödosamma arbetet att räknat ut både longitud och latitud för att kunnat bestämma vår position.

Alla matroserna; Anna Brydsten, Klara Johansson, Karina Nygren, Ida Linander, Inger Haukenes, Frida Johansson, Jenny Andersson och Andreas Lundin som seglar nu eller seglat vidare på nya äventyr, för ett gott sällskap på denna resa där alla är på väg mot samma destination. Det har varit fint att dela denna tid och erfarenheterna med er! Speciellt vi jag lyfta fram jungman Lisa Harryson, en jämlige vid min sida från start till slut, någon att dela allt med på denna brokiga resa. Skratt, tårar och ett stöd när allt bara känns mörk, finaste fina du! Jungman Sofia Elwér den visaste av de alla; jag beundrar dig! Ett evigt utbyte av allt, varje dag och innebörden att jobba sida vid sida, som har hjälpt mig att knyta nya knopar, då det mesta slutar kärring knop, och njutning av det svarta guldet, vår gemensamma last.
Alla som man har snackat med i Skansen under denna resa, dag efter dag över en bit mat eller skeppsskorpa har vi haft fina samtal, möten, skratt man minns, och jag har fått hjälp med stort och smått. Tack; Cia, Eva F.S., Eva J, Eva F, Roger, Herbert, Anette, Anne-Lie, Lotta, Lennart, Lena, Lars Hjalmar, Katarina, Ulla, Arja, Emilie, Anna, Maria, Tijn, Patrik, Sigbritt, Christer, Karin, Mattias och alla övriga på ”Amy”. Ni har varit viktiga för mig.

Redaren; Olle Rolandsson med två fotter stadigt på fastlandet och glimten i ögat.

Jag minns också alla inlandstigna sjömän rumlandes på Amsterdams gator där vi delade glada skratt och kunskap över ett glas Genever. Speciellt tack till Petra Verdonk för ett otroligt varmt mottagande och till Lena Aléx för din fina historia om de röda liftarbyxorna.


Båtsmännen, Miguel San Sebastian, Kerstin Isaksson, Tohr Nilsson, Urban Janlert, Peter Byass och Annci Fjellman-Wiklund som med kritisk blick pekat på vad som behövs åtgärdas ombord innan nästa etapp.

Sjörövarna & skärgårdsprinsessorna, Mariell, Anna P, Jojo, Jocke, Ellan, Saima, Nina, Elin, Maria, Milla & Lill-Pontan för varmaste vänskap genom evinnerliga tider.

Havanna hamn och Berglundarna, hos er finns alltid en kaj & koj-plats ledig, för att ni är min norrländska familj.

Breviks hamn, för att hemma är alltid hemma och ni finns där som ni alltid gjort, kravlokt och kärleksfullt; mami, papi, allra käraste syster, bror och bror. För att vi alltid avhandlar livets viktiga frågor:

["Vad blir det till middag?" "Markrill med mangold eller har Brattvåg kommit in med räkor?", "Har pappa dratt krabbinan?", "Har nån ringt Fröken mussla?", "Vill nån plocka hallon?", "Vad är det för vind?", "Blir det Smultronön eller Möris?", "Vill du att jag bakar rabarberkaka eller vinbärsbjud?"].
Mamma, evigt tack för ditt självklara sätt att finnas där när du behövs som allra mest.

I byssan, min Patrik. Tack för extraordinära middagar och all vardagsmatlagning, efter långa dagar, för ändlöst stöd och tilltro, all kärlek till dig!

I kojen, där gommer jag min käraste skatt, Siri. Ett ögonkast och man är förtrollad och allt annat än nuet är glömt.
References


Mossakowski, K. N. (2008) Is the duration of poverty and unemployment a risk factor for heavy drinking? 


Richards, H. & Emslie, C. (2000) The 'doctor' or the 'girl from the University'? Considering the influence of professional roles on qualitative interviewing. *Family Practice, 17*, 71-75.


behaviour as predictors of the occurrence of unemployment and

Virtanen, P., Liukkonen, V., Vahtera, J., Kivimaki, M. & Koskenvuo, M.
(2003) Health inequalities in the workforce: the labour market core-
periphery structure. *International Journal of Epidemiology*, 32,
1015-21.

Employment security and health. *Journal of Epidemiology and
Community Health*, 56, 569-74.

Vives, A., Amable, M., Ferrer, M., Moncada, S., Llorens, C., Muntaner, C.,
Benavides, F. G. & Benach, J. (In press) Employment Precariousness
and Poor Mental Health: Evidence from Spain on a New Social
Determinant of Health. *Journal of Environmental and Public
Health* [Epub 2013 Feb 3].

Employment: Measurement, Association with Poor Mental Health
and Prevalence in the Spanish Workforce. *Departament de Ciències
Experimentals i de la Salut*. Universitat Pompeu Fabra.

employment and psychological self-rated health? and self-rated
health? -Entangling and (or) disentangling the problems of assessing
the relationship between temporary employment and psychological
and self-rated health. Umeå, Umeå University, Public Health and
Clinical Medicine.

Wagenaar, A. F., Kompier, M. A. J., Houtman, I. L. D., van den Bossche, S.,
health and work-related attitudes be explained by quality of working
life and job insecurity? *International Archives of Occupational and
Environmental Health*, 85, 763-773.

Selection Unhealthy Employees Out and Healthy Employees In?
*Journal of Occupational and Environmental Medicine*, 54, 1192-
1200.

70


