YESTERDAY ONCE MORE?

Unemployment and health inequality across the life course in northern Sweden

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This book is dedicated with love to Turid, Hedda and Johan
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Abstract

Background. It is relatively well established in previous research that unemployment has direct health consequences in terms of mental and physical ill health. Recently, knowledge has emerged indicating that unemployment can lead to economic consequences that remain long after re-establishment in the labour market. However, few empirical studies have been able to apply a life course perspective asking whether there are also long-term health consequences of unemployment, and, when and in which context unemployment may affect the individual health status across the life course. The aim of this thesis was to analyse the relationship between unemployment and illness across the life course, and how it relates to individual and structural factors in the geographical setting of northern Sweden. In particular, three main areas have been explored: youth unemployment and illness in adulthood (Paper I and Paper II), contextual unemployment of national unemployment rate and neighbourhood unemployment (Paper II and Paper III) and lastly, social determinants of health inequality between employment statuses (Paper IV).

Methods. This thesis is positioned in Sweden between the early 1980s and the mid-2010s, following two comparable cohorts sampled from northern Sweden (26 and 19 years follow-up time respectively from youth to midlife) and a cross-sectional sample from 2014 of the four northernmost counties in Sweden. The two longitudinal cohorts comprised the Northern Swedish Cohort and the Younger Northern Swedish Cohort, consisting of all pupils in the 9th grade of compulsory school in Luleå municipality in 1981 and 1989. The participants responded to an extensive questionnaire on socioeconomic factors, work and health, in 5 and 2 waves respectively of data collections. Neighbourhood register data from Statistics Sweden was also collected for all participants in the Northern Sweden Cohort. At the latest data collection, 94.3% (n=1010) participated in the Northern Sweden Cohort and 85.6% (n=686) in the Younger Northern Sweden Cohort. The cross-sectional study Health on Equal Terms is a national study, administered by the Public Health Agency together with Statistics Sweden and county councils with the aim of mapping public health and living conditions in the country over time. In this thesis, material from 2014 has been used for northern Sweden with a response rate of around 50% (effective sample n=12769). The statistical analyses used were linear regression, multilevel analysis and difference-in-difference analysis to estimate the concurrent and long-term health consequences of unemployment, and a decomposition analysis to disentangle the inequality in health between different labour market positions. The health outcomes in focus were functional somatic symptoms (the occurrence of relatively common physical illnesses such as head, muscle and stomach ache, insomnia and palpitation) and psychological distress.
**Results.** Among men only, as little as one month of youth unemployment was related to increased levels of functional somatic symptoms in midlife, regardless of previous ill health or unemployment later in life, although only during relatively low national unemployment (pre-recession) when comparing with youth unemployment during high national unemployment (recession). This was explained by the health promoting effect of more time spent in higher education during the recession period. Furthermore, the health impact of neighbourhood unemployment highlights the importance of the contextual setting for individuals’ health both across the life course and at specific periods of life. Lastly, employment-related mental health inequalities exist for both men and women in all life phases (youth, adulthood and midlife). Economic and social deprivation related to unemployment and illness varied across different phases in life and across genders.

**Conclusion.** The key findings of this thesis paint a rather pessimistic vision of the future: one’s own and others’ unemployment may cause not only ill health today but also ill health later in life. Importantly, the responsibility of unemployment and the associated ill health should not be placed on the already marginalised individuals and communities. Instead, the responsibility should be directed towards the structural aspects of society and the political choices that shape these. In other words, health inequality manifested by the position in the labour market is socially produced, unfair and changeable through political decisions. The results of this study therefore cannot contribute to any simple or concrete solutions to the concurrent or long-term health consequences of individual or contextual unemployment, as the solution is beyond the areas of responsibility and abilities of research. However, if there are long-term health consequences of one’s own and other people’s unemployment, labour market and public health policies should be initiated from a young age and continue throughout the life course to reduce individual suffering and future costs of social insurance, sick-leave and unemployment benefits.

**Keywords:** unemployment; life course; long-term health consequences; health inequity; national unemployment rates; neighbourhood unemployment rates; northern Sweden
Populärvetenskaplig sammanfattning

Det är relativt väletablerat i tidigare forskning att arbetslöshet har direkta hälsokonsekvenser i form av mental och fysisk ohälsa. På senare tid har det även kommit allt mer kunskap som tyder på att arbetslöshet kan leda till ekonomiska konsekvenser som kvarstår långt efter återetablering på arbetsmarknaden. Det är dock relativt outforskat huruvida det även finns långsiktiga hälsokonsekvenser av arbetslöshet. Dessutom saknas det kunskap om arbetslöshetens betydelse för hälsovårdsmomentet under olika skeden av livet, av att själv vara arbetslös i en miljö av andras arbetslöshet samt vilka sociala och ekonomiska faktorer som kan förklara ojämlikhet i hälsa mellan personer i arbete och arbetslöshet. Den här avhandlingenens syfte är att analysera sambanden mellan arbetslöshet och ohälsa över livsloppet och hur det relaterar till individuella och strukturella faktorer i norra Sverige. Avhandlingen behandlar specifikt tre områden: i) sambandet mellan arbetslöshet i ungdomen och ohälsa senare i livet (artikel I–II), ii) kontextuell arbetslöshet, i termer av nationell arbetslöshet nivå och arbetslöshet nivå i bostadsområdet för ohälsa över livsloppet (artikel II–III) och slutligen, iii) sociala determinanter av ojämlikhet i hälsa mellan arbetslösa och arbetande i ett livsloppsperspektiv (artikel IV).

Metod och material


Tvärsnittsstudien ”Hälsa på lika villkor” är en nationell studie, insamlat av Folkhälsomyndigheten tillsammans med Statistiska Centralbyrån (SCB) och landsstingen med syftet att kartlägga den allmänna hälsan och livsvillkoren i landet över
tid. Datainsamlingen är administrerad av SCB med enkät och registerdata. I den här avhandlingen har 2014 års material används för norra Sverige (n=25 667) med en svarsfrekvens på omkring 50 % (i vår studie n=12 769).

Som statistisk analys användes linjär regression, flernivåanalys och en difference-in-difference analys för att uppskatta de direkta och långsiktiga hälsoeffekterna av arbetslöshet, samt dekompositionsanalys för att urskilja och identifiera vilka sociala determinanter som förklarar ojämlikhet i hälsa mellan arbetande och arbetslösa. Hälsooutfallen i fokus var funktionella somatiska symptom (förekomsten av relativt vanliga fysiska besvär så som huvud-, muskel- och magvärk, sömnsvårigheter och hjärtklappning) och mental ohälsa.

Centrala fynd och slutsatser
Resultat från den här avhandlingen visar att unga arbetslösa män rapportera högre grad av funktionella somatiska symptom, både direkt och långsiktigt över tid, än sina jämnåriga i arbete (artikel I). Sambandet fanns endast under förhållandevis stabil ekonomisk konjunktur (artikel II) och förklaras inte av ohälsa före exponering av ungdomsarbetslöshet, socioekonomisk faktorer i barndomen eller av arbetslöshet senare i livet (artikel I). Unga arbetslösa män under 1990-talets lågkonjunktur rapporterade lägre nivåer av funktionella somatiska symptom mitt i livet, jämfört med arbetslösa ungdomar före den ekonomiska krisen (artikel II). Sambandet förklaras av den hälsofrämjande effekten av högre utbildningsnivå under lågkonjunktur, vilket möjliggjordes genom det statliga initiativet av ökat antal platser i universitets- och högskoleutbildning under 1990-talskrisen. Conceptuellt var detta också förstått utifrån betydelsen av att dela bördan av egen och andras arbetslöshet och mindre individuell skuldbeläggning.

Ungdomsarbetslöshetens hälsokonsekvenser i en svensk kontext visade sig vara starkt könade; endast bland män fanns säkerställda kortsiktiga och långsiktiga samband mellan ungdomsarbetslöshet och funktionella somatiska symptom (artikel I och II). Det berodde troligen på den genussegregerade arbetsmarknaden i Sverige med sämre arbetsvillkor och därmed sämre hälsa bland kvinnor jämfört med bland män i arbetslivet. Därmed förstods de små skillnaderna i hälsotillstånd mellan arbetande och arbetslösa kvinnor som en möjlig förklaring till bristen på signifikant samband bland kvinnor.

Förutom den kontextuella betydelsen av nationell arbetslöshet, visar den här avhandlingen att arbetslöshet i bostadsområdet har betydelse för funktionella somatiska symptom under livsloppet (artikel III). Sambanden kvarstår oberoende av individens egen arbetsmarknadsposition. Med andra ord, bostadsområden med hög arbetslöshet bland dess invånare är relaterat till generellt högre nivåer av funktionella somatiska symptom över livsloppet, oberoende om individen är arbetande eller arbetslös, jämfört med bostadsområden med lägre arbetslöshet. Det allmänna intresset för kontextuell arbetslöshet har huvudsakligen fokuserat på arbetslöshet på nationell, kommunal eller regional nivå i samhället. Därför bidrar våra fynd till kunskap om betydelsen av arbetslöshet i närområdet, och betonar hur de sociala och ekonomiska skillnaderna mellan bostadsområden kan påverka enskilda individers hälsa över livsloppet även i Sverige med förhållandevis låg bostadssegregering.
Även om det ideala vore att alla människor har någon form av sysselsättning, har jag i den här avhandlingen fokuserat på vilka faktorer som kan minska ojämlikheten i hälsan mellan arbetande och arbetslösa. Ojämlikhet i hälsa hittades mellan arbetande och arbetslösa kvinnor och män i alla livsfaser – ungdom, vuxenliv och medelålder (artikel IV). Våra resultat betonar att både sociala och ekonomiska faktorer har en viktig roll att spela för att minska ohälsan bland arbetslösa, samt att betydelsen varierar över livsloppet. Huvudsakligheterna var, i) bland kvinnor: låg kontantmarginal och brist på praktiskt stöd (ungdom), ekonomisk belastning och brist på förtroende för andra (vuxen och medelålders), medan ii) bland män: låg kontantmarginal (medelålders och ungdom), ekonomisk belastning (vuxen), brist på förtroende för andra (vuxen och ungdomar) och bristande socialt stöd (medelålders). Dessa skillnader tydliggör även behovet av ett genus- och livsloppsperspektiv i folkhälsoarbetet.

**Några avslutande ord**

De mest betydelsefulla resultaten i den här avhandlingen tycks frambringa en relativt pessimistisk framtidssyn – egen och andras arbetslöshet kan orsaka inte bara ohälsa idag utan även ohälsa senare i livet. Det är viktigt att ansvaret för arbetsrelaterad ohälsa inte förläggas på de redan marginaliserade individerna och samhällena. Istället bör ansvaret riktas mot strukturella aspekter på en samhällelig nivå och de politiska val som bidrar till dessa ojämlikheter i resurser och livsmöjligheter. Det vill säga, ojämlikhet i hälsa som manifesterad av ställningen på arbetsmarknaden är socialt producerad, orättvis och föränderlig genom politiska beslut. Resultat från den här studien kan därmed inte bidra med några enkla eller konkreta lösningar på de samtida eller långsiktiga hälsokonsekvenserna av individuell eller kontextuell arbetslöshet, då lösningen ligger utanför forskningens ansvarsområden och möjligheter. Om det emellertid förekommer långsiktiga hälsokonsekvenser av egen och andras arbetslöshet, bör arbetsmarknadspolitiska och folkhälsopolitiska insatser initieras från ung ålder och fortsätta under hela livsloppet för att minska det individuella lidandet och de framtida kostnaderna för socialförsäkring, sjukfrånvaro och arbetslöshetsersättning.
List of original papers

This thesis is based on the following four papers, referred to as Papers I–IV:


IV. Brydsten A, Hammarström A, San Sebastian M. Health inequalities between employed and unemployed in Northern Sweden: An Oaxaca decomposition analysis of social determinants for mental health. Manuscript
Introduction

The present thesis studies the health consequences of unemployment and how it is related to aspects of individual and contextual factors in a Swedish setting. The thesis focuses in particular on the long-term relationship between unemployment and illness that remains despite re-employment and how it is influenced by the complex interplay between individual resources, social context and the temporality across the life course. The title of this thesis – *Yesterday once more?* – is formulated as a reflection of how we all are products of our present and our past; how we carry our own and others’ experiences and how this can become an issue when yesterday’s unemployment-related illness is not isolated to the past but cast long shadows into the present. In this introduction, the three central themes of this thesis will be briefly introduced – 1) work, and lack of work, as a social position in society, 2) work as a key social determinant of health inequity and 3) life course – before we examine them in greater depth in the following chapters.

When outlining the concept of unemployment it is inevitable not to enter into the sphere of work. There is however no clear-cut meaning of what counts as work, such as the distinctions between the categories of work—non-work—leisure time, or paid work—domestic work (Grint, 2005). What is commonly described as work in contemporary Western societies is ‘wage labour’, and thus — economically actively paying taxes to the state (Bambra, 2012; Grint, 2005; Weeks, 2011). In that sense, work tends to be described as a human activity usually under some productive or social circumstance providing the necessary needs of food and shelter, social interaction and self-fulfilment (Jahoda, 1981; Weeks, 2011). More narrowly, it means ‘to be employed or to have a job’ and thus emphasising the economic transfer between employed and employer (Bambra, 2012). At both an individual and a collective level, work is the primary means to get integrated into the social, political and economic systems of a society (Weeks, 2011). Past and present definitions of work allow us to mirror the temporal and cultural social position of work: what kind of work is desirable, despised and/or gender-related (Grint, 2005). It also tells us much about the view of the lack of work, i.e. unemployment, such as the life chances, opportunities and stigmatisation attached to the position of unemployment (Miething, 2014). Basically, paid work is interlinked with high status and values characterising the working individual as being important, capable, needed and wanted by the society, while lack of paid work may be stigmatising by attributing the opposite values and characteristics (Bambra, 2012). Altogether, unemployment may involve loss of income and social interaction, degradation of status and not being a part of a social, economic and capitalistic society and thus may restrict abilities to make life choices (Jahoda, 1981). In accordance with Weeks (2011) and Bambra (2012), this thesis adopts the view of unemployment as a position in the social system rather than

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1 This is illustrated on the cover by the fine black lines linking together the past, present and future of everyday struggles, visualising the highly complexed and non-linear life paths of human development and agency. I would like to express my great gratitude to the brilliant artist Shantell Martin for allowing me to use her artwork on my thesis cover.
an individualised choice, reflecting the central position of paid work in contemporary society.

The European office of the World Health Organisation (WHO) identifies unemployment as one of the main social determinants of health inequities, influencing the physical and mental ill health in the population through the uneven distribution of power, money, and resources in the population (Marmot et al., 2012). Unemployment is a stressful life event comparable to a form of bereavement, by which the relationship between unemployment and ill health is developed (Jahoda, 1981). Epidemiological studies linking unemployment and ill health have shown associations between concurrent unemployment and different health outcomes such as anxiety and depression, high blood pressure, unhealthy cortisol levels and increased mortality, both in Sweden and across different European countries (McKee-Ryan et al., 2005; Paul & Moser, 2009). A less explored issue is the potential association between unemployment and ill health later in life. A previous assumption within the research field has been that ill health related to unemployment resets when re-employed. However, a growing body of longitudinal studies suggest that unemployment could have remaining socioeconomic, social and ill health consequences long after re-employment (Garcy & Vågerö, 2012; Lundin, Falkstedt, Lundberg & Hemmingsson, 2014; McKee-Ryan et al., 2005; Strandh, Winefield, Nilsson & Hammarström, 2014; Toge, 2016). Conceptually the long-term associations may be viewed as a lowering of the set-point of ill health which could be improved after re-employment but remain lower than before the unemployment experience (Lucas, 2007). It could also happen that unemployment causes embodied stress, emotional strain and stress sensitivity is incorporated into the body (Krieger, 2005) leading to long-lasting illness remaining long after re-employment.

From a life course perspective, there are also reasons to believe that the magnitude of the relationship between unemployment and ill health may differ across the life span, corresponding to the position on the labour market, the social and psychological development and the social and economic circumstances characterising different life phases (Green, 2014; Larkin, 2013). However, few empirical studies have been able to adapt a life course perspective asking when and how unemployment may affect individual ill health. In this thesis, the life course approach and the contextual environment have been considered in order to shed light on the complex relationship between individual and contextual unemployment and individual illness in different periods of life.
Overview of the thesis

This thesis contains six more chapters following this introduction. The second chapter elaborates on the main areas presented in this introduction, as well as the setting of Sweden and northern Sweden, previous empirical and theoretical perspectives on the relationship between unemployment and ill health later in life. The second chapter ends with the aim and research questions. In the third chapter, the conceptual framework is presented – first with a broad sociological view of structure and agency (structuration theory), then a longitudinal perspective highlighting the importance of temporality and life phases (life course theory). In the fourth chapter, I present the methods, and then in chapters five and six, the main results are given and then discussed together with a section on methodological considerations. Lastly, in the seventh chapter, I end with the main conclusions highlighting the relevant policy implications.
Background

This thesis is positioned in Sweden across nearly three decades, from the early 1980s until mid-2010. This covers a period of time when Sweden faced its worst economic recession since the 1930s and when the welfare institutions were downsized for the first time since the establishment of the welfare state. Given that the processes of unemployment and ill health occur in determined contexts, this chapter gives a brief historical overview of the contextual setting of Sweden and northern Sweden and, thereafter, an outline of the research field of unemployment and ill health. After this, the aim and research questions are presented.

The labour market in Sweden

The Swedish welfare state plays a key role in the constitution of work, working conditions and level of unemployment. It is national and local institutions which regulate sanctions and benefits related to the labour market and its actors (Bambra, 2012). The state also plays a key role for maintaining a certain standard of living regardless of labour market performance (Bambra, 2012). Sweden is typically described as a social democratic welfare state (as opposed to liberal and conservative welfare states), regulating the social and economic relationship between citizens and market based on values such as universalism, solidarity and equality (Esping-Andersen, 1990). It is a welfare system with generous social benefits for its citizens. Benefits in the form of free education and subsidised health care, childcare from the age of one and free school meals throughout compulsory school, universal child support, one and a half years of parental leave and social security in case of sickness and unemployment. Altogether, it is an expensive tax-funded system that requires that all citizens are working, paying taxes and, therefore, sharing the burden of responsibility (Esping-Andersen, 1990). It has also been described as a family-friendly welfare state, creating opportunities for a shared family-work responsibility, referred to as the ‘dual-earner/dual-carer’ model (shared income and care of children within the family unit), with the cornerstones of gender-neutral policies, public childcare and parental leave (Bergqvist, 1999). These gender-neutral reforms were introduced in the 1960–1970s and captured the core of the gender equality debate at that time, problematising the unpaid work at home and the caring responsibility within the family (Florin & Nilsson, 2005). This was a contributing factor enabling the entrance of large numbers of women into the Swedish labour market. Today 83.3% of working-age women in Sweden are active on the labour market, compared to 88.3% among men (Statistics Sweden, 2016).

The Swedish labour market is also characterised by high availability of passive and active labour market policy measures, a relatively low level of unemployment and a high need of labour in the largest cities (Bengtsson & Berglund, 2012; Magnusson, 2000). From the Second World War until the 1970s the highest level of unemployment was around 3%, and slightly increased to 4.5% in the 1980s (Figure 1). However, compared to the general patterns of unemployment in Europe, the unemployment rates in Sweden were still relatively low (Magnusson, 2007).
Bengtsson and Berglund (2012) have identified four different phases in the Swedish labour market from the 1980s to 2010s. The first period (1985–1991), governed by the social democratic party, was characterised by relatively low unemployment (1.5–4.5% in the total population, 7.2–11.8% among those aged 16–24 years). It was a period of high focus on active labour market programs (ALMPs, such as active employment matching, education, vocational training and trainees). Membership in the income security system was mandatory and entitled those in unemployment to 90% of their salary for up to 300 days. This period of relatively low unemployment levels has been explained by the massive efforts carried out by the Swedish state to get unemployed people to remain near the labour market (Magnusson, 2000). During the second period, governed by liberal conservative and social democratic political parties, economic crisis hit Sweden (1992–1997). This meant relatively high unemployment (8.5–11.2% in the total population, but among youths as high as 25%), low public revenues, and several public institutions were rapidly converted from public to private. Internationally, the financial crisis was attributed to the collapse of the Bretton Woods system and the oil crises (see Helleiner, 1996) while on a national level it was aggravated by the dramatic increase in public expenditure and political instability (Magnusson, 2000). With the general downsizing of welfare, those in unemployment were hit hardest by the reduction of the replacement rate of the income security system to 75–80%, and increased fees and restrictive requirements for those who were entitled to the benefits. An important strategy for countering unemployment was the expansion of the number of places in higher education, aiming to increase the
competence in the workforce and qualification levels on the Swedish labour market (Angelin, 2009; Swedish Agency for Youth and Civil Society, 1998). During the post-crisis time, the unemployment rate decreased but was still higher than before the crisis. The post-crisis time divides into the third period of social democrats governing (1998–2006, 5.1–8.2% national unemployment) and then the fourth period of liberal conservatives governing (2007–2014, 6.2–9.5%) (IAF, 2016). During these two phases, profound changes were made in the Swedish welfare system. The main responsibility for re-employment, income and social protection was gradually shifted from the state to the individual, and stricter requirements for passive labour market measures were introduced (IAF, 2016). For example, decreased replacement rates were implemented in the income security system (from 80% of previous income up to 200 days, decreasing to 70% and then 65% up to 100 days) (Bengtsson & Berglund, 2012; IAF, 2016). The most dramatic change in the social protection was for the unemployed youths. During the last phase, unemployed youths’ access to income protections decreased from 46% in 2007 to 19% in 2014 (Swedish Unemployment Office, 2014). The group became the most vulnerable on the Swedish labour market, due to lack of previous labour market experience, active membership requirements, new demands on individual activity from the employment office, and abolished replacement rate for newly graduated.

Figure 2: Map of Sweden marking the four northernmost counties (Norland) and Luleå city
Labour market context in northern Sweden

As mentioned before, this thesis is positioned in the northern part of Sweden. Norrland is the largest land area in Sweden which represents 60% of Sweden’s total land, although only 12% of the Swedish population (Statistics Sweden, 2010). Figure 2 gives the geographic overview of the four northernmost counties in Sweden: Norrbotten, Västerbotten, Jämtland and Västernorrland. It is a geographical area dominated by coniferous forests, mountain chains, rivers, and restricted cultivable land. The main industries are agriculture and forestry, hunting and fishing, energy production from water and wind, mining and manufacturing industry. With regard to unemployment rates, the northernmost counties in Sweden have had relatively low unemployment during the last three decades compared to the country as a whole (Figure 3) (Janlert, 2016). Among the northernmost counties, the highest unemployment rates between the mid-1990s and early 2000 were found in Norrbotten county, after that, the highest levels were found in Västernorrland county. Västerbotten and Jämtland counties showed similar patterns across time. The counties also presented similar unemployment patterns independent of the geographic setting of coastal or inland.

Figure 3: Open unemployment rate (%) 1996–2015 in the counties of Norrbotten, Västerbotten, Jämtland and Västernorrland and the nation as whole (age 16–64). Source: Swedish Unemployment Office
This thesis is in particular positioned in Luleå in the county of Norrbotten (Figure 2). This is a medium-sized industrial town founded in 1621, which became an important commercial centre around the start of the twentieth century with marine and the shipyard business, which streamlined the industrialisation of agriculture, forestry and led to economic growth and relatively large population increase. In modern times, the cornerstones for the development of the city are the steelworks SSAB Luleå along with the technological centre, research and higher education. In 1980, Luleå municipality had a population of 66,834 citizens (which increased to 76,088 citizens in 2015).

The links between unemployment and ill health

The research interest of unemployment and ill health extends across several scientific fields, such as sociology, economics and social epidemiology (McKee-Ryan et al., 2005; Paul & Moser, 2009; van der Noordt, H, Droomers & Proper, 2014). Previous research has shown a clear relationship between unemployment and concurrent general poor mental health, anxiety and depression, heart disease, blood pressure and mortality (McKee-Ryan et al., 2005; Paul & Moser, 2009; van der Noordt et al., 2014). However, most of these studies have been cross-sectional or assessing short-term periods, overlooking that some of the health problems may remain even after re-employment. In fact, a growing body of literature regarding the long-term health consequences of unemployment has shown associations for health outcomes such as mental ill health (McKee-Ryan et al., 2005), self-rated health (Toge, 2016), increased risk of coronary heart disease (Lundin et al., 2014) and mortality (Garcy & Vågerö, 2012). This is somewhat novel because unemployment research has assumed that ill health related to unemployment would recover when re-employed (McKee-Ryan et al., 2005). The issue of unemployment and ill health is of particular concern for young people entering the labour market, who typically have lower labour market experience and shorter education, and therefore at higher risk of becoming unemployed and staying in long-term unemployment compared to other phases of the life course. Of the few studies available, youth unemployment has been found to be associated with later sickness absence, disability pension and further unemployment long after exposure (Gregg, 2001; Helgesson, 2015). Three studies based on the Northern Sweden Cohort, with 2, 14 and 26 years of follow-up respectively, showed that youth unemployment had implications for poor psychological distress in adulthood (Hammarström, Janlert & Theorell, 1988; Reine, Novo & Hammarström, 2008; Strandh et al., 2014); however, knowledge is lacking regarding other health outcomes such as subjective physical complaints.

Unemployment and ill health in context

Ill health related to unemployment is not only limited to the unemployed but also affects their families and the wider community (Diez Roux & Mair, 2010; Merlo, 2011; Pickett & Pearl, 2001; Riva, Gauvin & Barnett, 2007). Individual unemployment and ill health can therefore not be fully understood by looking at the individual life path; we need to put more emphasis on the timing and the contextual
setting of exposure. One important contextual level is, for instance, the macroeconomic setting of national unemployment rates. Findings from studies examining the macroeconomic influence are scattered, arguing for positive, negative and no long-term health implications due to economic recessions. For example, recessions have been shown to have health-improving effects such as increasing healthy lifestyle behaviours and decreased mortality (Aguilar-Palacio, Carrera-Lasfuentes & Rabanaque, 2015; Ruhm, 2000). On the other hand, recessions have also been shown to be related to increased depression, suicide, substance abuse and mortality (Berk, Dodd & Henry, 2006; Córdoba-Doña et al., 2014; Goldman-Mellor, Saxton & Catalano, 2010; Reeves et al., 2014; Stuckler et al., 2009; Stuckler et al., 2015). However, less focus has been placed on the long-term relationship: whether unemployment in youth influences current and future ill health differently in different macroeconomic settings. This is partly due to the cross-sectional dominance within the field. One of the few studies is a Swedish register-based study examining the macroeconomic influence of recessions, which found a long-term association between youth unemployment and mental ill health later in life (Thern et al., 2017). With a 19-year follow-up, this study concluded that unemployed youths had an increased risk of getting a mental health diagnosis, irrespective of the context of the national unemployment rate. Similar results were found in a Swedish study based on the same cohorts as this thesis, suggesting a relationship between youth unemployment and mental ill health in adulthood independently of the macroeconomic setting (Virtanen, Hammarström & Janlert, 2016).

Another important contextual level is the neighbourhood, and the advantage or disadvantage of living in, and being unemployed in, a neighbourhood with high or low unemployment rates. The interest in area level studies has seen a renewed interest in recent years (Cummins et al., 2007; Diez Roux & Mair, 2010; Pickett & Pearl, 2001; Riva et al., 2007). Socioeconomic characteristics of the neighbourhood have been related to ill health through social and economic deprivation influencing the individual ill health (Gustafsson & San Sebastian, 2014). However, unemployment is typically not a central factor in itself. Instead, it is seen as one of several other socioeconomic factors for deprivation in the neighbourhood. Of the few studies investigating neighbourhood unemployment, a British study showed that people (age 40+) living in neighbourhoods with high unemployment were more likely to experience early retirement, sick-leave or unemployment ten years later (Murray et al., 2016). This has also been confirmed in longitudinal studies from the US and Northern Europe, revealing that living in a neighbourhood with high unemployment was associated with poor self-rated health, mental ill health, increased risk of cardiovascular diseases, diabetes and mortality (Müller et al., 2015; Stafford et al., 2004; van Lenthe et al., 2005; Wight et al., 2013). As far as I am aware, knowledge is lacking regarding the current and the long-term influence of contextual unemployment and individual ill health in a Swedish setting.
Unemployment as a social determinant of health inequity

In recent years, there has been a growing interest in social inequality, including health inequalities. Health inequalities have mainly been analysed in the population according to social status, income, gender and place of residence (McLeod et al., 2012). Remarkably few studies have focused on health inequalities related to labour market position (Bambra, 2011), even though work and unemployment is one of the most important social determinants of health inequality due to the polarities it creates by uneven distribution of social and economic resources (Bambra, 2012). As mentioned in the introduction, the WHO has stated that health inequalities between different socioeconomic groups are socially produced, unnecessary and unfair, and that is so-called health inequities which should be highly prioritised by all levels of society (Marmot et al., 2012). This implies that all people ideally could attain their full health potential if their social position or social circumstances were not a disadvantage to them (Whitehead & Dahlgren, 2006). Nevertheless, the social gradient in health is manifested across all European countries in worse health and higher mortality among the most vulnerable groups (Whitehead & Dahlgren, 2006). For example, as noted before, people living in the most disadvantaged neighbourhoods have a lower life expectancy than those living in less disadvantaged neighbourhoods (Meijer et al., 2012). Similar patterns of health inequalities has been shown between educational level, income and other socioeconomic features (Matthews, Manor & Power, 1999; McLeod et al., 2012; Mosquera et al., 2016; Prus, 2007; San Sebastian, Hammarström & Gustafsson, 2015). Work-related health inequality has also been shown between women and men, typically explained by the gendered working conditions (Campos-Serna et al., 2013).

The relationship between unemployment and economy operates across all levels of the society. It is present at the organisation of production level, the family and household level, and at the individual level. For the vast majority of people, work is the primary means to ensure an income, allowing the ability to feed, clothe and shelter themselves and their families, as well as take part in other forms of consumption and to produce and reproduce labour in the capitalist economy (Weeks, 2011). In relation to the economic sphere, unemployment means economic deprivation and dependence on state support and loss of material power (Bambra, 2012). In the conceptual pathway between unemployment and ill health, economic deprivation may lead to ill health, limited feeling of control and ability to plan for the future (Bartley, 1994; Strandh, 2000). Even though generous welfare benefits have been shown to buffer some of these health hazards (Niedzwiedz et al., 2016; O’Campo et al., 2015; Vahid Shahidi, Siddiqi & Muntaner, 2016), financial strain and low cash margin have been identified as the main mechanisms in the relationship between unemployment and ill health even in the context of Sweden (Olivius et al., 2004; Hultman & Hemlin, 2008; Toge, 2016). Economic deprivation has also been identified as a key factor in the long-term association of unemployment and socioeconomic deprivation, remaining even after re-employment (Arulampalam, 2001; Gregg, 2001; Strandh & Nordlund, 2008).

Beyond the economic aspect of working life, work can give rewarding feelings such as control, responsibility, achievement and pride, constituting an important
element in most people’s self-identity and how others perceive them (Jahoda, 1981). This is vital even for those without work, who often define themselves in relation to their former employment (Schöb, 2012). Jahoda’s (1981) latent deprivation theory emphasises that being in unemployment leads to loss of time structure, social interaction and the feeling of participating in a larger society, which could lead to ill health through emotional strain. A central aspect is the experience of stigma, i.e. the deeply discrediting attribute of an individual by the normative surrounding society. Loss of social status and feelings of shame have been shown to be common when experiencing unemployment and depressiveness, and anxiety can remain even when income buffers are high (Nordenmark & Strandh, 1999). Shame and stigma related to unemployment have been shown to be associated with ill health and financial hardship (Rantakeisu, Starrin & Hagquist, 1999).

However, the contextual setting of high unemployment levels could also dampen the individual stigma, leading to less negative feelings of self-blame and shame and less ill health as a result of the collective burden and the shared experience of the mass layoffs (Strandh, Novo & Hammarström, 2011). That is, if the unemployment experience is seen as a result of external factors the individual ill health suffering is mitigated (Schrecker & Bambra, 2015; Weeks, 2011).

Rationale

If not only present but also previous unemployment experiences could lead to individual ill health long after re-employment, we as researchers, public health promoters and community members may have underestimated the complexity of the issue. The growing evidence of health consequences remaining long after the unemployment experience stresses the need to adopt a life course perspective, although with particular focus on youth unemployment and ill health across the life span. A life course perspective is also needed when considering the contextual influence of unemployment on individual ill health. Previous research provides reasons to believe that unemployment not only affects the exposed individuals, but also people surrounding them. However, little is known about the long-term importance of how contextual unemployment, such as macroeconomic and neighbourhood unemployment can influence individual health across the life course. Furthermore, most of the studies previously conducted within the field come from other European countries or the United States, dominated by mental ill health. More research is needed in a Swedish context, taking into account the contextual features. It also reinforces the need to examine the relationship with other health outcomes, such as somatic symptoms. Lastly, health inequality due to labour market position is a crucial public health problem, for individuals and society. However, the social determinants of health are often assumed to be homogeneous across the life course, ignoring the spatial difference, such as the temporality of unemployment in different stages of life. Drawing on the life course and contextual arguments of the relationship between unemployment and future ill health, I argue that there are reasons to believe that the social determinants of health inequality between different labour market positions varies depending on the life phase. To identify those determinants could be highly useful in targeting and creating health-promoting policies.
Aim and research questions

The aim of this thesis is to analyse the relationship between unemployment and illness across the life course, and how it relates to individual and structural factors in northern Sweden. The following research questions are asked:

1. Is there a long-term association between youth unemployment and functional somatic symptoms in adulthood among women and men? (Paper I)

2. Does contextual unemployment (such as national unemployment levels and neighbourhood unemployment) have an influence on individual unemployment and functional somatic symptoms over the life course? (Paper II, Paper III) How do these potential associations between contextual unemployment, individual unemployment and functional somatic symptoms vary over the life course? (Paper III)

3. Which social determinants of health explain the mental health gap between unemployed and employed? Does it vary across the life course? (Paper IV)
The conceptual framework

Peoples lives are multi-layered, embedded in several social structures: taking part in local, international and national networks, cultures and communities in a globalised world. Based on the same reasoning, experiencing unemployment is not a discrete event but an essential part of individuals’ lives and the way society is organised (politically, socially, and economically) (Weeks, 2011). Therefore, the relationship between unemployment and ill health needs to be viewed within the broader structures of society. This chapter briefly outlines two such theories – structuration and life course theories – and how these conceptual frameworks are applied to the subject of this thesis.

Structuration theory

Understanding the meanings and implications of unemployment requires a theory that acknowledges the dynamics of and between the individual and society. The structuration theory was developed by Anthony Giddens (1984) as a critique of symbolic interaction theory ignoring social structures, and also as a critique of structural theories for neglecting human agency by treating individual’s actions as dominated by the structure (Turner, 1986). Instead, the structuration theory is an attempt to combine the views of structure-agency and micro-meso-macro perspectives by arguing for the conceptualisation of structures as being actively produced and reproduced by reflexive human agents and their social interaction (Giddens, 1984; Turner, 1986). Furthermore, this is an eclectic theory stressing the association in determined settings referred to as ‘guilt by association’, that is, an approach that challenges the fruitfulness of adopting abstract social laws. The structuration theory, therefore, consists of a number of different concepts rather than a coherent framework (Månson, 2010), and will be used as a theoretical roadmap in understanding unemployment and illness in a given context.

Structure and agency

Structuration is defined as the ongoing process of social interactions – across time and space – modified and developed by the mutually interdependent individuals (agency) and society (structure) (Giddens, 1984) (Figure 4). Human agency at different levels of social interaction constitutes the point of departure (Figure 4, bottom part of the circle). Firstly, three forms of agency are identified at the individual level – practical, unconscious and discursive consciousness – constituting the foundation of collective and structural levels of society. Human agency is the ability to act, reflect and act differently if an individual chooses (referred to as the practical consciousness). However, actions are not always a result of volitional acts; they could be a consequence of unconscious motives marked by events, experiences and habits from youth or childhood (the unconscious consciousness). Hence, previous experiences can be incorporated into the emotional and physical memory, influencing current and future actions. This could be expressed by feelings (discursive consciousness) as a way to reflect on and discuss the practical actions (Giddens, 1984).
These abilities to act occur within a specific historical and cultural context (referred to as a social system), and the foundation of the production and reproduction of structures. In Figure 4, the social system is illustrated by the centre circle and the arrows of ongoing process, in front of the past historical and cultural social systems. Structure is defined as the rules and resources used by actors in interaction with each other (Figure 4, upper part of the circle) (Giddens, 1984). Rules, such as different rights, obligations, legislations and sanctions, are formed by generalised procedures in the social interaction of human lives, which are built on the values, norms, rituals and daily routines in a given social system. Resources, on the other hand, are the material and organisational capacities of an actor to influence the surroundings and mobilise power. However, power is a result of possessing allocative and authoritative resources rather than a resource by itself (Turner, 1986). On an individual level, resources include both the abilities for and the limitations on social action (referred to as the duality of structure). That means that the ability to act relates to the individual’s structural resources, such as the position on the labour market, gender or social class (Månson, 2010). The structure created by human interaction can lead to consequences beyond the individual control, which impacts on the individual as well as collective ability to act (Månson, 2010). The structuration theory also uses the term ontological security, i.e. the feeling of trust and security in the social context in relation to threats and dangers. This is a part of the practical and unconscious consciousness and the foundation in the community and the seemingly pliant routines in everyday actions and behaviours (Giddens, 1984). One example of ontological security could be the individual trust in one’s own ability and prospective future as well as trust in the institutional system (such as trust in the income protection or labour market measures) to handle threats of unemployment.
By applying the structuration theory in this thesis, I wish to emphasise that individuals are neither determined by factors which they are unable to control or influence, nor acting in a structural vacuum. Instead, individuals have the ability to act but the choices and actions are constrained by the opportunities of social and economic contextual circumstances that are shaped by their own experiences, available resources and the contextual arena of a social system. Related to the topic of this thesis, unemployed individuals have the ability to handle threats of unemployment and illness. Furthermore, the rules and routines constitute the ontological security for people and the individual and collective level. Lastly, guilt by associations is viewed through the lens of specific empirical contexts across time. However, even though the structuration theory recognises the ongoing changes across time, it fails to fully acknowledge the complexity of exposures across different life periods. In order to overcome these deficiencies I have supplemented it with the life course theory.

**Life course theory**

The life course theory is an interdisciplinary approach to human development and ageing across the life span. Since the mid-1900s, there has been an increasing interest in human development, social pathways and life course. Alongside the emergence of longitudinal studies and new methodologies during the 1990s, life course perspectives became a general theoretical framework in interdisciplinary fields such as sociology, psychology, public health and social epidemiology (Elder Jr, 2001). In accordance with the structuration theory, life course theory is based on the premise that individuals and society are constantly undergoing changes that are embedded in social structure and history (Elder Jr, 2001). In this thesis, I apply Giele and Elder’s (1998) core principles of life course, defining life course as age-related events and transitions, social roles and positions embedded in the current and past social structure, emphasising the temporality of an event and the human agency.

**Life phases on the labour market**

Human development and ageing are lifelong processes, where the timing of an event could have different meaning and implications depending on the normative and social expectations of an individual’s phase in life (Elder Jr, 2001). Life transitions and timing refer to socially expected changes and stabilities in events across a life course, such as getting an education, moving from parental home, finding a spouse, getting married, becoming a parent, retirement or mourning the death of a loved one. The timing of all these events is interchangeable with our social expectations of ages and life phases. Even though there are no coherent contemporary rituals of the transition from youth to adulthood to later life (Elder, 1975; Elder Jr & Giele, 2009), three common life phases are presented, representing different positions on the Swedish labour market.
Figure 5: Normative life phases on the labour market

Figure 5 illustrates normative life course transitions of different social and economic circumstances, such as education, social network and labour market measures. Along the y-axis, different types of social and economic circumstances are found, which are more or less on an individual or structural level. Along the x-axis, events are placed across the life course of youth, adulthood and midlife. The dotted line in the figure represents ill health across the life course. The first entry phase on the labour market is youth (late teens to mid-twenties). It is a life phase characterised as the ‘in-between time’ of childhood and the adult stage of life. It is a typically a dense period of intense social and demographic passages. It includes role transitions such as the move from school to entering the labour market or higher education, from living in the parental home to having one’s own household or cohabiting with spouse and/or friends, becoming economically independent of parents and learning how to manage social relationships, household chores and other tasks related to adulthood life (Elder Jr & Giele, 2009). Altogether, these age-normative events mark the social transitions of adult status in human development (Billari, 2001; Hayford & Furstenberg, 2008). Employment is an essential part of this role transition of adulthood independence. Unemployment may delay some of these age-normative events (Gregg, 2001; Tiggemann, Winefield & Goldney, 1993), referred to as delayed adulthood (Hayford & Furstenberg, 2008).

The second life phase is adulthood (mid-twenties to 40). It is the ‘settling down’ phase with increased investment in work, family and friends (Larkin, 2013) and thus high lifestyle stress. The rituals for passing of adulthood vary historically, culturally and between different social settings (Billari, 2001). A typical Western view of adulthood is the engagement in long-term relationship, cohabiting and
childbearing phase (average age of first birth is 30.8 years old in 2011 in Sweden) (Statistics Sweden, 2013). This is also the time before the more critical health problems accruing in midlife (Larkin, 2013). The adult role identity of adulthood is also closely related to work and labour market participation, partly because the high financial strains of higher expenses, such as children, housing and student loan. Unemployment during this phase is a violation of the social norm of employment i.e. the social expectation of wage work is closely related to the feeling of belonging, identity and taking part in society. Unemployment during this phase has also been shown to be a strain on relationships with family and friends, resulting in higher risks of divorce among unemployed (Doiron & Mendolia, 2012).

The third and last labour market phase before retirement is midlife (40 to 65 years). This is typically a phase where most people have a stable position on the labour market, although age-related health problems start to become more frequent. It is sometimes referred to as the ‘empty nest’ period of life, when children move out of the parental home and the financial burden becomes lower. Unemployment during this period is quite unusual, and when it happens it is typically related to several unemployment spells during the life course or mass layoffs, for example during a recession. Unemployment could also be troubling because of the difficulties of getting re-employment (Vansteenkiste, Deschacht & Sels, 2015; Worach-Kardas & Kostrzewski, 2014), and thus can have negative health status implications (Wagenaar et al., 2015).

**Life course models**

With an epidemiological life course terminology, the following four conceptual models are commonly used, and illustrated in Figure 6. Along the y-axis, individual health status is found, where good health is indicated by high values and poor health by low values. Along the x-axis, events are placed across the life course of youth, adulthood and midlife. The dotted lines illustrate the four life course models across the life course. **Sensitive period** is the first life course model (pathway A), implying that unemployment could have stronger implications for ill health during specific vulnerable phases in life (Kuh et al., 2003). Youth could be seen as a sensitive period in life with rapid individual change (Kuh et al., 2003), strongly influenced by the social and economic resources while growing up (Marmot et al., 2012), the first tentative experiences on the labour market entering the adult life (Elder Jr & Giele, 2009). Altogether, these are events influencing the development of ill health.
In Figure 6, this is illustrated by starting with relatively good health but when experiencing unemployment in the transition between youth and adulthood (represented by a dot), the health status drops and remains lower than previous health status even after re-employment (represented by a triangle). **Critical period** is the second life course model, which is often used interchangeably with the sensitive period. However, the critical period implies a stronger, more dramatic and irreversible change in health due to exposure during a particular period in life. The term critical periods is often used in natural science (Mishra, Cooper & Kuh, 2010) referring to the wholly or partially irreversible change occurring in a limited time window, while the exposure during a sensitive period would have a stronger influencing current and later health compared to other periods of life (Kuh *et al.*, 2003). In the figure critical period (pathway B) is illustrated by unemployment in youth, rapidly and irreversibly changing in current and future health, which remains low even with re-employment. The third conceptual model is the social chain of risk implying that early exposure to unemployment could lead to direct ill health but also a starting point for continuous risk trajectories of socioeconomic disadvantage and adult unemployment, which in turn leads to ill health in adulthood (Ben-Shlomo & Kuh, 2002). This is in contrast to the sensitive period where youth unemployment does not lead to further social and/or material disadvantage when gaining new employment. Lastly, unemployment could be seen as a trigger event, leading to accumulated unemployment and ill health across the life course.

**Figure 6: Epidemiological life course models, unemployment spells represented by a dot, employment represented by a triangle**
The third and fourth models are illustrated by pathway C: a decrease in ill health across the life course with repeated spells of unemployment. In Figure 6 pathway D is also included, representing the model of full recovery when re-employed (mentioned in the previous chapter).

**Health implications of one’s own and others’ unemployment**

Structuration theory and life course theory share the multi-layered view of human agency and contextual influence across time, where the structuration theory gives the broad sociological perspective while the life course approach puts more emphasis on the temporality of an individual life. Combining the conceptual understanding of the structuration theory with life course theory provides a tool to analyse how and when unemployment and other social determinants for health inequity in various settings can differ across the life span. Central throughout papers I–IV is the understanding of humans’ ability to act and their ability to manage challenges over the life course in relation to unemployment and ill health. Even though the structuration theory and life course theory are present across all papers, I will here give a brief overview of the theories applied in the different studies.

Life transitions and age-normative timing of unemployment are present across all the papers; Papers I and II emphasise youth, while Papers III and IV highlight youth, adulthood and midlife. Unemployment in youth may make a mark on individual health and social and economic situation affecting health later in life (sensitive period or critical period) or be the starting point for an unfavourable life course trajectory (social chain of risk) leading to accumulated unemployment and ill health. However, the age-normative life transitions and timing of unemployment is likely to differ across the life course, and thus the magnitude and importance of unemployment and related ill health. Regarding the structuration theory, Papers I–IV emphasise the duality of structure, thus, the individual ability and limitation to handle the threat of one’s own and others’ unemployment and ill health. However, their ability is restrained by individual resources (such as socioeconomic position and gender) and by the institutional regulations (such as replacement rate of the income security, availability of labour market measures and higher education). Likewise the ability and limitations to choose health-benefiting actions, resulting in less ill health in adulthood. Papers II and III also highlight that the health implications of one’s own and others’ unemployment experiences may vary in different settings and life phases (guilt by association). Thus, the social setting of welfare benefits, social security and sharing the collective burden of unemployment (ontological security) may operate as a protection against ill health.

However, neither the structuration theory nor the life course theory addresses a specific gender perspective. In this thesis, the setting of the Swedish labour market is relevant for conceptually understanding the relationship between unemployment and ill health across the life course. As mentioned in the background, the Swedish labour market is strongly gendered despite the institutionalised ef-
forts to make citizens share the family-work responsibility through gender-neutral welfare policies (dual-earner/dual-carer) (Bergqvist, 1999; Florin & Nilsson, 2005). Although working-age women in Sweden are equally as active on the labour market as men, women and men are typically found in different positions (vertical gender-segregation) and in different spheres of the labour market (horizontal gender-segregation) (Weeks, 2011). The women-dominated workplaces tend to be disadvantaged with part-time and temporary employment, lower salaries and low status, typically caregiving public sectors with high stress/demands and low control. The typical men-dominated workplaces have full-time employment, higher salaries, better working conditions (less stress, higher control) and are typically in the private sector (Barrett, 2014; Campos-Serna et al., 2013). These differences in employment conditions may also influence the health pattern in the population (Campos-Serna et al., 2013). From a structuration theory and a life course perspective, these different positions imply different conditions and opportunities for women and men, where women have lower abilities to act and less resources to influence regardless of labour market position than men do.
Methods

In this chapter, the methodological framework will be described. This thesis includes four quantitative studies based on slightly different materials and methods presented in Table 1. Papers I–III follow cohort participants sampled from Luleå municipality while the last study, Paper IV, was based on cross-sectional data collected in 2014 in the four counties of northern Sweden; Västernorrland, Jämtland, Västerbotten and Norrbotten.

### Table 1: Overview of populations, main measures and methods used in this thesis

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Paper I</th>
<th>Paper II</th>
<th>Paper III</th>
<th>Paper IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population description</td>
<td>NSC (n=1001)</td>
<td>NSC and YNSC (n=1001 + 686)</td>
<td>NSC with neighbourhood measures (n=1001)</td>
<td>HET (n=12769)</td>
</tr>
<tr>
<td>Main Exposure</td>
<td>Months in unemployment between age 16 and 21</td>
<td>National unemployment rate</td>
<td>Neighbourhood unemployment rate</td>
<td>Current unemployment at following ages: 16–25, 26–39 and 40–65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual unemployment (&lt;3 months) between age 21 and 25</td>
<td>Individual unemployment (last 12 months) at age 16, 21, 30 and 43</td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>FSS at age 21 and 43</td>
<td>FSS at age 43 in NSC and at age 39 in YNSC</td>
<td>FSS at age 16, 21, 30, 43 and time-varying between age 16–43</td>
<td>Physiological distress, Concurrently</td>
</tr>
<tr>
<td>Method of analysis</td>
<td>Multiple linear regression</td>
<td>Difference-in-difference analysis</td>
<td>Hierarchical linear regression</td>
<td>Decomposition analysis</td>
</tr>
<tr>
<td>Follow-up time</td>
<td>26 years</td>
<td>26 years</td>
<td>26 years</td>
<td>–</td>
</tr>
</tbody>
</table>

Abbreviations: Functional somatic symptoms (FSS); Northern Sweden Cohort (NSC); Younger Northern Sweden Cohort (YNSC); Health on Equal terms (HET)

The Northern Swedish Cohort

Professor Anne Hammarström initiated the Northern Sweden Cohort (NSC) in collaboration with colleagues within the field of social medicine as a longitudinal PhD project on possible health consequences of youth unemployment in early 1980s. Across 26 years, this cohort followed all school-leavers in the 9th grade of compulsory school in Luleå municipality from youth to midlife. The pathway of data collection is illustrated in Figure 7; an arrow represents time from 1980 to 2010, while cohort members’ age appears in the upper part of the figure and the type of data collected in the bottom part of the figure. In the first wave of data collection at age 16 (in 1981), 506 girls and 577 boys answered a comprehensive
questionnaire with around 90 items concerning labour market experiences, socioeconomic conditions, health and health behaviours, family and leisure time. In the following four waves at age 18 (1983), age 21 (1986), age 30 (1995) and age 43 (2008), participants completed a questionnaire with questions phrased the same each time they were posed (Hammarström & Janlert, 2012). The response rate at the last wave was 94.3% (n=1010) of those still alive in the original cohort (n=1071). The first and second waves of data collection were carried out at the pupils’ schools, thereafter; in waves 3–5, the participants were invited to class reunions in their former schools. Those who could not attend these occasions were sent a questionnaire by mail, one reminder if they did not respond and were thereafter given the opportunity to answer by telephone. Individual register data was also collected from Statistics Sweden, between the years 1992 and 2008 (age 27 to 43) of different socioeconomic measures.

Neighbourhood register data were collected from Statistics Sweden in collaboration with Associate Professor Per E. Gustafsson. At age 16, 21, 30 and 43, socioeconomic measures were collected for approximately 1000 individuals living in the same neighbourhood at least as one of the participants in the NSC. The operational definition of neighbourhoods was in accordance with Statistics Sweden’s small-area market statistics (SAMS): a small-scale geographic division constructed as polygons, using demographic distinctions (such as roads, physically visible borders, buildings) to demarcate neighbourhoods. The intention of SAMS is to construct an area that is commonly perceived as a close neighbourhood. The neighbourhood information was collected on 31 December in 1980, 1986, 1995 and 2007, and the socioeconomic measures for all residents were collected as close as possible to that measuring point. However, during 1981, many participants moved from their parental home in conjunction with leaving compulsory school and therefore 1980 was chosen as a baseline measuring point. The number of neighbourhoods increased from n=72 in 1980, n=215 in 1986, n=333 in 1995 to n=374 in 2007, due to the cohort members’ moving pattern. The number of residents per neighbourhood varied between n=979 (1981) and n=1400 (2007) (Gustafsson & San Sebastian, 2014).
The Young Northern Swedish Cohort

The Younger Northern Swedish Cohort (YNSC) was designed by Professor Anne Hammarström and colleagues to be comparable to the NSC, but represents a different period of macroeconomic conditions in Sweden. The YNSC consists of all school-leavers in the 9th grade of compulsory school in 1989 (n=897, 469 boys and 438 girls), followed from youth to midlife with the similar questionnaire as NSC, and in the same geographic setting of the municipality of Luleå.

The pathway of data collection in YNSC (in relation to NSC) is illustrated in Figure 8. In the bottom part of the arrow, the two waves of data collection of YNSC are shown: the first time in 1994 at age 21 and the second time in 2013 at age 39. In this way, YNSC and NSC are comparable in youth (at age 21) and midlife (at age 43 in NSC and at age 39 in YNSC). The grey blocks in the figure represent two different macroeconomic circumstances in Sweden, in terms of national youth unemployment (age 16–24) (Statistics Sweden, 2005). During the 1980s (light grey block) the youth unemployment rate of 5–10% was regarded as high. However, it became even more dramatic during the 1990s with a youth unemployment rate of 10–25% (dark grey block) (Statistics Sweden, 2005). The questionnaires and the data collection were performed in a similar way for both cohorts. The response rate at the last follow-up was 85.8% (n= 686 of those still alive participating at 21, n=800). Socioeconomic register data from Statistics Sweden was collected for each cohort member from 1991–2012 (age 18 until age 38), such as employments, number of sources of income, sick leave, unemployment and labour market measures.

Health on Equal Terms

Health on Equal Terms (HET) is a Swedish public health survey administered by the Public Health Agency of Sweden in collaboration with the four northern county councils (Västernorrland, Jämtland, Västerbotten and Norrbotten) and Statistics Sweden (Public Health Agency of Sweden, 2014). The national survey has been conducted each year since 2004 (in northern counties 2006, 2010 and
2014), with the overall aim of mapping the general health and lifestyle in the population and the development over time (Public Health Agency of Sweden, 2014). The Statistics Sweden register of the total population conducts the national and regional sampling procedure. In this thesis, the wave of 2014 of HET was used for the northern Sweden. The sample consisted of a random number of individuals from the four counties of northern Sweden (total population of 708,641 inhabitants, age 16–84, n=25,667). The data collection was conducted between February and May of 2014 by mailed surveys with the option to answer by a web-based form. The response rate was around 50%. The participants answered a self-administered questionnaire of 88 questions covering areas such as health and well-being, health care, living habits, work, occupation, and social relationships. The effective sample in our study was n=12,769, of whom 7.7% were unemployed. Register data from Statistics Sweden was also collected for education, income and civil status. The majority of dropouts were registered as not accessible, while only a small part were mail returns, declining participation, questionnaire problems or unable to contact (Public Health Agency of Sweden, 2014).

**Measurements**

In this section, I will mainly focus on the exposure and outcome variables used. Covariates included are shown in Table 3, and a more detailed description of the coding is found in each corresponding paper.

**Unemployment**

The main exposure of this thesis was unemployment – on an individual, community and national level. The overall definition of unemployment has been lack of paid work, actively looking for work and being available to take an employment. A definition in accordance with the International Labour Organization (ILO) and the Swedish Unemployment Office. However, the variables of individual and contextual unemployment differ between each study. Individual unemployment has mainly been measured by the subjective self-reported experience of unemployment across the different phases of the life course, including those without employment but not registered at the unemployment office, typically capturing those most sensitive to unemployment (such as health problems). In the NSC, unemployment was measured by retrospective questions asking about different labour market situations for each semester since the last follow-up. In the YNSC, unemployment was based on labour market register data from Statistics Sweden while self-reported unemployment was captured in HET. See Table 4 for a description of the different labour market positions in the NSC.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Data material</th>
<th>Year</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NSC(\textsuperscript{a})</td>
<td>YNSC(\textsuperscript{b})</td>
<td>HET(\textsuperscript{c})</td>
</tr>
<tr>
<td><strong>Socioeconomic measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1986/1994</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2014</td>
<td>IV</td>
</tr>
<tr>
<td>Living arrangement</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Civil status</td>
<td>X</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td>Occupational class</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td><strong>Economic measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td>2014</td>
<td>IV</td>
</tr>
<tr>
<td>Cash margin</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td>2014</td>
<td>IV</td>
</tr>
<tr>
<td>Financial strain</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td><strong>Social network measures</strong></td>
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<td>Social adversity</td>
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<td></td>
<td></td>
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<tr>
<td>Practical support</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td>Social support</td>
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</tr>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
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<tr>
<td>Trust in others</td>
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<td></td>
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<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td>Sports events</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td></td>
<td>IV</td>
</tr>
<tr>
<td><strong>Structural measures</strong></td>
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<td></td>
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<td>Neighbourhood</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trust in unemployment benefits</td>
<td>X</td>
<td>2014</td>
<td>IV</td>
</tr>
<tr>
<td>Trust in health care system</td>
<td>X</td>
<td>2014</td>
<td>IV</td>
</tr>
<tr>
<td><strong>Other measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Doing what they want</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Outlook on future</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1986/1994</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Gender</td>
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<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I, II, III, IV</td>
</tr>
<tr>
<td>Adulthood</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
<td>1986–2007</td>
<td>I</td>
</tr>
<tr>
<td>Parents’ occupational class</td>
<td>X</td>
<td>X</td>
<td>1981/1994</td>
</tr>
<tr>
<td>Previous health (FSS)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1981/1994</td>
<td></td>
<td>I, II</td>
</tr>
</tbody>
</table>

\(\textsuperscript{a}\) Northern Sweden Cohort (NSC)

\(\textsuperscript{b}\) Younger Northern Sweden Cohort (YNSC)

\(\textsuperscript{c}\) Health on Equal Terms (HET)

* Variable used cross-sectional and as time-dependent across all measure points
Table 4: Self-reported employment question and response options in the Northern Sweden Cohort

<table>
<thead>
<tr>
<th>Response options;</th>
<th>Youth Age 21 a</th>
<th>Adulthood Age 30 b</th>
<th>Midlife Age 43 c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper-secondary education</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>University or other higher education</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other education</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Labour market measure</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Full-time employment (incl. self-employed)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Part-time employment</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Temporary employment</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Unemployed</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sick-listed</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Parental leave</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Summer holiday</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Outside the labour market (such as education or travelling)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

At age 18, the participants were asked how many weeks they had been unemployed.

a What has been your labour market position since 1983? Reported by spring, autumn and summer.
b What has been your labour market position since 1986? Reported by spring and autumn.
c What has been your labour market position since 1996? Reported by spring and autumn.

The following individual unemployment variables were used:

Two different types of youth unemployment were tested. In Paper I, youth unemployment was based on two measure points in the NSC and coded into months in unemployment between age 16 and 21. The variable consists of two questions asking, first, number of weeks in unemployment (measured at age 18, retrospectively till age 16), and secondly, the labour market position each semester (measured at age 21 retrospectively till age 18). The variable was recoded into months of unemployment and then added into a quasi-continuous variable. In Paper II, youth unemployment between age 21 and 25 was based on questionnaire data in NSC and register data in the YNSC, due to unavailable register data in the first case. In the NSC the variable was based on different labour market positions, asked at age 30 for the period between age 25 and 21. In the YNSC, the annual number of days in unemployment was used between age 21 and 25, first coded as months of unemployment and then dichotomised by 3 months of employment/unemployment. The unemployment variables were used separately for each cohort.

A broader use of unemployment as being outside the labour market were also tested in Paper III. The NSC retrospective question on different labour market status during the last 12 months at age 21, 30 and 43 was dichotomised by those in unemployment, labour market measure and sick leave compared to those in
some type of employment. At age 16, most participants were still in compulsory school and self-reported parental unemployment was used as a proxy for individual unemployment. The variable was constructed as cross-sectional in youth, adulthood and midlife and as a time-varying measure across all waves.

Current unemployment in three age groups: youth (age 16 to 25), adulthood (age 26 to 39) and midlife (age 40 to 65) was used in Paper IV. The measurement was based on self-reported questionnaire data on labour market position from the HET survey. The variable was dichotomised into unemployed and employed (including self-employed), excluding all those in labour market measures, students, parental leave and different forms of sick listening.

Contextual unemployment variables were also used. On a macro level, used in Paper III, national unemployment rate at age 21 was used as an unobserved, latent variable of macroeconomic conditions assigned the different cohorts. In NSC the national youth unemployment rate was relatively low (8.5%) while in YNSC the national youth unemployment rate was high (25.3%). On a meso level, used in Paper II, unemployment was measured by neighbourhood unemployment as the proportion of non-employment in the working-age population (age 18–64) within a neighbourhood. Non-employment, here referred to as unemployed, were all those outside the labour market with the main source of annual income from unemployment benefits, health related benefits and early retirement. The variable was constructed both as cross-sectional and as a time-varying measure across all waves.

Two measures of illness
The ill health measure adopted in this thesis is illness, which more specifically is viewed as the self-reported physical or mental symptom persons identify themselves with (Wikman, Marklund & Alexanderson, 2005). This thesis looks at common occurring subjective physical and mental illness, such as headache, various kinds of stomach aches and back pain, worries and anxiety. It is actually very prevalent symptoms, which almost all of us experience relatively often even though most of us are happy and in good health (Ursin & Eriksen, 2010). It is when these symptoms become severe or when we experience several of them that we need to devote more attention to it. In this thesis, the health outcomes used are functional somatic symptoms (Papers I–III) and psychological distress (Paper IV).

Functional somatic symptoms
Functional somatic symptoms (FSS) are common symptoms such as headaches, nausea, shortness of breath, palpitation, fatigue, dizziness, back pain and abdominal pain, often without somatic pathology (Zijlema et al., 2013). They are self-reported bodily complaints perceived as a change from normal health status but without medical explanations, related to anxiety and depression (Beck, 2008; Campo, 2012; Zijlema et al., 2013) but not fully explained by internalised mental health symptoms (Creed et al., 2012; Zijlema et al., 2013). FSS represent a separate dimension causing trouble among both patients and clinicians; patients often feel they are misunderstood and not taken seriously when they do not receive the
health care they need, while practitioners experience the patients as difficult and demanding (Bohman, 2012). The assessment of FSS differs greatly within the field, such as which symptoms to be included and the severity and time span of the symptoms (Zijlema et al., 2013). Zijlema and colleagues formulated four important factors for the assessment of FSS within medical research when reviewing 40 questionnaires in large-scale studies. Firstly, the symptoms included should not be restricted to medically unexplained symptoms but to concerned symptoms in general. This is due to the uncertainty of establishing the causes of symptoms and the fact that a high number of somatic symptoms has shown to be an important predictor of ill health and quality of life (Creed et al., 2012). Secondly, the symptoms should be assessed with severity (3 points on a 5-point scale) and, thirdly, during a restricted time span (such as a week or a month). A shorter time span increases the reliability in respondents’ ability to remember but can also lead to bias in terms of generalising over a longer time period. A combination of severity and restricted time span may lead to higher validity. Lastly, a questionnaire measuring FSS should be phrased informally to make it easy for participants (Zijlema et al., 2013).

For the measure used in this thesis, a panel of 25 clinical psychologists, paediatricians and child and adult psychiatrists were asked to judge 43 listed symptoms as to whether or not they considered it to be classified as FSS. The symptoms included in the FSS index were: Headache or migraine (80% of the clinical personnel agreed); other stomach ache (than heartburn, gastritis or gastric ulcer; 96% agreed); nausea (68%); backache, hip pain or sciatica (64%); general tiredness (76%); breathlessness (64%); dizziness (72%); overstrain (64%); sleeping problems (68%); and palpitations (72%) (Hammarström, Westerlund, Kirves, Nygren, Virtanen & Hägglöf, 2016). When asked for in the questionnaire, the first eight symptoms were rated on a 3-point scale of severity as ‘no’, ‘yes, light’ and ‘yes, severe’ during the past 12 months. Participants were also asked to rate the severity of sleeping difficulties during the past 12 months in a 4-point scale as ‘never’, ‘sometimes’, ‘often’ and ‘always’. The last symptom of palpitation consists of two questions merged to measure its severity. The first item asked if the participants had any nervous problems during the past 12 months (yes, no), where those ticking ‘yes’ could choose from 6 different types of nervous problems where palpitations was one of the symptoms. In a second step, this variable was merged with the question asking how often they had nervous problems during the past 12 months on a 4-point scale of ‘never’, ‘sometimes’, ‘often’ and ‘always’ (Hammarström et al., 2016). Lastly, all items were recoded ranging from no symptom, light symptoms and severe symptoms and then added into an index. The index was created for each wave in NSC and YNSC (see Table 2) except at age 18 in NSC because some of the items were not included in the survey. The FSS index was used at the following ages (with Cronbach’s alpha in the parentheses): in NSC at age 16 (0.699), age 21 (0.698) and age 43 (0.782), and in YNSC at age 21 (0.739) and age 39 (0.784). The reliability of the Cronbach’s alpha indicates a good internal consistency (score around 0.7 of the indexes used). All questions were phrased the same way each time they were posed.
Another health outcome used was psychological distress, measured with the instrument General Health Questionnaire (GHQ-12). This is a self-administered screening tool developed for non-psychotic mental illness, typically depressive-ness and anxiety, aiming to capture the general mental health of the respondent (Goldberg & Williams, 1988; Lundin, Hallgren, Theobald, Hellgren & Torgén, 2016). It is a well-validated instrument with relatively good fit (Hankins, 2008; Lundin et al., 2016). This thesis used the twelve-item version, asking respondents about symptoms and severity during the last weeks, such as enjoying day-to-day activities, feeling unhappy, depressed, and capable of making decisions. All the items are found in Table 5. The severity of symptoms was ranked on a 4-point scale from ‘less than usual’, ‘as usual/never’, ‘more than usual’ and ‘much more than usual’. The items were recoded into more or less severity and then summed up in an index with the range 0–12, and dichotomised by three or more symptoms, commonly used in surveys to indicate psychological distress (Lundin et al., 2016).

### Table 2: Description of items included in the index of functional somatic symptoms in the Northern Sweden Cohort and the Younger Northern Sweden Cohort

<table>
<thead>
<tr>
<th>Questions</th>
<th>Response options (coding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have (or have you during the past 12 months had) any of the following:</td>
<td></td>
</tr>
<tr>
<td>Headache, migraine</td>
<td>No (0), Yes light (1), Yes severe (2)</td>
</tr>
<tr>
<td>Other stomach ache</td>
<td></td>
</tr>
<tr>
<td>Nausea*</td>
<td></td>
</tr>
<tr>
<td>Backache, hip pain, sciatica</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
</tr>
<tr>
<td>Breathlessness*</td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
</tr>
<tr>
<td>Overstrain*</td>
<td></td>
</tr>
<tr>
<td>Have you experienced any nervous problems in the past 12 months? where palpitations was one type of nervous problem*</td>
<td>No (0), Yes (1)</td>
</tr>
<tr>
<td>How often have you had nervous problems during the past 12 months?*</td>
<td>Never (0), Sometimes (1), Often (2), Always (2)</td>
</tr>
<tr>
<td>How often have you experienced sleeping difficulties during the past 12 months?</td>
<td></td>
</tr>
</tbody>
</table>

* Question not included in the NSC survey of 1983 (age 18)

**Psychological distress**

Another health outcome used was psychological distress, measured with the instrument General Health Questionnaire (GHQ-12). This is a self-administered screening tool developed for non-psychotic mental illness, typically depressive-ness and anxiety, aiming to capture the general mental health of the respondent (Goldberg & Williams, 1988; Lundin, Hallgren, Theobald, Hellgren & Torgén, 2016). It is a well-validated instrument with relatively good fit (Hankins, 2008; Lundin et al., 2016). This thesis used the twelve-item version, asking respondents about symptoms and severity during the last weeks, such as enjoying day-to-day activities, feeling unhappy, depressed, and capable of making decisions. All the items are found in Table 5. The severity of symptoms was ranked on a 4-point scale from ‘less than usual’, ‘as usual/never’, ‘more than usual’ and ‘much more than usual’. The items were recoded into more or less severity and then summed up in an index with the range 0–12, and dichotomised by three or more symptoms, commonly used in surveys to indicate psychological distress (Lundin et al., 2016).
Table 5: Description of items included in the index of psychological distress (GHQ-12)

<table>
<thead>
<tr>
<th>Over the last few weeks…</th>
<th>Response options (coding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you been able to concentrate on whatever you’re doing?</td>
<td>Better than usual (1)</td>
</tr>
<tr>
<td>Have you felt capable of making decisions about things?</td>
<td>As usual (2)</td>
</tr>
<tr>
<td>Have you been able to face up to your problems?</td>
<td>Less than usual (3)</td>
</tr>
<tr>
<td>Have you been feeling reasonable happy?</td>
<td>Much worse than usual (4)</td>
</tr>
<tr>
<td>Have you felt that you are playing a useful part in things?</td>
<td>More than usual (1)</td>
</tr>
<tr>
<td>Have you been able to enjoy your normal day-to-day activities?</td>
<td>As usual (2)</td>
</tr>
<tr>
<td>Have you been feeling reasonable happy?</td>
<td>Less than usual (3)</td>
</tr>
<tr>
<td>Have you lost much sleep because of worry?</td>
<td>Much less than usual (4)</td>
</tr>
<tr>
<td>Have you felt strain?</td>
<td>Not at all (1)</td>
</tr>
<tr>
<td>Have you felt you could not overcome your difficulties?</td>
<td>Less than usual (2)</td>
</tr>
<tr>
<td>Have you been feeling unhappy and depressed?</td>
<td>As usual (3)</td>
</tr>
<tr>
<td>Have you been losing confidence in yourself?</td>
<td>Less than usual (4)</td>
</tr>
<tr>
<td>Have you been thinking of yourself as a worthless person?</td>
<td></td>
</tr>
</tbody>
</table>

Statistical analysis

This thesis make use of linear regression, multilevel analysis and difference-in-difference (DiD) analysis to estimate the concurrent and long-term health hazards of unemployment, and a decomposition analysis to disentangle the inequality in ill health between different labour market positions. Altogether, these statistical approaches were used in an attempt to quantify the social development across the life course in the relationship between unemployment and ill health. The following section gives a brief description of the different analytical approaches used.

Linear regression was used in Paper I to analyse the direct and long-term relationship between months in youth unemployment (between age 16 and 21) and FSS (at age 21 and age 43). Crude and multiple linear regressions were applied using data from all waves in the NSC. Four models were constructed, stratified by women and men, separately for FSS at age 21 (direct relationship) and FSS at age 43 (long-term relationship). A bivariate model of the crude relationship between youth unemployment and health was constructed (model 1), adjusted for previous health status and socioeconomic background by FSS at age 16 and parental occupational class at age 16 (model 2), time spent in education at age 21 (model 3) and months in unemployment in adulthood between age 21 and 43 (model 4, only applied for FSS age 43).

The long-term association between youth unemployment and adult FSS was developed in Paper II by accounting for the potential macroeconomic influence of national unemployment levels. This was performed with a difference-in-difference (DiD) analysis assessing the role of national unemployment levels on the long-term relationship between youth unemployment and adult FSS, across the
NSC (here referred to as the pre-recession cohort) and YNSC (the recession cohort). This quasi-experimental technique is typically used when non-experimental data is analysed in an experimental approach – that is, estimating the effect across time without randomly assigned group comparisons (Angrist & Pischke, 2008; Antonakis et al., 2010). This method has previously been applied within the economic, psychology and public health field of research (Angrist & Pischke, 2008; Urbanos-Garrido & Lopez-Valcarcel, 2015). In this study, a modified version of DiD approach was applied with two pairs of employed and unemployed, exposed to different macroeconomic periods (pre-recession and recession). A similar approach was used by Urbanos-Garrido and Lopez-Valcarcel (2015) when studying the long-term mental health consequences before and after the recent economic crisis in Spain. The analysis was conducted in two steps. First, mean difference in adult FSS between employed and unemployed was estimated separately in pre-recession and recession, taking into account the difference in covariates between employed and unemployed. Then, in a second step, the mean difference within the cohorts was used to estimate the mean difference between pre-recession and recession. Selecting the covariates of individual characteristics between the comparing groups, making the groups as similar as possible and with the main difference located in the macroeconomic context, is crucial (Angrist & Pischke, 2008; Lechner, 2011).

Hierarchical linear regression model (HLM) was applied in Paper III when examining the association between neighbourhood unemployment and FSS, independently of the individual employment status. When using the longitudinal data of the NSC with neighbourhood measures the data constitutes three levels, illustrated in Figure 9: time (from 1981 until 2007) as the first level, nested within individuals (second level), and nested within neighbourhoods (third level). The HLM allows accounting for the shared variance within and between levels, allowing for random intercept within and between grouped data, that is, taking into account that people living in the same neighbourhood will share unmeasurable characteristics with their neighbours (such as social, material, economic and geographic features of the neighbourhood) compared to people living in other neighbourhoods (Pickett & Pearl, 2001). In this analysis, the intercept was allowed to vary between neighbourhoods, i.e. taking into account the difference in lowest level of FSS between neighbourhoods. The analysis was carried out in two steps. First by a longitudinal hierarchical regression across the life course (age 16–43) and then by four cross-sectional life course periods (at age 16, 21, 30 and 43). The between-neighbourhood difference was attained by the variance partition coefficient (VPC), estimating the explained variance attributed to difference between neighbourhoods. In the longitudinal analysis, five models were constructed. The first model regressed the crude relationship between neighbourhood and FSS, adding time, neighbourhood unemployment, and individual unemployment stepwise. In the last model all individual and neighbourhood variables were included. The cross-sectional analysis did not include the level of time, and thus, only two levels of analysis. Four models were run, separately at age 16, 21, 30 and 43. A crude model with FSS regressed on neighbourhoods, adding neighbourhood unemployment, individual unemployment and lastly a model including all covariates. The models’ fit was calculated by the deviance information.
criterion (Bayesian DIC), where decreasing numbers indicated model improvement.

![Three-level panel structure](image)

**Figure 9: Three-level panel structure**

In the last study, Paper IV, the health inequality between employed and unemployed was decomposed by identifying the main contributing social determinants in the health gap. A life course perspective was applied by stratifying the analysis by three age groups (youth, adulthood and midlife), and between women and men, using the HET survey. The non-linear Blinder-Oaxaca decomposition analysis was applied to disentangle the mental health gap between two groups (employed and unemployed) into an explained and unexplained part by the differences in observed characteristics and by the difference in estimations of coefficients. The approach was developed in the 1970s by Blinder (1973) and Oaxaca (1973), and has mainly been applied in the context of linear regression models studying wage discrimination between genders and socioeconomic health inequalities (Hosseinpoor *et al.*, 2012; Jann, 2008; Oaxaca, 1973; Yun, 2004). However, with the binary health outcome of high or low psychological distress chosen in this study, the non-linear Oaxaca decomposition analysis was applied (Yun, 2004). In the first step of the analysis, the difference in psychological distress was estimated between unemployed and employed (establishing the mental health gap). Then, in a second step, the mental health gap was decomposed into explained, unexplained and a detailed display of each contributing factor associated with the health inequalities calculated (Yun, 2005). The social determinants included were conceptually grouped into four categories: *economic factors* (containing income, cash margin and financial strain), *social network* (practical and social support, trust in others, and participation in social activities and sports events), *trust in welfare institutions* (unemployment benefits and health care system) and lastly, *socioeconomic background* (education, civil status, occupational class) factors.
Ethical considerations

The four studies included in this thesis were performed according to the ethical principles approved by the Regional Ethical Review Board in Umeå, Sweden; Northern Sweden Cohort [Dnr 07-057M], additional neighbourhood measurements from Statistics Sweden [Dnr 11-326-32M], the Younger Northern Sweden Cohort [Dnr 12-69-31M] and lastly, Health on Equal Terms [15-134-31Ö]. All participants in the surveys gave their informed consent for the data to be used for research purposes; they were ensured confidentiality, voluntary participation and the right to withdraw their participation at any time without being required to give any reason. It is of great importance to note that the large and comprehensive datasets requires a certain ethical consideration of how I use and store the material. Confidentiality was ensured by a strict security protocol when working with data. Data files used for analyses contain no individual identifiers. All questionnaires were kept in locked areas and datasets have always been encrypted. When doing research on vulnerable groups like unemployed and/or persons with ill health, it is important to avoid stigmatisation. This aspect has been taken into account throughout the project of the thesis.

Methodological considerations

The data materials used in this thesis have different strengths and limitations, as do the measurements and statistical analyses chosen. For example, Paper IV is based on the representative sample HET; a random selected sample in northern Sweden, possibly giving a rather accurate reflection of members in the larger population. HET, however, is cross-sectional and unable to consider health selection. In that sense, the longitudinal data material used in Papers I–III from NSC and YNSC includes several valuable strengths: it accounts not only for health selection but also for individual and contextual changes over time. Then again, cohort studies have the limitation of representativeness. In this section, I will discuss some of these main methodological issues during this thesis project.

An overall strength of this thesis is the use of the rich longitudinal data available in NSC and YNSC, following participants for 26 and 19 years respectively, with an exceptionally high response rate protecting against attribution bias. At the last wave of follow-up, the response rate in NSC was 94.3% and 85.8% in YNSC. The high response rate was achieved through intense efforts to get hold of participants, gathering around class reunions (in the NSC) and offering structured telephone interviews for those who did not respond. These datasets have allowed improving the causal inference by enabling sequential measurement of exposure and outcome, adjusting for both individual and contextual characteristics, health selection and low selection bias of unemployed. Another overall strength in this thesis is the different methodological approaches selected to answer the research questions. The statistical analyses used were linear regression, multilevel analysis and difference-in-difference analysis to estimate the concurrent and long-term health consequences of unemployment, and a decomposition analysis to disentangle the inequality in health between different labour market positions. These methods have their own strengths and limitations (Lechner, 2011; Merlo et al.,
Representativeness and selection bias

The cross-sectional sample HET used in Paper IV was, as mentioned before, intended to be representative of a larger population. However, with a response rate of around 50% the non-response bias could potentially become an issue. That is, when there is systematic difference between characteristics of those in the sample and those excluded from the sample (or never in the sample), thus leading to uncertainties in the inference about a larger population. The analysis performed by Statistics Sweden showed that the majority of dropouts were registered as not accessible while only a small part were mail returns, declining participation, questionnaire problems or unable to contact. The internal dropout regarding labour market position was only 1.4%, although we are unable to know whether unemployment is a reason for not participating in the survey. To the best of my knowledge, no sensitivity analysis regarding the dropouts has been performed.

Representativeness is, however, a more difficult question regarding the other studies. Papers I–III are based on the two cohorts sampled from Luleå municipality, containing all pupils who attended or should have attended the last year of compulsory school. A problematic element in cohort studies is the potential cohort effect, i.e. systematic difference in characteristics between the cohort and the general population, which could influence the possibility to extrapolate conclusions to a larger population. The middle-sized industrial town of Luleå share common characteristics of a typical town in Sweden; based on the size of the population, the proportion of urban and rural population and industries (Novo, 2000). The NSC have shown to be representative of the Swedish population regarding demographic and socioeconomic factors as well as illness and health behaviour (Hammarström & Janlert, 2012). Even though youth unemployment is generally low in the cohorts, it was twice as high in Luleå as the national youth unemployment during the 1980s but similar to the nation in 1990s (Statistics Sweden, 2005). The cohorts are also ethnically more homogeneous than the Swedish population (Hammarström & Janlert, 2012). Another potential bias might have occurred in the lifestyle and attitudes to work and unemployment with respect to a sample from northern Sweden (Dahlgren & Sandström, 1994; Hammarström et al., 2015). When the data collection of NSC was initiated and then followed by YNSC, over 1000 individuals was considered a high number but compared to more recent cohort studies of today it is a rather small (Hammarström & Janlert, 2012). However, given the high response rate, a low selection bias of unemployed (and other socially and economically vulnerable people) who often decline participation might be expected.

Concerning the comparability between the cohorts, the YNSC was designed with the intention to compare the difference in contextual influences in youth unemployment with the NSC. In paper II, we used the level of national unemployment rate as a proxy for macroeconomic conditions. This is a commonly used approach (Buffel, Van de Straat & Bracke, 2015) even though the unobserved state of the exposure may incorporate other factors, such as access to different labour market
measures. On the other hand, with only 8 years apart, the societal difference is unlikely to have gone through any major structural changes. Furthermore, the similarity in terms of geographic setting, data collection procedure and identical questionnaire provides reasons to believe the bias could have been rather small.

The potential bias related to age is another issue concerning birth cohorts. The youth cohorts growing up during the 1980s and early 1990s were influenced by the national and international events of that time. Highly simplified, it was a time characterised by the international tension of the Cold War in the early 1980s, the fall of the Berlin Wall in 1989 and the public awareness of AIDS and HIV. Nationally, Sweden was characterised by the public debate of nuclear, the entrance of mobile phones, youth pop culture and discovering Europe by train and the global financial crisis. Compared to generations growing up today, the individual responsibility and possible life choices differ greatly. For the participants in our cohorts, youth was not as much of a personal project of great complexity, opportunities and crucial choices of life as it is for youth growing up today (Angelin, 2009). These types of differences were not something we could adjust for in our analysis, however, it may be important for our interpretation, especially when drawing conclusions concerning youth unemployment of today.

**Health selection**

It is rather well established that health selection can influence in opposite directions; ill health can influence the capacity to work, retain an employment and get re-employment; unemployment can also lead to ill health (Black, 2008; Janlert, 1997). Furthermore, childhood ill health can lead to youth unemployment and further unemployment in adulthood (Egan, Daly, & Delaney, 2015). Studies have also shown that unemployment can bridge across generations, where the children of unemployed parents are at higher risk of suffering ill health and becoming unemployed themselves (de Goede et al., 2000; Powdthavee & Vernoit, 2013; Sleskova et al., 2006). In our longitudinal studies, we had the possibility to take several of these factors into account. For instance in Papers I and II, the association between youth unemployment and functional somatic symptoms in midlife was not confounded by previous health status, parental unemployment, socioeconomic status or health status, or own unemployment spells in adulthood. Even though the health selection into unemployment could be related to other types of ill health or different types of social and economic deprivation, we are rather sure the long-term association is not due to health selection. However, due to the cross-sectional study design in Paper IV, we were not able to control for previous health, and the results should therefore be interpreted with caution.

**Unemployment measurements**

In this thesis I have used different types of individual and contextual unemployment measurements in each study; youth unemployment was measured in different age groups (Papers I–II and IV), the operational definition in the categories of employed and non-employment (Paper III) and a mixture of self-reported and
register-data (Paper II). This approach allows showing the stability in the relationship of unemployment and ill health, but it also makes it difficult to compare across the studies.

Self-reported unemployment was used in all papers. A problem that can occur with self-reported measures is the recall bias. This is especially an issue of retrospective data where respondents are encouraged to remember events several years back in time. In the NSC, respondents were asked to remember different labour market position 3, 9 and 12 years back in time. In this thesis, the recall bias was minimised by giving the respondent shorter time intervals with reference points in terms of seasons and national and international events linked to a certain period of time. The recall bias was also reduced by follow-up interviews with all youths reporting long-term unemployment. The self-reported data might also be biased by unrealistic reporting. For instance, people define unemployment differently, perhaps having a paid internship or working but not paying taxes and therefore not reporting unemployment. This could also cause bias in terms of unwillingness to interpret their own situation as unemployment, due to stigma and undesirable characteristics linked to unemployment. This kind of unrealistic reporting is difficult to detect and to take into account. Instead I emphasised the meaning of subjective feeling and interpretation of unemployment as an important determinant of health, valuable for our understanding of this complex social phenomenon.

Another issue regarding the unemployment measure is the use of self-reported youth unemployment (in the NSC) and register data (in the YNSC) in Paper II. This was due to the unavailable register data in the NSC at that time, which may be problematic for the comparability. A general issue with register data unemployment is the potential selection bias, i.e. systematic difference in who is included in the sample and who is not included. Regarding the register data from Statistics Sweden, it is perceived as rather reliable. We cannot, however, be sure that people registered as unemployed were not actually working although not paying tax. Likewise, how many young people actually were unemployed according to our operational definition but not registered at the unemployment office, perhaps because they did not perceive themselves as unemployed or not in need of or entitled to the services and benefits of the unemployment office. However, in the NSC, both self-reported and register data were available in adulthood and comparisons showed approximately the same patterns, giving some indication of non-bias in the reporting of unemployment.

Another limitation in this thesis is the rather static use of the categories ‘unemployment’ and ‘employment’, overlooking the difference in types of work and employment contracts, and thus the potential difference in health implications of being unemployment from temporary employments compared to a permanent employments. Furthermore, one might assume that unemployment from a physically demanding working environment (such as shift work, heavy lifting, repetitive movements, noise, vibrations and chemicals) could have a different health impact compared to unemployment from an administrative job in an office. Unfortunately, this kind of difference in unemployment did not fit into the subject
and timeframe of this thesis, but it is something that could be explored in further research.

**Functional somatic symptoms as a health outcome**

The main health outcome explored in this thesis is functional somatic symptoms. Compared to the psychological distress used in paper IV, functional somatic symptoms is not as well established and validated a measure. In this thesis I have used a quasi-continuous index of ten common somatic symptoms, which has been shown to be stable across the life course (Hammarström *et al.*, 2016).

Many of our common aches and bodily complains are rather common phenomena, such as gut movements, muscles hurting and different types of ache. In spite of this, most people do not identify it as a serious health problem affecting their ability to work, while for some people it develops into a terrible and difficult state of illness (Ursin & Eriksen, 2010; Wikman *et al.*, 2005). A difficult question is whether it is necessary to control for potential diagnosed diseases with similar symptoms. According to Zijlema and colleagues’ (2013) review of how to assess functional somatic symptoms in large-scale studies, symptoms should not be restricted to only medically unexplained symptoms but to concerned symptoms in general. This is due to the uncertainty of establishing the causes of symptoms and the fact that the high number of somatic symptoms has shown to be an important predictor of ill health and quality of life (Creed *et al.*, 2012). Due to the complexity of the clinical picture and the close association to mental ill health, common bodily symptoms have been seen interpreted and treated as a mental disorder (Creed *et al.*, 2012; Zijlema *et al.*, 2013). However, in this thesis I have considered functional somatic symptoms as a separate dimension of quality of life.

Measuring FSS over the life course could be problematic, because the frequency of functional somatic symptoms has been shown to increase across the life course, typically more among women then among men from early adolescence until adulthood (Beck, 2008; Haug, Mykletun & Dahl, 2004; Torsheim *et al.*, 2006). Regarding unemployment, people suffering from FSS may be at higher risk of becoming unemployed and remaining in unemployment. From young age they are often challenged with educational (absent from school and difficulties doing schoolwork) and social trouble (few hobbies and strained social relationships with peers) (Beck, 2008), potentially leading to higher risk of unemployment and adult unemployment (Gregg, 2001). To minimise issues regarding comparisons over time, identical questions have been used across all waves of follow-ups in the NSC and YNSC (Hammarström *et al.*, 2016).
The main findings

I will here present a selection of the main findings to address the three objectives of this thesis.

Young and unemployed, what does the future health hold?

Results corresponding to the first research objective (Paper I) are summarised in Figure 10: association between youth unemployment (between age 16 and 21) and functional somatic symptoms, first short-term at age 21 and then long-term at age 42, stratified for women and men (p<0.05 is noted with asterisks). These findings suggest that young men with at least one month of unemployment reported higher levels of functional somatic symptoms, at age 21 (short-term, dark grey and mid-grey bar) and at age 43 (long-term, light grey bar) compared to their employed peers. Previous health status and parental occupational class, level of education and adulthood unemployment did not confound this association. However, among women, no short-term or long-term associations were found.

![Figure 10: Months in youth unemployment and functional somatic symptoms at age 21 (short-term) and at age 43 (long-term) between women and men in the Northern Sweden Cohort (p<0.05 represents by a asterisk)](image_url)
Young and unemployed in time of recession?

Findings related to the contextual influence of youth unemployment in different macroeconomic settings (second objective, Paper II) showed a slightly different picture regarding future illness. When participants in the pre-recession period (NSC) and recession period (YNSC) allegedly entered the labour market at age 18–21, their possibility to get an employment differed greatly (Figure 11). During the pre-recession period, the national youth unemployment rate was around 8.5% among men and 9.3% among women (3.6% in the whole working-age population) while corresponding figures during the recession were 28.0% among men and 22.5% among women (10.6% in the working age population). For participants in the NSC and YNSC it meant that 72% of the youths in the NSC had an employment compared to 38% in the YNSC at age 21, which meant a considerable delay in getting into the labour market in the YNSC (Erikson et al., 2007).

![Figure 11: National youth unemployment (%) age 16–24 by age and gender for Northern Sweden Cohort (NSC) and Younger Northern Sweden Cohort (YNSC). Source: Statistics Sweden Labour Force Survey](image)

Results show that those experiencing youth unemployment in relatively low national youth unemployment (NSC) reported higher levels of functional somatic symptoms in midlife compared to those experiencing unemployment during the period of high national youth unemployment (YNSC) (Figure 12). However, the association was only found among men and in the total sample, but not among women (Figure 12-13) when adjusted for education, parents’ occupational class, smoking, previous health status, living arrangement, income, doing what they want, outlook on the future and low cash margin.
Figure 12: Difference in functional somatic symptoms between unemployed and employed men and women within and between pre-recession and recession (p<0.05 represents by an asterisk)

Figure 13: Difference in functional somatic symptoms between unemployed and employed men and women within and between pre-recession and recession (p<0.05 represents by an asterisk)
Furthermore, these results also stress the difference in absolute functional somatic symptoms. The difference in functional somatic symptoms was higher between unemployment and employed in the pre-recession cohort (NSC) than in the recession cohort (YNSC). This was due to the higher levels of functional somatic symptoms among the unemployed in YNSC. In the total sample, functional somatic symptoms scores (ranging 0–20) among unemployed were 5.33 compared to 4.06 among employed (among men: 4.65 and 2.88, while among women: 3.85 and 3.15). Comparable figures in the recession cohort (YNSC) were 3.74 among unemployed and 3.45 among employed in the total sample (among men 3.19 and 2.79, among women 2.04 and 1.92).

The lack of association among women, however, was not due to differences in exposure to unemployment. In the NSC, the mean score of youth unemployment (between age 16 and 21) was 4.54 months among women and 4.83 months among men (p=0.58). Similar patterns were found in adulthood unemployment (between age 21 and 43): 10.13 months among women and 12.51 months among men (p=0.10). This gender distribution was also confirmed in the YNSC, even though the overall unemployment rate was much higher: among women 36.8% report at least 3 months of unemployment, while men report 37.9% unemployment (p=0.77, data not in any previous tables). Similarly, young unemployed women did not report higher functional somatic symptoms, short-term or long-term, than women in employment. This was found in both the NSC and the YNSC in two different age groups (youths 16 to 21 years and 21 to 25 years old).

Can neighbourhood unemployment make you sick?

The second objective also addressed contextual unemployment in the neighbourhood across the life course (Paper III). The longitudinal findings suggest that high neighbourhood unemployment was modestly but significantly associated with higher levels of individual self-reported functional somatic symptoms across the life course, independently of own unemployment experiences. This association remained even when accounting for socioeconomic status and level of education. In other words, those who lived in a neighbourhood with high levels of unemployment reported more functional somatic symptoms than those in neighbourhoods with low unemployment, across the life course, regardless of their own labour market position (see Table 2 in Paper III). Apart from the longitudinal findings, this thesis also explored age-specific patterns in cross-sectional analyses (second part in objective two). Both neighbourhood and individual unemployment were related to concurrent functional somatic symptom in adulthood (age 30), whereas individual unemployment was associated with functional somatic symptoms in youth (age 16), young adulthood (age 21) and midlife (age 43) (see Table 3 in Paper III).
What can explain the health gap?

Results corresponding to the third objective (Paper IV) intend to identify the social determinants that could explain the health gap in psychological distress (GHQ-12) between employed and unemployed, across the phases of the labour market (youth age 16 to 25, adulthood age 26 to 39, and midlife age 40 to 65) and genders. Differences in psychological distress were found in all phases of the labour market (see Tables 2–4 in Paper IV). The largest difference was among young women (GHQ difference: 0.20, p<0.01) followed by men and women in adulthood (0.18 and 0.17, respectively, p<0.01). The smallest health gap was found in midlife men and women (0.13 and 0.14, p<0.01) and among young men (0.12, p<0.01).

The differences in psychological distress were decomposed by several social determinants of health, showing that among unemployed and employed young men and women 43% and 51% of the health inequality respectively was attributed to social determinants of health (Figure 14). The corresponding numbers in adulthood were 92% among men and 43% among women, 60% among men and 65% among women in midlife.

Figure 14: Decomposed mental health inequality between unemployed and employed in three age groups, by explained and unexplained factors
Economic variables proved to be the main contributing factors across age groups and genders, explaining 28–59% of the health inequality. In the detailed results (Tables 2–4 in Paper IV), the single most contributing factor was low cash margin among youths and midlife men, followed by financial strain among adults and midlife women. The second most important factor in explaining the health gap was the social network of social and practical support and trust in others, which increased with age. In youth, social network only explained 3–14%, increasing to 17–28% among adults and 38–39% among midlife. Lastly, the findings also showed modest, or even negative, contribution of the socioeconomic factors to mental health inequality. Only small contributions were found for the remaining factors, such as institutional trust and alternative role identities.
Discussion

In this thesis I have analysed the individual and structural factors influencing the relationship between unemployment and illness, concurrently and later in life. The thesis contains three themes (related to the objectives): (1) experiencing youth unemployment and illness later in life (Paper I and Paper II), (2) one’s own and others’ unemployment in the context of neighbourhood unemployment and national unemployment rates and illness (Paper II and Paper III), and, (3) social determinants of health inequality between different labour market positions (Paper IV). In this chapter, I will discuss the main findings of this thesis.

Youth as a sensitive period of life

Longitudinal findings from Paper I support long-term evidence of previous studies, showing that young men experiencing unemployment report higher functional somatic symptoms in midlife compared to their employed peers. For instance, Helgesson and colleagues (2013) study show that native and foreign-born youths (age 20 to 24) in Sweden who received unemployment benefit from the National Labour Office had higher risk of sickness absence, disability pension and death in adulthood (age 35 to 40). Strandh and colleagues (2014) also confirmed a long-term association in research using the same cohort – at least 6-month spells of youth unemployment (age 18–21) showed to be associated with mental ill health later in life. This was also confirmed by Hammarström and Janlert (2002), findings of long-term association between a spell of youth unemployment (6 months’ unemployment between age 16 and 21) and health behaviours and mental ill health among women and men, and somatic health among men in adulthood. In relation to the longitudinal studies in a Swedish setting, our findings highlight that even relatively common bodily complaints can be a health consequence of youth unemployment, and most of all, that as little as one month of unemployment could lead to adulthood illness.

How can we conceptually understand this long-term association between youth unemployment and illness later in life? In this thesis, youth has been suggested as a particularly vulnerable phase in life where unemployment could have long-term harmful consequences for individual health and socioeconomic development (Kuh et al., 2003). This may partly be due to the higher risk of unemployment and future unemployment in adulthood among youths (such as lack of previous labour market experiences, less time in education and difficulties gaining access to welfare state support). This is also a phase with several important role transitions, such as completing compulsory and secondary education, entering the labour market or moving on to higher education, moving out of the parental home, starting to become socially and economically independent of guardians (Elder Jr & Giele, 2009). Unemployment during this phase may delay some of these age-normative events, with potential implications in young people’s identity and perception of themselves, socialisation into adulthood and current and long-term ill health (Gregg, 2001; Tiggemann et al., 1993). In line with prior evidence (Gregg, 2001; Helgesson, 2015; Strandh et al., 2014), results from this thesis support the life course model of youth as a sensitive period for ill health across
the life course. That is, after considering key individual factors, such as previous health status and later unemployment in adulthood, the association between youth unemployment and FSS in midlife remained among men (Paper I). Alternatively, these long-term findings could also be seen as a social chain of risk where socioeconomic consequences of youth unemployment, such as financial strain and temporary employments could lead to adult ill health. Previous studies have shown that youth unemployment can lead to further disadvantages up into adult life. For example, Gregg’s (2001) British cohort study showed that men who experience three months of unemployment as youths were at higher risk of going on to further unemployment in adulthood. However, our findings stress that the association is likely not due to unemployment later in life. That is, the association is not a result of unemployment during the 1980s, remaining in unemployment during the 1990s recession, leading to ill health in the 2000s. However, the association may still be related to other social and economic disadvantages. The mechanisms of the pathway are something that should be explored in future research.

**Education as a protective factor for future illness?**

Results from Paper II concluded that these long-term findings between youth unemployment and illness later in life only were found within the context of relatively stable macroeconomic conditions. These differences may be viewed from the abilities and limitations in young people’s practical and unconscious ability to act. Even though young people in the YNSC grew up with the definite threat of unemployment, they did also have the opportunity of higher education supported by the Swedish state (Swedish Agency for Youth and Civil Society, 1998). Among those in the YNSC who completed higher education (perhaps to avoid unemployment) it could mean an adult life with several health-improving experiences, such as better working conditions, higher salary and higher status; this may result in less FSS in adulthood, reflecting accumulated health-promoting factors across the life course. On a structural level, high youth unemployment with low expectations of finding employment (along with privatisation, decreasing replacement rate, national and international political instability) may be viewed as a limitation constraining individual ability to act, while the increase in higher education places may reflect the structural initiative encouraging individuals ability to act. In conclusion, these contextual differences may reflect a normalisation of the risk of unemployment during the recession compared to pre-recession time. That is, the practical and unconscious consciousness of ontological security to handle threats of unemployment (Giddens, 1984), with less social isolation, lower stigma and victim blaming and relatively less economic deprivation (Jahoda, 1981) leading to less individual ill health in adulthood.

**The gender dimension**

Although I have not focused specifically on gender in this thesis, it was not disregarded in the empirical studies. In all the studies gender-stratified analyses were run, although not primarily to test the difference between genders but rather to emphasise differences within genders. Our analysis showed no associations among women between youth unemployment and short-term or long-term FSS.
However, women and men showed to be similarly exposed to unemployment. The research field of unemployment and health is typically gender-blind – only performing studies based on experiences from male participants or gender-collapsed analyses (McKee-Ryan et al., 2005; Paul & Moser, 2009; Waters & Moore, 2002). This is partly due to the dominant view of the social structure of male-breadwinners, which assumes that men have the main responsibility for the household income, leading to higher economic deprivation among men than women in case of unemployment (Bambra, 2010; Krantz & Östergren, 2000; McKee-Ryan et al., 2005). However, within a Swedish setting, the high labour market participation rate among both women and men and the institutionalised gender-neutral dual-earner/dual-carer model instead implies that economic deprivation of unemployment affects women and men similarly. Instead, the lack of association among women could be viewed in the light of the gender division of employment of vertical and horizontal gender-segregation (Weeks, 2011). These differences may also be related to employment conditions and health (Campos-Serna et al., 2013). Women-dominated workplaces tend to be disadvantage with part-time and temporary employments, lower salaries and low status, typically caregiving public sectors with high stress/demands and low control. Additionally, women tend to bear the burden of the unpaid domestic work. The typical men-dominated workplaces have full-time employment, higher salaries, better working conditions (less stress, higher control) and are typically in the private sector (Barrett, 2014). These gendered working-conditions can influence the health pattern in the population where employed women report worse mental health, more often being in sick-leave or in early retirement than men (Barrett, 2014; Campos-Serna et al., 2013). In our findings, this is reflected by women generally reporting higher levels of FSS across the life course compared to men, regardless of labour market position. However, within the group of women only small differences in health were shown, regardless of labour market position. In fact, the relatively small difference in health status between employed and unemployed women could be a reason for the lack of significant difference among women, implying that women’s health is not divided by labour market position. However, when using a closed cohort with a relatively low number of participants, it could also be a result of small sample size and lack of statistical power.

The burden of contextual unemployment

The influence of contextual unemployment on FSS over the life course was examined both in terms of neighbourhood unemployment and in terms of national unemployment, highlighting a heterogeneity in contextual unemployment and individual ill health. Longitudinal results from Paper III showed that those living in neighbourhoods with high unemployment reported on average higher levels of functional somatic symptoms compared to those living in neighbourhoods with low unemployment across the life course. On the other hand, in Paper II we found that youth unemployment during high national unemployment levels was related to lower functional somatic symptoms compared to unemployment during lower national unemployment. These findings are in line with recent research: showing long-term association between neighbourhood unemployment and individual ill health (Murray et al., 2016; Wight et al., 2013) and also, no relationship between the 1990s recession and individual ill health (Garcy & Vägerö, 2013; Novo,
Hammarström & Janlert, 2000; Tapia Granados et al., 2014). These somewhat contradictory findings highlight that different contextual levels of unemployment may act differently on population health depending on the particular setting, such as national or neighbourhood unemployment. These collective findings stress the need to include contextual factors in future research.

**The role of national unemployment**

Regarding the contextual influence of national unemployment, our findings are in line with current evidence from Garcia and Vågerö (2013), concluding that the Swedish 1990s recession only had no role, or only a marginal role, in the relationship between unemployment and mortality when comparing the recession and the post-recession period. Novo and colleagues (2000) found similar results when they conducted the first analysis comparing the NSC and YNSC: youth unemployment during the recession did not show any association with concurrent ill health when compared with the pre-recession period. These findings may be seen from the perspective of health selection into unemployment. High national unemployment levels are likely to be related to less health selection into unemployment, which means a generally healthier unemployment group. Another interpretation could be found in the ontological security of the collective burden of unemployment during the recession. When the whole nation is under the threat of economic recession, unemployment is seen as a structural rather than individual cause. This collective threat of the recession is likely reinforced by a general decline in commercial interests and leisure-time activities in the whole population, such as travelling, dining at restaurants and shopping. It has also been shown that general health behaviours improve during recessions (Aguilar-Palacio, Carrera-Lasfuentes & Rabanaque, 2015; Ruhm, 2000). At an individual level, the recession period could mean relatively lower social and economic disadvantages related to unemployment when compared to those in employment, less individual shame and stigma (Rantakeisu et al., 1999; Strandh et al., 2011). Altogether, the ontological security of feeling of shared burden of unemployment and one’s own unemployment as result of external factors, together with the decline in relative social and economic disadvantages and self-blame and stigma, could possibly act as a buffer for population ill health. However, research within the field is scattered, and several studies have shown an influence of national unemployment rates on population ill health (Buffel, Van de Velde & Bracke, 2015; Stuckler et al., 2015). For example, Urbanos-Garrido and Lopez-Valcarcel (2015) used a similar approach to the one in this study, and compared the national unemployment levels, individual unemployment and concurrent mental health and self-related health in Spain before and during the recent economic recession. They concluded that people in long-term unemployment during the recession time were a particularly vulnerable group suffering from negative impact on both self-rated health and mental ill health (Urbanos-Garrido & Lopez-Valcarcel, 2015). There are also Swedish studies showing conflicting results. For example, a recent study by Thern and colleagues (2017) found youth unemployment to be associated with higher risk of poor mental health in the 1990s recession than in the pre-recession period. Based on the Swedish Labour Force Survey, the study used a register-linked cohort comparing youths (17 to 24 years old) with at least three months of unemployment during recession (1991–1994) and pre-recession
(1983–1986) and concurrent self-reported mental ill health. Virtanen and colleagues (2016) study also found long-term associations between youth unemployment and poor mental health in adulthood independently to the macroeconomic circumstances. With the same exposure and contextual setting as Virtanen and colleagues (2016), the main difference from our study lies in the health outcome, our gender perspective and the study design. All this research highlights how health disparities due to youth unemployment may play out differently depending on the socio-political context and stressing the need to further investigate the contextual influence on micro, macro and meso levels of society.

The role of neighbourhood unemployment

Turning to the contextual importance of neighbourhood unemployment, a longitudinal link was established between neighbourhood unemployment and individual health status. Murray and colleagues (2016), have conducted one of the few public health studies concerning neighbourhood unemployment across time. Their longitudinal study from England and Wales showed that those living in neighbourhoods with higher unemployment in 2001 were more likely to be sick, disabled or retired in 2011. Similar findings were reported in the United States by Wight and colleagues (2013) studying neighbourhood unemployment history and depressive symptoms. They found that depressiveness was higher among those who had been residents in neighbourhoods’ with high unemployment ten years earlier. However, most neighbourhood studies within the field have bunched up unemployment with other socioeconomic factors influencing individual ill health, and to the best of my knowledge, our study is the first exploring neighbourhood unemployment in a Swedish context.

The contextual importance of neighbourhood unemployment could be seen as the collective burden of one’s own and other residents’ unemployment influencing individual health. The claim is that living in a deprived area with high unemployment among the residents could reflect contextual disadvantages leading to individual illness as they accumulate over the life course (Bartley & Plewis, 2002). This may operate through socioeconomic deprivation on the individual and structural levels of the neighbourhood, such as financial strain, low cash margin and lack of social support at an individual level, lack of educational, labour market opportunities, access to health services, stores with affordable healthy foods and availability of green spaces or recreational facilities on a structural level. Taken together, these neighbourhood mechanisms may reflect the abilities and limitations of people to act (Giddens, 1984) and, furthermore, lead to individual strain and ill health (Murray et al., 2012; Pickett & Pearl, 2001; Riva et al., 2007). However, our findings stress the key role of work and unemployment as a social determinant of health, at both a meso-level and a micro-level of society.

This thesis also emphasises the importance of neighbourhood on health in different phases of life. For example, results from Paper III showed that those living in neighbourhoods with high unemployment in adulthood (age 30) reported higher levels of concurrent FSS, independently of their own labour market position. One interpretation may be found in the normative expectation and the social timing of the life phase (Elder Jr, 2001). For example, adulthood is often characterised
as a time in life with high investment in family, friends and work (Larkin, 2013), such as commitment in long-term relationships, raising children and an intense phase of labour market career. It could be related to higher social and economic expectations, such as raising children (with implications such as lower income due to parental leave, care of sick children and part-time employment), moving to larger and more stable housing, paying off the student loan and other loans, and expensive leisure time activities (Elder Jr, 2001). With this view, results from Paper III, could reflect a predominant selection pattern into more or less advantaged neighbourhoods, where those with social and economic resources (i.e. paid work) can move into neighbourhoods meeting similar characteristics. Another interpretation is related to the contextual argument, reflecting that the relatively higher neighbourhood unemployment in the 1990s compared to the other measure points would be more harmful for residents’ health. When participants in the NSC turned 30 years old, the year was 1995 and Sweden had passed four years of its worst economic recession since the 1930s. The national unemployment was dramatically higher in 1995 (10.5% of the working age population) than in the other periods (3.2% in 1981, 3.4% in 1986 and 6.6% in 2007 in the working-age population) and thus higher unemployment in the neighbourhood. In fact, mean neighbourhood unemployment was 12.87% at age 30 compared to around 7–8% at age 16, 21 and 43. Thus, lack of associations at age 16, 21 and 43 may be interpreted as a statistical power issue.

Disentangling the health gap

This thesis has also shed light on how economic stress and access to social networks operated differently depending on the social position of employed and unemployed across three life phases (youth, adulthood and midlife). Previous evidence from northern Sweden and between other European countries also identified cash margin and financial strain as important mediators in the relationship between unemployment and poor quality of life and self-rated health (Hultman, Hemlin & Hornquist, 2006; Toge, 2016). However, while most studies within the field focus on the risk factors, our study disentangles the mental health inequality trying to identify which social determinants could explain the health gap.

Our findings highlight the importance of single items across age groups and genders. For instance, among the economic factors the single most contributing item among youths was low cash margin, i.e. difficulties getting hold of a large amount of money for unforeseen circumstances (however, only significant among men), while financial strain, i.e. difficulties managing ongoing expenses, such as food, rent and bills, showed to be most important among women in midlife. This implies that economic deprivation related to unemployment and current ill health could operate differently depending on the social position across the life course, thus stressing that the meaning of work and unemployment likely differs depending on the normative expectations and social expectations of an individual’s phase in life (Elder Jr, 2001). Consequently, the social and economic deprivation due to unemployment may vary across age and be more or less important for the development of ill health. Nevertheless, there are remarkably few studies applying a
life course perspective on health inequality, and even fewer exploring the health gap between employed and unemployed.

Moreover, among participants in adulthood and midlife, our findings stress the importance of social network, which was shown to increase across the life phases. That is, trust in others, social support and practical support may serve as a buffer against psychological distress. This could be seen as the increasing social importance that work may have across age, i.e. the social interaction with colleagues, time-structure and feeling of belonging to a social network – hence, an interpretation based on the normative assumption that young people have access to more social arenas beyond the workplace (Larkin, 2013). These results are in line with previous research showing associations between lack of social support and lower well-being, depression and mortality (Hultman et al., 2006; McKee-Ryan et al., 2005). Altogether, these findings stress that the meaning of work and unemployment differs across the life course, highlighting the need to further explore the policy perspective.
Conclusion

This thesis has explored the individual and structural factors influencing the relationship between unemployment and ill health across the life course, in the geographical context of northern Sweden. Three research subjects were addressed: 1) The long-term association between youth unemployment and functional somatic symptoms in adulthood, 2) The influence of contextual unemployment (such as national unemployment levels and neighbourhood unemployment) on functional somatic symptoms in a life course perspective, and lastly, 3) The social determinants of health that could contribute to explaining the mental health gap between unemployed and employed in a life course perspective. The relationship between unemployment and health is, however, complex and this study contributes new insight into this complexity. In this final chapter, I will summarise my key conclusions, suggest policy actions and raise questions for future research.

Summing up the key conclusions:

- Among men only, as little as one month of youth unemployment was related to increased levels of functional somatic symptoms in adulthood, regardless of previous illness and unemployment later in life. However, no such association was found among women.

- Experiencing youth unemployment during the 1990s recession in Sweden was associated with lower levels of functional somatic symptoms in adulthood compared to those with youth unemployment experience during the pre-recession period. A possible explanation could be the health-promoting effect of more time spent in higher education during the recession period. Theoretically this could also be perceived as the importance of sharing the burden of one’s own and others’ unemployment and less victim blaming.

- Youth unemployment showed to be strongly gendered; only men showed significant short-term and long-term association between unemployment and functional somatic symptoms. This could be due to the relatively small difference in health status among employed and unemployed women, which could be a reflection of the gendered labour market situation in Sweden influencing working conditions and health status.

- High neighbourhood unemployment showed to be a factor for functional somatic symptoms across the life course, independently of factors such as own unemployment. This finding stresses the importance of the contextual setting for individuals’ health both across the life course and at specific periods of life. These findings stress the key role of work and unemployment as a social determinant of health, at both a meso-level and a micro-level of society.
Employment-related mental health inequalities exist for both men and women in all life phases (youth, adulthood and midlife). Economic and social deprivation related to unemployment and illness varied across different phases in life and across genders. The main contributing factors were, i) among women: cash margin and practical support (youth), and financial strain and trust in others (adult and midlife), while, ii) among men: cash margin (midlife and youth), financial strain (adult), trust in others (adult and youth) and social support (midlife). These differences stressed the need for a gender-differentiated life course perspective in public health work.

The findings revealed that there are reasons to believe that the long-term health consequences due to youth unemployment are seriously underestimated in research, in policy and in the public debate, even though it constitutes one of the most important public health issues of our time. Even though our findings stress the importance of the contextual setting of unemployment and illness later in life, it is not possible for us to predict the future. Thus, we need to use our knowledge from the past in attempts to prepare our public efforts and reduce unnecessary suffering in the future. There are, however, extensive societal differences between the Swedish context of the 1980s and the late 2010s of today (to mention just a few: labour market flexibility, neoliberalism, privatisation of welfare institutions, the internet, globalisation and national and international political instability). On the other hand, a similarity between the 1980s and today is that youth unemployment is still regarded as a major public issue, which today has become normalised and expected. We might, therefore, assume that unemployed youths of today could be at higher risk of illness later in life, due to the lack of shared experience of contextual unemployment, increasing individualisation (victim blaming) and lower welfare protection buffering against social and economic deprivation for young people. One protective factor recognised in this thesis was time spent in higher education during high levels of national unemployment, which could likely operate, directly and indirectly, as promoter of health across the life course. In order to create a good start for young people entering the labour market, possibilities for further education should be promoted by the state for those at risk of unemployment, which could be conducted by adding more places in higher education and making it more available, for instance, by affordable student housing or adequate economic living standards. Another appropriate state initiative targeting those in unemployment could be to increase the access and level of income protection for young people, as a way to increase young people’s social and economic position in society and decrease the risk of ill health.

Our findings also stress the need to further describe and analyse labour market health inequality with a gender perspective. This is important because of the difference in social position between genders, related to access to social and economic resources, in terms of employment conditions, salaries and double burden of unpaid domestic work among women influencing the population health. Knowledge of the gendered work-related health inequalities might be of use to public policy makers, researchers and practitioners in occupational health who wish to identify and reduce them.
In this thesis I have acknowledged that people live in a specific historical and cultural context, in different social and economic positions influencing their ability to act, their life opportunities and health status. Based on the findings of my thesis, I argue that research should pay more attention to the contextual importance of unemployment and ill health; how different contextual settings may generate differences in the life opportunities in the population in terms of risk of illness, social and economic vulnerability and unemployment across the life course. In particular, the health disparities related to neighbourhoods in Sweden should receive more attention. The general interest in contextual unemployment has mainly focused on unemployment rates at national, municipal or regional levels of society. Therefore, our findings contribute to a limited field of neighbourhood unemployment, stressing how the social and economic differences between neighbourhoods may influence individual health across the life course. These findings also highlight that attempts to reduce work-related ill health should start at a young age and continue throughout the life course, in order to decrease the individual suffering and future state expenditure on social insurance, sick-leave and unemployment benefits.

Finally, the key role of work and unemployment as a social determinant of health, at both a meso-level and a micro-level of society, is emphasised in the thesis. Even though the Swedish social democratic welfare state is internationally viewed as a regime promoting high equality, with well-developed policies striving for socioeconomic, gender and health equality among citizens (Esping-Andersen, 1990), the health inequality remains high (Förster & delle Politiche Sociali, 2011). The research field of health inequality has for the most part analysed the inequality according to socioeconomic status, concerning factors such as education and gender, which has been a very valuable and important contribution. Nevertheless, studies examining the health inequality manifested by the labour market position are remarkably limited and an important gap to fill for future research. Although the ideal would be that all people could have an employment, our focus has been directed towards which factors could reduce the health gap between employed and unemployed, that is, the social determinants that could explain the difference in health rather than unemployment as a risk factor for ill health. Our findings stress that both social and economic determinants have an important role to play to dampen ill health among unemployed. However, our findings also highlight that the single item of economic deprivation related to unemployment and current ill health operates differently depending on the social position across the life course. This implies, for instance, that a targeting policy approach from the government of increased cash margin may be most beneficial among youths while financial strain could be more beneficial among adults and women in midlife in order to reduce health differences. While contributing new knowledge, this thesis also identified the need for further research into which factors could reduce the health gap between employed and unemployed.

Some closing words: this thesis stresses the multidimensional complexity of unemployment and illness, bridging over subjects such as individuals and structures, social and economic surrounding, time and space. It does not, however, provide any simple or concrete solutions to the concurrent or long-term health consequences of one’s own or others unemployment, as the solution is beyond
the areas of responsibility and abilities of research. It is noteworthy, however, that
the health inequality manifested by the labour market in terms of unequal distri-
bution of resources and opportunities, is socially produced, unfair and changea-
ble through political decisions. So if the long-term association of one’s own and
others’ unemployment and illness remains across time, a lot of individual and
collective suffering could be reduced by early labour market and public health
interventions and continue across the life course.
Tack!

Nu när denna, något abstrakta, avhandlingsprocess slutligen ska konkretiseras är det väldigt många jag vill tacka. Först och främst tack till alla deltagare i Luleåkohorten, Yngre Luleå-kohorten och Hälsa på lika villkor för att ni generöst delat era erfarenheter av arbete, arbetslöshet och ohälsa. Det är tack vare er som den här avhandlingen har varit möjlig. Tack till Forte och Formas som via anslag stött denna forskning ekonomiskt.

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