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PATHWAYS TO LABOUR MARKET MARGINALISATION – ASPECTS OF COMMON MENTAL DISORDERS, MIGRATION STATUS, AND AGE

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Pathways to labour market marginalisation – aspects of common mental disorders, migration status, and age

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ABSTRACT

Background: Labour market marginalisation (LMM), measured as sickness absence (SA)/disability pension (DP) or unemployment, differs between young immigrants and natives in several countries. The aim of this project was to investigate the risk of LMM among immigrants, second generation immigrants, and refugees and if the risk differed with region/country of birth, age, generation, refugee status and before and after a diagnosis of common mental disorder (CMD). A second aim was to assess psychiatric healthcare utilization before and after DP due to CMD among immigrants and natives, and if it differed before and after changes in social insurance regulations in Sweden in 2008.

Methods: Four studies were conducted, all based on Swedish nationwide register data. Study I: a cohort study of all 3 507 055 individuals living in Sweden in 2004 (19-50 years), with a 6-year follow-up. Hazard ratios (HR) and 95% confidence intervals (CI) for DP were estimated by Cox regression for first and second generation immigrants compared to natives, across regions of birth and stratified by age. Study II: individuals with incident DP due to CMD (n=28 354), before or after the introduction of stricter social insurance rules, were included. Patterns of psychiatric in- and specialised outpatient healthcare utilization during a 7-year window before and after being granted DP were assessed by Generalized Estimating Equations. Study III: A total of 28,971 individuals (19-30 years) with an incident CMD in 2007 were included. Group-based trajectory models were utilised to identify trajectories of annual months of LMM three years before and six years after the diagnosis. Study IV: A prospective cohort study including individuals (19-30 years) with CMDs during 2009 (N=69,515). Cox regression was used to calculate HR for future LMM (2010-2013).

Results: In the first generation immigrants compared to natives, HRs for DP were higher (range: 1.17 to 1.74). Also in the second generation immigrants, HRs were higher (range: 1.10 to 1.30) (study I). Prevalence rates of psychiatric inpatient healthcare were comparable among immigrants and natives, lower though in non-Western immigrants. Three years after granted DP, non-Western immigrants in comparison to natives and Western immigrants had a stronger decrease in inpatient psychiatric healthcare. After 2008, a strong reduction in outpatient psychiatric healthcare after granted DP was observed, similarly in immigrants and natives (study II). Young natives and immigrants showed similar trajectories of SA/DP in individuals with CMDs. A higher proportion of non-Western immigrants (21%) followed trajectories of high levels of unemployment compared to Western immigrants (15%) and natives (17%). Educational level and duration of residence in Sweden discriminated trajectories of both SA/DP and unemployment (study III). Regarding subsequent unemployment, both refugees and non-refugee immigrants with CMDs had a higher risk compared to natives. Regarding subsequent SA, refugees from Africa and Asia showed a lower risk compared to natives (study IV).

Conclusions: Immigrants differed in comparison to natives in LMM in terms of a higher level of DP in both generations, in lower levels of inpatient psychiatric healthcare after DP granting,

particularly among non-Western immigrants, in higher unemployment trajectories after a CMD and in higher unemployment risk and lower SA risk, particularly among refugees. Educational level, psychiatric comorbidity and duration of residence are relevant factors in discriminating differences in LMM trajectories among immigrants and natives.

SAMMANFATTNING

Bakgrund: Marginalisering från arbetsmarknaden, i termer av sjukfrånvaro, sjuk- eller aktivitetsersättning (SA) (tidigare förtidspension) eller arbetslöshet, skiljer sig mellan unga invandrare och infödda i flera länder. Syftet med detta projekt var att studera risk för arbetsmarknadsmarginalisering bland invandrare, andra generationens invandrare respektive flyktingar och huruvida denna risk skiljde sig beroende på födelseland, ålder, och flyktingstatus samt före och efter att personen fått en diagnos för depression och ångestsyndrom (CMD; common mental disorders). Vidare var syftet att studera användning av sjukvård före och efter SA i CMD bland invandrare och infödda, och om det fanns skillnader mellan dessa grupper före och efter att socialförsäkringsreglerna förändrades i Sverige år 2008.

Metod: Avhandlingen består av fyra delstudier, som alla baseras på rikstäckande registerdata. Studie I är en prospektiv kohortstudie av alla 3 507 055 personer som bodde i Sverige år 2004 (19-50 år). Dessa följdes i sex år. Hazardkvoter (HR) med 95% konfidensintervall för SA beräknades med Cox regressionsanalys för första och andra generationens invandrare och jämfördes med infödda, mellan olika födelseländer och åldersgrupper. I studie II inkluderades alla personer med ny SA till följd av CMD (n=28 354) före och efter införandet av striktare regler i socialförsäkringen år 2008. Mönster av användning av specialiserad öppen- och slutenvård under en 7 års period före och efter beviljandet av SA identifierades med s.k. "Generalized Estimating Equations". I studie III inkluderades 28 971 individer (19-30 år) som 2007 för första gången fått en CMD diagnos. Olika mönster av marginalisering från arbetsmarknaden identifierades under tre år före och sex år efter diagnosen. Den fjärde studien är en prospektiv kohortstudie där personer (19-30 år) med CMD under 2009 inkluderades (n=69 515). Marginalisering från arbetsmarknaden under åren 2010-2013 beräknades med hjälp av Cox regression.

Resultat: Första generationens invandrare hade SA i större utsträckning än infödda (HRs: 1.17 – 1.74). Detta gällde även för andra generationens invandrare (HRs: 1.10-1.30, studie I). Prevalensen av psykiatrisk slutenvård var lika hög för invandrare som för infödda, dock något lägre för utomeuropeiska invandrare. Tre år efter beviljandet av SA minskade användningen av psykiatrisk slutenvård hos icke-västerländska invandrare mer jämfört med bland infödda och västerländska invandrare. Efter 2008 observerades en starkare nedgång av psykiatrisk öppenvård efter beviljande av SA både bland invandrare och infödda (studie II). Unga infödda och invandrare med CMD hade liknande mönster av sjukfrånvaro och SA. En högre andel icke-västerländska invandrare (21%) hade höga arbetslöshetsmönster jämfört med västerländska invandrare (15%) och infödda (17%). Både utbildningsnivå och hur länge man bott i Sverige varierade mellan de olika sjukfrånvaro/SA mönstren och arbetslöshetsmönster (studie III). När det gäller arbetslöshet hade både flyktingar och andra invandrare med CMD högre risk än infödda. Invandrare från Afrika och Asien hade lägre risk för framtida SA än infödda (studie IV).

Slutsatser: Sammantaget visar avhandlingen att både första- och andra generationens invandrare skiljer sig från infödda när det gäller marginalisering från arbetsmarknaden på så sätt att större andelar av dem hade lägre nivåer av specialiserad psykiatrisk slutenvård efter beviljad SA, speciellt bland icke-västerländska invandrare. De hade även högre nivåer av arbetslöshet efter CMD, högre risk för arbetslöshet och lägre risk för SA, speciellt bland flyktingar. Utbildningsnivå, psykiatrisk samsjuklighet och hur länge personen bott i Sverige är relevanta faktorer när man beaktar skillnader i marginalisering från arbetsmarknaden mellan invandrare och infödda.

LIST OF SCIENTIFIC STUDIES

I. Di Thiene D, Helgesson M, Alexanderson K, La Torre G, Tiihonen J, Mittendorfer-Rutz E. Risk of disability pension in first and second generation immigrants: the role of age and region of birth in a prospective population-based study from Sweden. BMC Public Health. 2017;17:931

II. Di Thiene D, Rahman S, Helgesson M, Wang M, Alexanderson K, Tiihonen J, La Torre G. Mittendorfer-Rutz E. Healthcare use among immigrants and natives in Sweden on disability pension, before and after changes of regulations. European Journal of Public Health. 2018;28:445-451.

III. Di Thiene D, Mittendorfer-Rutz E, Rahman S, Wang M, Alexanderson K, Tiihonen J, La Torre G, Helgesson M. Trajectories of sickness absence, disability pension and unemployment in young immigrants with common mental disorders. European Journal of Public Health. 2019 Mar 30. pii: ckz046. doi: 10.1093/eurpub/ckz046. [Epub ahead of print].

IV. Di Thiene D, Helgesson M, Rahman S, Alexanderson K, Tiihonen J, La Torre G, Mittendorfer-Rutz E. Risk of labour market marginalisation in young immigrant with common mental disorders and the role of country of birth, refugee status, duration of residence and age at arrival in the country. *Manuscript submitted*.

CONTENTS

LIST OF ABBREVIATIONS

AD	Antidepressant
ATC	Anatomical Therapeutic Chemical
BIC	Bayesian Information Criterion
CI	Confidence interval
CMD	Common mental disorder
DP	Disability pension
DSM-V	Diagnostic and Statistical Manual of Mental Disorders, fifth edition
GEE	Generalized Estimating Equations
HR	Hazard ratio
ICD	International Classification of Diseases
LISA	Longitudinal Integration Database for Health Insurance and Labour Market Studies
LMM	Labour market marginalisation
MiDAS	Micro Data for Analysis of the Social Insurance
MDS	Musculoskeletal diagnoses
OECD	Organisation for Economic Co-operation and Development
SA	Sickness absence
SCB	Statistics Sweden
SEP	Socio-economic position
SIA	Social Insurance Agency
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organisation

1 INTRODUCTION

1.1 GLOBAL MIGRATION

Migration is an age-old phenomenon, present since the earliest phases of human history and indispensable to understand human histories, cultures, and civilisations (1). During the present globalisation era, international movement is becoming more feasible, through reductions in travel costs and the digital revolution. Factors underpinning such migration are numerous, relating to economic growth, inequality, demography, wars and even climate change (2). In the last years, migration has become a political and social challenge, involving aspects such as integration and cultural identity. Worldwide, over the past fifteen years the number of international immigrants has continued to increase rapidly, from an estimated 155 million people in 2000 reaching up to 244 million in 2015 (3). Besides these impressive numbers, it is important to note how immigrants are, globally, a small minority, about 2.8% to 3.3% of the global population. In 2015, most of the international migrants, around 72%, were of working age (20 to 64 years of age) (3). Of those approximately 20 million were classified as refugees. Nearly 76 million immigrants live in Europe, nearly the same proportion as in Asia, followed by North America and Africa (3). However, in this last decade, Asia was the region with the fastest growth in the resident migrant population (3, 4).

1.1.1 Patterns of global migration

Migration is defined as a movement of an individual across an international border or within a country with the intention to settle in a new location (3). Traditionally, there are two different conditions: 1. International migration when the national boundaries are crossed. An international migrant is someone who moves in and settles in a different country (5). 2. Internal migration, a change of place within national boundaries, such as between states, regions or cities. This is an even more prevalent form of migration, but it is difficult to have good or reliable estimates (3). In this PhD project, only the international migration is considered.

Given the complexity and the heterogeneity of the phenomenon migration, many different aspects must be taken into account (3, 6). There are different factors leading to the decision to migrate, traditionally defined as pushing or pulling factors. From such a perspective, the term refugee most often refers to an individual being pushed from his/her country by war, natural disaster or famine, while a labour immigrant is pulled or attracted by the work opportunities. However, quite often a combination of such factors are involved (3).

A refugee, defined as according to Article 1 of the 1951 UN Convention, as modified by the 1967 Protocol, is a person who "owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail

himself of the protection of that country" (7). Today, globally, 57% of refugees come from three countries: Syria, Afghanistan and South Sudan (8).

Beside the reason of immigration, time-related factors, such as the duration of residence in the new country and the age at arrival, were shown to be important factors in the migration process (5, 9, 10). Duration of residence in the new country has been shown to be important when studying access to healthcare services, immigrant and refugee mental health and psychiatric drug use in refugees (11-13). Even after ten years of residence, unemployment rates remain higher among immigrants in comparison to natives (14). Age at arrival has been associated with the risk of mortality and the later socio-economic life chances as adults (9, 10).

More recently, research has not only focused on immigrants but also on their children, especially those born in the new host country. These children are often referred to as "second generation immigrants" (15, 16). Second generation immigrants, according to Berry's acculturation theory, can be at risk of psychological distress due to conflicting cultures between their parents' country of birth and their own country of birth (17, 18). Moreover, second generation immigrants may experience socio-economic difficulties or disadvantages, which could increase their risk of developing mental disorders. Several studies have reported differences in mental health and healthcare utilisation between immigrants of the first and second generation (19-21).

1.1.2 Migration to Sweden

Sweden has, like other European countries, changed from an emigration country to an immigration country. It has been estimated that between 1851 and 1930 around 1.5 million of the Swedish population emigrated, with main destination North America (22). In 1940, only 1% of the population in Sweden was born abroad (23). During the second world war and, particularly in the following decades through the 1960s, the recruitment of labour immigrants increased, principally from Finland, southern Europe, and Turkey. Since the 1970s and in the following decades, most of the immigrants to Sweden were refugees, with different waves from Chile, Iran, former Yugoslavia and more recently from Somalia, Eritrea, Iraq, and Syria (14, 23).

In 2016, the reason for immigration most represented were family ties and refugees followed by labour and study. (24). Other reasons for immigration utilized in this project are: in need of protection and humanitarian grounds/stressful circumstances. In this project, reason for immigration in need of protection and humanitarian grounds/stressful circumstances were grouped together defining refugees. Family ties, labour and study reasons have been defined as non-refugee immigrants. In the recent arrivals in Sweden a large number of unaccompanied minors is present (25). They are generally defined as persons who arrive without parents, adult relatives or guardians and are below the age of 18. They represent a big challenge for the

welfare system, because they need a solid support structure to compensate the absence of parents (25).

Today, around 19% of the population in Sweden are immigrants and if we consider the second generation (born in Sweden with parents born abroad) the percentage arrives to 24% (26, 27). In table 1, the proportion of immigrants in Sweden in 2018 according to Statistics Sweden is reported (27). The annual inflow of immigrants to Sweden in the years to come is predicted to remain at its current high level (26).

Table 1. The largest ten countries of birth among people living in Sweden in 2018 (from Statistics Sweden).

Country of birth	Number and proportion in Sweden (%)
Sweden	8 274 616 (80.8)
Syria	185 991 (1.8)
Finland	147 883 (1.4)
Iraq	144 035 (1.4)
Poland	92 759 (0.9)
Iran	77 386 (0.8)
Somalia	68 678 (0.7)
Former Yugoslavia	65 124 (0.6)
Bosnia and Herzegovina	59 395 (0.6)
Afghanistan	51 979 (0.5)
Germany	51 140 (0.5)

1.2 IMMIGRANT HEALTH

1.2.1 Predominant theories and empirical evidence on health and migration

Immigrants often have equal or better health outcomes than natives (28, 29). The so-called *healthy migrant effect* has been reported, for example, for mortality and low birth weight (30, 31). This theory is often explained as a health selection effect, immigrants would be positively selected by their health status: those with the best physical health are better equipped to have the pre-requisites of migrating (29). The healthy migrant effect is often reported as a paradox: immigrants tend paradoxically to have substantially better health than the average population in the host country, despite their low level of socio- economic position, lower levels of income, education, healthcare access and utilization (31). Specific immigrant subgroups, however, such as refugees or undocumented immigrants, may not have the same protective effects associated with migration (32). Furthermore, it has also been stated that the healthy migrant effect may be outcome-specific, and may apply in different ways on the basis of the country of birth (12, 31, 33).

Beside the selection effect, another theory tries to explain the healthy migrant effect. The *salmon bias effect*, where the paradoxical health advantage is partly attributable to return migration among those who are less healthy (34, 35). Immigrants with a poorer health status and elderly immigrants may be more likely to return to the country of origin. Another important factor involved in the health outcome of immigrants is the duration of residence. Duration of residence in the new country has been showed to reduce the health advantage (36, 37). The health advantage erodes over time and health in immigrants tends to converge to the native population (38). This deterioration is partially attributed to the adoption of unhealthier behaviours in the host country. This phenomenon is often called *assimilation or acculturation paradox* (37).

Finally the concept of *Intersectionality* theory should be discussed despite not referring directly to migration (39). This theory first developed in the USA originally explains the disadvantage of black women and how multiple social categories intersect in one individual reflecting social inequality and disadvantage (39). It can be utilized to avoid a one-dimensional category to understand immigrant health and to understand how being an immigrant intersects with other social categories that may influence health (39, 40).

1.2.2 Social determinants and health inequalities

The final report of the World Health Organization (WHO) Commission on the Social Determinants of Health called "Closing the Gap in a Generation" has brought wide attention to social inequalities and their impact on health (41, 42). The social determinants of health field covers the understanding of how social and economic factors, from the societal level to the individual level, influence people's health (43). People who are socially disadvantaged are

generally at a higher risk of poor health, while those who are privileged are more likely to enjoy good health; determinants of health are conditions able to determine a person's chances of maintaining good health. They are sometimes referred to as 'the causes of the causes', as it is recognized that health is not simply about behaviour or exposure to risk, but how social and economic structures shape the health of populations (44). One of the main characteristics of inequalities is that they are not inevitable and unfair (42).

Migrant status is one dimension through which social stratification occurs in the labour market, and has previously been identified as a "key, cross-cutting axis linking employment and working conditions to health inequalities through diverse exposures and mechanisms"(45). Immigrants have usually worse work environment conditions, physically demanding work and stress factors as discrimination (45). Furthermore they can experience education mismatch, which describes the situation where the educational level does not match with the requirements of the occupation (46). However, migration-related factors such as immigrant generation, status of refugee, duration of residence, and age at arrival may modify the degree of the relationship between work factors and health inequalities (47, 48).

1.2.2.1 Health inequalities among immigrants and socio-economic position

The relation between health and migration, as discussed in previous paragraphs, is complex. An important aspect to be considered regarding health inequalities in immigrants is the socio-economic position. The association between socio-economic position and health is well recognized in the scientific literature (42, 49). As already mentioned in the previous paragraph newly arrived immigrants are often in the lowest socio-economic position of the society (50, 51). Socio-economic position can be measured in different ways and has some specific issues to be considered when discussed in immigrants (52). Typically, it is defined by social status, measured by educational level; economic status, measured by income; or work status, measured by type of occupation. These three aspects can represent different pathways through which socio-economic position can affect health (52).

Higher education, utilized throughout this project as a measure of higher socio-economic position, has been assumed to lead to jobs that are better paid and with lower physical hazards or demands; moreover, individuals, who are more educated, are more likely to understand health risks and engage in preventive health behaviours (52, 53). The measure education has an advantage that it is easy to measure and that it is quite stable across time after reaching a certain level. However, considering education among immigrants, some important issues can be present: 1. Comparability of different education systems; 2. Different effect of lack of education among immigrants and natives (i.e. a reduction in the ability of learning the language of the new country), 3. over-education among immigrants. Over-education refers to the phenomenon that immigrants are more often underemployed according to their educational level and therefore education is less indicative of their socio-economic positions (52).

Similar problems play a role when considering income or occupation among immigrants. These determinants reflect material living standards, but are not stable over time and changes on a short-term basis are likely. Remittances, the money sent to the relatives in the home country, are often not taken into account, resulting in an overestimation of the available income of immigrants (54). Finally, it is important to mention the paradox in socio-economic position in immigrants: income and wealth usually increase with duration of stay in the host country, but health tends to decrease (38, 55). However, according to Stronks and Kunst, insight into socio-economic inequalities in health is a necessary and essential but not a sufficient condition for understanding inequalities and will not automatically lead to an elimination of inequalities in health among immigrants (51).

1.3 MENTAL HEALTH AND COMMON MENTAL DISORDERS

1.3.1 Definition of mental health and common mental disorders

According to the World Health Organization (WHO), mental health is a "state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"(56). When this state of being is lacking the individual can experience mental disorder. However, this definition raised several concerns, particularly on the definition of state (57, 58). A "dynamic state of internal equilibrium" has been suggested to better describe a more dimensional perspective (58).

In this thesis, common mental disorders (CMDs) have been conceptualized according to the International Classification of Diseases version 10 (ICD-10) as a clinically recognizable set of symptoms or behaviours associated in most cases with distress and with interference with personal functions (59). Depressive, anxiety, and stress-related mental disorders are the most common mental disorders (60). They are reported to be more common among women and to have the onset in childhood or adolescence, and anxiety disorders might have an earlier age of onset than depressive disorders. Risk factors for CMDs may include socio-economic position, family history of CMD, and family situation (60-62). Adequate treatment and rehabilitation are found to improve the prognosis (60, 63).

The global prevalence of CMDs is 15-20% of the population (64). In Sweden according to Johansson et al., about 15.2% of the general population at any given time point have a clinically significant depression (10.8%) or anxiety (4.7%) (65). Generally, CMDs have a positive prognosis, showing an improvement in depressive symptoms and in productivity and they are reported to worsen with inactivity (66); the majority of patients with such disorders are treated in primary healthcare, more severe cases in specialised healthcare (60, 67).

Work ability of individuals can be affected by a CMD, potentially causing temporary or permanent marginalisation at the labour market (68, 69). For these reasons, CMDs have become one of the leading causes of sickness absence (SA) and disability pension (DP) in many European countries (70). Especially, depressive disorders are predicted to be the leading cause of loss of disability adjusted life years (DALYs) in high-income countries by 2030 (71, 72). However, the development of CMD and labour market marginalisation (LMM) is strongly intertwined, i.e. CMDs may contribute to a higher risk of LMM and LMM might in turn increase the risk of CMD (61-63). This describes the bidirectional relationship between health and LMM, i.e. economic difficulties of being on lower income can cause depression, stress and other mental symptoms. In turn, being depressed or with a mental disorder reduces the possibilities to find and keep a job (62, 73).

1.3.2 Mental health and common mental disorders among immigrants

As already stated, migration is a very complex and multifaceted phenomenon and the discussion on the mental health among immigrants must reflect this complexity. According to Namer and Razum (2018), the paradox of healthy migrants, although partially extending to mental health, therefore does not universally point to immigrants enjoying better mental health in comparison to natives (74). Pre-migration and post-migration factors, being an undocumented migrant, social and economic inequalities, age, and gender all impact on immigrant mental health within multilevel and complex interactions (75).

Traditionally, factors involved in immigrants' mental health can be divided in pre-migration, migration, and post-migration factors (5). Reasons for immigration are part of the pre-migration factors varying from trauma of war or persecution among refugees to economic opportunities for labour immigrants (33, 76). Pre-migration factors may include starvation or malnutrition as well as lack of access to healthcare (77). During the migration itself, the travel from one place to another may also involve many risks and difficult situations, including mental stress. Finally, the post-migration risk factors should be mentioned which are related to the adjustment of the immigrant to the society of the new country. Post-migration risk factors for mental ill-health include uncertainty and waiting during asylum procedures, language problems, isolation, social marginalisation, loss of identity and barriers to healthcare (5, 78, 79).

Most of the studies on immigrants' mental disorders have particularly focused on CMDs (80-82). A systematic review showed a higher rate of CMDs and psychotic disorders among immigrants in Sweden in comparison to natives (80). Depressive disorders were reported to be higher among immigrants in comparison to the native population in a study in 23 European countries (82). However, the results are mixed due to the heterogeneity of immigrant populations and shortcomings in the respective studies (83). A scoping review on register-based studies on immigrant' mental health highlighted the importance of the reason of migration for mental disorders, finding worse mental health among refugees (84). Also other factors matter. Increasing time after the immigration process for example was found to be a protective factors for CMD, highlighting an improvement of the symptomatology amongst immigrants with the duration of residence (80). This in contrast with previous results on other health aspects (9, 36). It is possible that CMDs have a strong relation with pre-migration factors, the stress of the migration itself and with the challenge of the integration, particularly though in the first years in the host country (80). However, among refugees, a recent systematic review reported high levels of depression and post-traumatic stress disorder (PTSD) many years after resettlement (85).

1.3.2.1 Mental health service utilization among immigrants

Immigrants have been reported to use mental health services differently than natives. Pattern of health service utilization can be affected by several factors: barriers in the access of the services

and/or beliefs about the need for health services, based on immigrants' experiences (86). The type of service, age, gender, country of origin, and reason for migration are factors involved in explaining differences in utilization (87, 88). However, findings differ: in the United Kingdom a higher risk for mental inpatient healthcare among immigrants, in Norway lower rates of specialised mental healthcare for immigrants but higher for refugees, and in Sweden a higher risk of mental inpatient healthcare but not of mental specialised outpatient care were reported (87-90). Factors behind lower utilization of mental healthcare among immigrants include lower familiarity with the healthcare system, language barriers, lower health literacy levels, and cultural aspects such as the self-perception of mental health needs (87). Moreover, differences with regard to compliance to treatment were reported: in a Danish study, non-Western immigrants with depressive disorders were found to have a higher risk not to initiate or to discontinue the antidepressant treatment recommended after hospital discharge in comparison to their native counterparts (91).

1.4 IMMIGRANTS AND LABOUR MARKET MARGINALISATION

1.4.1 Definition of labour market marginalisation

According to a United Nation´s report, most immigrants to Sweden are of working age, which emphasizes the role of paid work in the new society (2). Labour market marginalisation (LMM) can be defined in different ways and there is no international consensus in the definition. However, in all studies using this term, marginalisation covers a state of being more or less distant from the labour market. This is in contrast to the term "labour market exclusion" which means being outside the labour market. LMM is therefore a much wider term, with different policy implications in terms, for example, of return to work. This means that in the international literature, marginalisation is used as a concept of describing temporal or permanent problems of labour market attachment. The most frequently used measure of LMM in the literature is unemployment (92-94). In this research project, LMM is conceptualized from a social insurance perspective, as in some previous studies (95-97). LMM includes individuals having some type of benefit from social insurance indicating that they are not in paid work for shorter or longer periods of time. Such social security benefits involve unemployment benefits, and measures based on medical assessments, i.e. sickness absence benefits (SA), and disability pension (DP). A disease or injury causing work incapacity may lead to temporal (i.e., SA) or permanent (i.e., DP) marginalisation at the labour market.

The main reason for utilizing this definition of LMM is based on findings from previous studies including patients with mental disorders, showing that exclusion of sickness absence and disability pension from the measure of LMM leads to a considerable underestimation of the true consequences of mental ill-health (97). Moreover, a link between these three measures has been reported, e.g. a reduction of the risk of SA during times of high unemployment, due to e.g., workers being afraid of losing their employment, and the fact that many individuals at risk of SA are already outside the labour market (98). In the literature other terms for sickness absence and disability pension have been used: sick leave (99), sickness absenteeism (100), sickness benefits (101), disability retirement (102), disability benefit (103), ill-health retirement (104), health-related early retirement (105) or incapacity benefit (106).

Sickness absence, disability pension and unemployment benefits are all social benefits in welfare states (107). Social protection systems are designed to protect people against the risks of loss of income in case of difficulties in finding and keeping a job (in case of unemployment benefits) and in case of work incapacity due to disease or injury (SA and DP). In these situations, the aforementioned social benefits are important to secure income for individuals who otherwise would suffer severe economic constraints. However, absence from the labour market means a considerable loss of productivity and may be linked to negative health effects in affected individuals, including a lack of meaning, reduced social integration, physical inactivity, sleep disturbances, and low self-ratings of psychological well-being (70, 108-110). A

hypothesis of a bidirectional association between mental distress and LMM has also been proposed (111). In other words, social causation (LMM negatively impacting psychological well-being) and social selection (poor mental health increasing the risk of labour market marginalisation) can be strongly intertwined, particularly in young adults (112-114).

1.4.2 Social insurance systems

1.4.2.1 The Swedish social insurance system

The public social security system in Sweden aims at providing economic security to individuals. Benefits from sickness absence, disability pension and unemployment are described in the following paragraphs.

1.4.2.2 Sickness absence

All people from the age of 16 years with income from work or unemployment benefits are covered by the sickness absence scheme and can claim SA benefits from the Social Insurance Agency, if they have reduced work capacity due to disease or injury. SA can be granted for full- or part-time (100, 75, 50, or 25% of ordinary work hours) (115). After a qualifying day, the employer usually provides sick pay for the first two weeks, after which benefits are payed by the Social Insurance Agency. From day 8, a medical certificate from a physician is required. Benefits amount up to about 80% of lost income, up to a maximum level.

1.4.2.3 Disability pension

All residents in Sweden aged 19-64 years can be granted DP if they have permanent or long-term reduced work capacity due to disease or injury. Among people with income from work or unemployment benefits, DP typically follows long-term sickness absence (SA). Among young adults (19-29 years old) temporary DP can be granted if the work capacity is reduced for at least one year, or if they due to health reasons fail to complete compulsory or upper secondary school in the required time. From age 30, the work incapacity must be permanent. DP can also be granted for full- or part-time (100, 75, 50, or 25% of ordinary work hours). Benefits amount to up to 65% of income up to a maximum level, or among those with no previous income: a minimum fixed benefit (115).

1.4.2.4 Unemployment benefits

In Sweden, unemployment insurance consists of two parts: a basic insurance and an optional earnings-related insurance. Individuals 20 years or older, who are not optionally insured, are covered by the basic insurance part. The optional earnings-related insurance is voluntary (116). A general requirement for receiving remuneration is to be completely or partially without work, and to be registered with the Swedish Public Employment Service (Arbetsförmedlingen), able

to work and available for any type job one is capable to do. The level of benefits is normally based on the average income over the last 12 months before becoming unemployed. For the first 200 days one can receive 80 % of the salary, and 70% until 300 days (116).

1.4.2.5 *Changes in sickness absence and disability pension rules*

Regulations of social insurance systems sometimes undergo minor or larger changes. In Sweden, several changes during the recent decades have been implemented in order to obtain a reduction in the previous very high levels of SA and DP (41). In 2003, the age limit for being able to be granted DP was set at 19 years (before it had been 16 years). Moreover, it was decided that only temporary DP could be granted when aged 19-29 years. In 2008, a new regulation changed the eligibility criteria for SA and DP introducing stricter requirements. Sickness absence duration was limited to one year for most individuals and the maximum number of days of a sick-leave spell was set at 914 days (2.5 years). After that there was a period of three months when the individual could not be granted SA-benefits (however, could have other benefits). After July 2008, temporary DP was no longer possible from the age of 30, and specific assessments of claimant's eligibility to SA benefits were established at three, six, and twelve months of a SA spell (115, 117). Generally, since the implementation of the 2008 reform, both DP and SA rates have been reduced (118).

1.4.3 Sickness absence, disability pension, and unemployment benefits in natives and immigrants

1.4.3.1 *Sickness absence and disability pension*

Previous studies have shown associations between different socio-demographic factors and LMM (119, 120). Findings suggest a higher likelihood for subsequent SA and DP among women, people living alone, in a rural area, or of older age. A low socio-economic position, particularly education, and work-related factors were also shown to have an association with future SA and DP (121-123). In general, around six percent of the working-aged people across countries of the Organization for Economic Cooperation and Development (OECD) are on DP (108). In Sweden, around the same percentage was in temporary or permanent DP among individuals in working age (19-64 years) at the end of 2017 (115).

Both in Sweden and Norway, DP is reported to be more common among immigrants in comparison to the native population (124-126). Previous studies from Sweden showed different rates of DP for immigrants on the basis of their region of birth, particularly high in immigrants from Northern European countries and immigrants from outside Europe (126, 127). Some of the higher risk of DP among immigrants has been shown to be explained by differences in socio-demographic factors and work-related factors (128). The higher levels of morbidity seem also to be involved in the higher risk of DP in the immigrant population. Differences in diagnostics and treatment of mental disorders in immigrants compared to the native population described in the

previous paragraph can have a role in the higher risk of being marginalised or excluded from the labour market (127, 129). Healthcare utilization and treatment before being granted DP due to a mental diagnosis have been reported to be suboptimal and differences with regard to a migration background are possible but to date not studied (130). Moreover, labour market marginalisation might not only affect the first generation, but also the second generation of immigrants (131).

1.4.3.2 Unemployment

Immigrants in Sweden were reported to have higher rates of unemployment than natives (14, 25). The difference between natives and immigrants decreases over time, but is still present after 10 years of residence (14, 25). Results of two Swedish studies have also shown the persistence of higher rates of unemployment among some second generation groups compared to the population with native-origin (25, 132). Unemployment, especially at young age, can be associated with a greater likelihood of subsequent unemployment, as well as sickness absence and disability pension (133). This can initiate a cycle of recurrent unemployment and an exposure to labour market marginalisation, that can negatively impact health over the life course.

1.4.4   A focus on young adults

Young immigrants are important as they have many years of their lives ahead of them, and the process of integration particularly in this group is crucial for the welfare societies. In the host countries, the welfare policies have a key role and the possibility to improve the trajectories of employment. Therefore, it is necessary to have a strong political focus on 'employability' among immigrants in the host countries to have a reduction in the expenses on social welfare services and secure the labour force and economic growth. On the basis of this argumentation, physical and mental health is mainly seen as a tool to gain and maintain an employment (134). However, a good employment can contribute to mental and physical health. Furthermore, it is an important aspect for everyday life and a right in itself.

Labour market marginalisation among young adults is a recognized and discussed public health and economic issue in OECD's countries (135). Early marginalisation in the labour market has been shown to influence the future health of the individuals (133). Unemployment as a young adult often occurs during the transition from the educational system into the labour market (136). However, layoffs are another possibility of becoming unemployed. The presence of a mental disorder is an additional problem for young people regarding finding paid work (58). CMDs were reported among the main causes of labour market marginalisation, particularly among young individuals (70). This is in part attributable to the common early age of onset and the high prevalence of these diseases (60). In the past 20 years, the number of young adults between the ages of 19 and 29 with disability benefits has doubled in Sweden (69). The increase

in the number of young adults with a permanent reduction of working ability is, however, not present only in Sweden; in other European countries a similar increase has been seen (69, 108).

1.4.5 Insurance medicine research

This is a thesis within the area of insurance medicine. SA and DP are very complex phenomenon and can be studied from different perspectives, using different theories, study design, types of data etc. Moreover, different types of research questions can be posed. In order to place my four studies in this context, I have used a categorization of SA/DP studies developed by Alexanderson (137) (table 2).

Table 2. Description of the performed studies in this thesis according to a structure for categorizations of studies on sickness absence (SA) and disability pension (DP). Factors relevant for this thesis are marked in bold.

What is studied	-Design -Studied -Data -Analyses	Scientific discipline	Perspective taken in research questions	Structural level of factors included in the analyses	Diagnoses
1. Factors that hinder or promote sickness absence/disability pension **2. Consequences of (being on) sickness absence/ disability pension** 3. Factors that hinder or promote return to work 4. Sickness certification practice 5. Methods, theories	**Study design** -Cross sectional **-Longitudinal** -RCT, CT, etc. **Studied** **General population** Insured In paid work **Diagnosed** **On SA/DP** Other **Type of data** Interview Questionnaire **Register** Medical files Insurance files Notes Documents Video Other **Type of analyses** -Qualitative -**Quantitative**	Economy Law Management **Medicine** Psychology Sociology **Public health** **Epidemiology** Philosophy Other	-**Society** -Insurance -**Healthcare** -Employer -**Family** -Patient	-National -Local -Worksite -Healthcare -Family -**Individual**	**All together** **Mental** Musculoskeletal Cancer Circulatory Infections Other

2 AIMS

2.1.1 Overall aims

This PhD thesis aims to investigate the risk of labour market marginalisation (LMM) in immigrants compared to native Swedes with a specific focus on common mental disorders (CMD) and age. A further aim was to assess patterns of specialised healthcare due to psychiatric diagnoses before and after being granted disability pension (DP) due to CMD, and whether such patterns differed among immigrants and natives before or after the changes of the social insurance regulations in Sweden in 2008.

2.1.2 Specific aims

Study I

The aim of this study was to investigate if the risk of DP due to mental or somatic diagnoses differed in first, second, and second/intermediate generation immigrants compared to natives, in general, across regions of birth, and stratified by age.

Study II

The aims of the study were to assess patterns of specialised healthcare due to psychiatric diagnoses before and after being granted DP due to CMD, and whether such patterns differed among immigrants and natives. A further aim was to study if patterns in different immigrant groups and natives differed if DP was granted before or after the changes of the social insurance regulations in Sweden in 2008.

Study III

The aims of study III were to elucidate if trajectories of LMM (LMM), measured as either SA/DP or unemployment, among young adults differed between immigrants and the native population before and after a diagnosis of a CMD, and to investigate if educational level, psychiatric comorbidity, and duration of residence in Sweden (in immigrants) had different associations with subsequent LMM in natives compared to in immigrants.

Study IV

The aim of this study was to investigate the risk of labour market marginalisation in young adults with common mental disorders among refugees and non-refugee immigrants compared to native Swedes and the role of country of birth, duration of residence, and age at arrival in Sweden.

3 METHODS

Four different longitudinal cohort studies were conducted, all based on nationwide register data. The design, data, analyses, and outcomes of each study are summarized in table 4.

Table 4: Overview of the four studies of the thesis.

	Study I	Study II	Study III	Study IV
Design	Prospective cohort study with baseline data on 31 December 2004 and follow-up until 31 December 2010	A population-based longitudinal cohort study with prospective and retrospective repeated measurements, baseline data on 31 December the year prior to year granted DP, observation for 7 years	Cohort study with prospective and retrospective repeated measurements, baseline data on 31 December the year prior to year granted DP, observation for 9 years	Prospective cohort study with baseline data on 31 December 2009 and follow-up until 31 December 2013
Inclusion criteria and population (n)	General population aged 19-50 years (n= 3 507 055)	Individuals with incident DP due to CMD 2005-06 and 2009-10, 19-64 years (n= 28 354)	Individuals with incident CMD in 2007 aged 19-30 years (n=28 971)	Individuals with CMD in 2009 aged 19-30 years (n= 69 515)
Data sources	LISA, MiDAS, National Patient Register, Cause of Death Register, Multigeneration register	LISA, MiDAS, National Patient Register, Cause of Death Register	LISA, MiDAS, National Patient Register, Cause of Death Register	LISA, MiDAS, National Patient Register, Cause of Death, STATIV
Outcomes	Somatic and mental DP	Specialised psychiatric outpatient and inpatient healthcare utilization	LMM: unemployment, SA/DP	LMM: unemployment, SA, DP
Factors included in the analyses	Age, sex, educational level, family situation, and unemployment status	Age, sex, educational level, type of living area, family situation, and DP diagnoses	Age, sex, educational level, family situation, type of living area, SA 2006/unemployment 2006, and psychiatric and somatic comorbidity	Age, sex, educational level, family situation, type of living area, labour market attachment in 2009, and specialised healthcare due to somatic disorders during 2009
Statistical analyses	Descriptive, Chi2 test, Cox proportional hazards regression models	Descriptive, Chi2 test, Generalized Estimating Equations with autoregressive correlations	Descriptive, Group-based trajectory modelling, Multinomial logistic regression, Chi2 test	Descriptive, Chi2 test, Cox proportional hazards regression models

3.1 DESIGN AND STUDY POPULATION

All four studies were population-based, all people living in Sweden the respective years who fulfilled the inclusion criteria were included (table 4). Also, all four studies were longitudinal cohort studies; two of them were prospective (I, IV) and two of them also included retrospective data (i.e., data from before being included in the cohort).

3.2 DATA SOURCES

Anonymized individual data from different nationwide registers were used (table 4). Data were linked at individual level by the use of the unique 10-digit personal number which all residents have in Sweden. Each of the registers utilized are described below.

3.2.1 Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA)

The Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA) is held by Statistics Sweden (SCB) and holds annual data from the year 1990 and is updated annually (138). LISA contains information on socio-demographics and social insurance benefits of all individuals living in Sweden from 16 years and above. LISA was used in order to obtain socio-demographic information at baseline, namely sex, age, educational level, country of birth, type of living area, family situation, emigration, as well as SA, DP and unemployment benefits and old-age pension.

3.2.2 Micro Data for Analysis of the Social Insurance (MiDAS)

The dataset 'Micro Data for Analyses of Social Insurance (MiDAS)' is maintained by the Social Insurance Agency (SIA) and started in 1994 (139). MiDAS includes information on all spells and periods of SA and DP payed by the SIA. Information includes start and end dates, grade (full- or part-time), and diagnoses.

3.2.3 The National Patient Register

The National Patient Register contains data on inpatient care and specialised outpatient care, was established in 1964 and is held by the National Board of Health and Welfare (140). From 1973, data on inpatient care due to mental diagnoses was included in this register. In 2001, it became compulsory to report specialised outpatient care visits. The inpatient care register is of good quality and covers almost 99% of all hospital admissions, whereas about 80% of specialised outpatient care is recorded in the outpatient care register (141). All diagnoses for in- or specialised outpatient care were coded according to the ICD. The National Patient Register does not include information from primary healthcare.

3.2.4 The Prescribed Drug Register

The Prescribed Drug Register is held by the National Board of Health and Welfare. The register includes information for all prescribed and dispensed medication in Sweden from 1 July 2005. The register contains information such as anatomical therapeutic chemical (ATC) codes, amount of dispensed medication per package, and Defined Daily Dose per package.

3.2.5 Multi-Generation Register

The multi-generation register is a register of individuals who have been registered in the population register of Sweden sometime since 1961 and who were born in 1932 or later. The register contains links between individuals and their biological parents if they lived in Sweden (142). Coverage of information is available for those born since 1961 for 100% of mothers and 98% for the fathers (143).

3.2.6 STATIV - Longitudinal Data Base for Integration Studies

The STATIV database has been developed by Statistics Sweden together with the Swedish Integration Board to provide a basis for illustrating the situation and development within different areas of society from an integration policy perspective (144). The register contains information on demography and employment status and specifically on immigration, such as: reasons for residence, date for resident permit, and time in Sweden.

3.3 EXPOSURE AND COVARIATES

3.3.1 Factors related to migration

In study I, first-generation immigrant was defined as being born outside Sweden, with both parents born outside Sweden. Second generation immigrant was defined as individuals born in Sweden with both parents born outside Sweden. An additional category was the "second/intermediate" generation, defined as born in Sweden and with one parent born in Sweden and the other parent born abroad. Individuals born in Sweden, with both parents born in Sweden were defined as the reference population. In "second/intermediate" and the second generation to define the parental region of birth was utilized the country of birth of the mother. Individuals in the "second/intermediate" generation were categorized in the "Sweden" group when the mother was born in Sweden and the father was born abroad. Moreover, regions of birth were classified into five subgroups: "Sweden", "Nordic countries" (Finland, Denmark, Norway, and Iceland); "EU-25+" (countries included in the European Union in 2006 except Sweden and "Nordic countries" plus US, Canada, Australia, and New Zealand); "European countries outside EU25 and Former Soviet Union countries"; "rest of the world" (Asia, South America, Africa).

In study II, III, and IV, native Swedes were defined as individuals born in Sweden. In study II and III we defined immigrants from Western countries: Nordic countries, EU 25, Canada, USA and Oceania; and non-Western countries: Africa, Asia, and South America.

In study IV, refugees were defined as immigrants with a reason for settlement as refugees, humanitarian grounds/particularly distressing circumstances, or in need of protection. Non-refugee immigrants were defined as individuals born outside Sweden with a reason for settlement as labour, study, or family reunification. Seven countries, that generated the highest number of refugees to Sweden up until 2009, were considered for the analyses regarding country of birth: Somalia, Afghanistan, Iraq, Iran, Syria, former Yugoslavia and Chile. Additionally, we considered the following regions of birth in order to analyse overarching patterns: Africa, Asia, Europe outside EU 25 and South America. Moreover, two further variables related to immigration were used as exposure variables: 1) duration of residence in Sweden: 0-10 years and >10 years; 2) age at arrival in Sweden ≤16 years or >16 years.

3.3.2 Socio-demographic factors

Age, sex, level of education, type of living area, and family situation were included in all the four studies as covariates and the analyses were controlled for these factors. In study II, analyses were also stratified by age groups, with a cut off at 35 years (median).

Type of living area, which was determined by the population size of a given area of living, included big cities (e.g., Stockholm, Gothenburg and Malmö), medium-sized cities (with more than 90 000 inhabitants within 30 kilometre distance from the center) and small cities/ villages area. Family situation was constructed from two variables from the LISA dataset, containing information regarding civil status and children (age and if living at the same place as the parents). This variable was classified into 'married/cohabiting without children living at home', 'married/cohabiting with children living at home', 'single (living without partner/divorced/separated/widowed) without children living at home', 'single (living without partner/divorced/separated/widowed) with children living at home' and 'adolescents living with parents, 16-20 years old'. The last category, except for study IV, was merged with the category 'single (living without partner/divorced/separated/ widowed) without children living at home' due to power issues.

3.3.3 Morbidity related factors and labour market attachment factors

Variables related to work: In study I, information on unemployment benefits during 2004 and in study IV a variable on labour market attachment, measured as a) income during 2009 from work, b) income, but not from work and c) no income. Variables related to health: in study I to measure morbidity up to the year the follow-up began, four dichotomous variables were included, regarding inpatient care (2000-2004) and specialised outpatient care (2001-2004) due to mental (ICD-10 codes: F00-99) and somatic disorders (all other ICD-10 diagnoses). In study

IV comorbid somatic disorders, measured as in- or specialised outpatient healthcare 2009 due to somatic disorders were used.

3.4 OUTCOME MEASURES

The two types of outcome measures used (LMM and psychiatric healthcare) are described below.

3.4.1 Labour market marginalisation (LMM)

In study I, the outcome was defined as being granted DP due to mental or somatic diagnoses (full- or part-time) during the follow-up period. Diagnoses were categorized according to the International Classification of Diseases version 10 (ICD-10). Mental diagnoses comprised ICD-10 codes F00-99 and somatic diagnoses comprised all remaining diagnoses in ICD-10.

In study III, the LMM was defined as SA/DP or unemployment. Annual number of months with SA/DP were used, combining net days of SA and DP. Part-time benefits were combined into net days, e.g., two days of 50% SA/DP benefits become one net day. Moreover, the annual number of months with unemployment was measured. In study IV, three different outcome measures during 2010-2013 were used: 1) long-term unemployment (>180 days annually), 2) long-term SA (>90 net days annually), and 3) DP.

3.4.2 Specialised psychiatric outpatient and inpatient healthcare utilization

In study II, the outcome measure of specialised psychiatric outpatient and inpatient healthcare utilization was measured at seven different time points. The outcome was measured as total number of individuals with a psychiatric outpatient and inpatient healthcare utilization during the period of study (yes/no). The main diagnoses of psychiatric healthcare had code F00-F99 (ICD-10). Information on primary healthcare was not available.

3.5 STATISTICAL ANALYSES

In all four studies, descriptive statistics, including frequencies and percentages, were calculated.

In study I and IV, Cox proportional hazards regression models were applied with crude and adjusted hazard ratios (HR) and 95% confidence intervals (CI). Proportional hazard assumptions were tested prior to the application of these models. Individuals were followed up until the event, death, emigration, or end of follow-up which ever came first. In study I, individuals were followed from 1 January 2005 until the event (mental or somatic DP), death, emigration, or end of follow-up (31 December 2010); In study IV, the risk of LMM was analysed during 2010-2013.

In study II, analyses were based on annual diagnosis-specific specialised healthcare use, namely in- and specialised outpatient care due to mental or somatic diagnoses, with a 7-year observation window for each individual with incident DP due to CMD granted either during 2005-2006 or 2009-2010. The year of DP granting was defined as time point 't0' and the three years of observation for both before and after the t0 year comprised t-3 to t-1 and t+1 to t+3, respectively. Individuals, granted DP during 2005-2006 and 2009-2010, comprised wave 1 and wave 2, respectively. Initially, the between-wave differences in socio-demographics and annual prevalence of healthcare use were assessed by Chi2 test. In order to adjust for between-wave variations with regard to socio-demographics, estimated annual prevalence rates of healthcare use with 95% CI were assessed during the three years before, the DP granting year, and the three years after DP. Hereby, repeated measure logistic regression analyses with a Generalized Estimating Equations (GEE) method and autoregressive (AR) correlation structure were used.

GEE is a repeated measure regression, which takes the interdependence between the repeated intra-individual measurements into account by assigning correlations between measurements in longitudinal studies. An autoregressive correlation (AR) structure assumes the correlation between time points to be greater the nearer the measurements are to each other. Therefore, we used AR based on the assumption that the correlation of healthcare use is stronger between time points that are closer to each other in time. Estimated annual prevalence and odds ratios (OR) with 95% CI of healthcare use at different time points (from t-3 to t+3) between the waves (wave 1 and 2) were compared. The chosen statistical method provides a flexible approach to analyses of longitudinal data by accounting for correlations between outcomes across time within the same individual and allowing for specification of both time-varying effects and individual differences in variables. All models were adjusted for sex, age, education, type of living area, and family situation. Individuals with missing values in the socio-demographic factors were excluded from the GEE models. Sensitivity analyses indicated the comparability of results in the study populations with and without exclusion due to missing values.

In study III, group-based trajectory modelling was used to estimate trajectories of LMM among individuals with incident CMD during 2007, for each person at nine time points (i.e. within a nine-year window, starting from three years before and ending at six years after the date of CMD).

Group-based trajectory models estimate 1) changes in LMM patterns over time in multiple subgroups within the cohort, 2) a regression model for each discrete group and 3) assess proportions of individuals in each group. The Bayesian information criterion (BIC) was used to test the best-fitted model related to the number of groups between 2-9. In order to assure comparability of the groups and to perform the logistic regression the model with five groups was considered to be most appropriate. Probabilities for an individual to be assigned to a specific trajectory group were calculated. The highest estimated probability was used to decide each individual's group belonging.

Thereafter, the association of education and psychiatric comorbidity and duration of residence in immigrants in each trajectory group were estimated by chi2-test and multinomial logistic regression. Moreover, likelihood ratio tests were used to evaluate whether education and psychiatric comorbidity and duration of residence in Sweden were associated with type of trajectory group in the full model. Additionally, Nagelkerke pseudo R2 values were estimated in order to evaluate the strength of these associations. We calculated differences in R2 for each factor in order to examine the contribution of a given factor to the full model.

Analyses were performed using statistical software SPSS version 20.0 (study I), version 22.0 (study II, III, and IV), and SAS for Windows version 9.4 (study III).

4 RESULTS

Below, results from each of the studies are presented.

4.1 STUDY I

In comparison to natives, first generation immigrants were more likely to be of older age whereas the second generation were more likely to be younger. Both first and second generation immigrants were more likely to have lower education, higher levels of unemployment and somatic specialised outpatient care than natives.

During the follow-up, in total, 1.1%, 1.9%, 1.5%, and 1.4% of individuals of the native population, first, second, and second/ intermediate generation, respectively, were granted DP due to mental diagnoses. Compared to natives, the first generation immigrants showed higher risk of mental DP (multivariate analyses: HRs of 1.17 for the younger group, <35 years, and 1.74 for the older ones, ≥35 years) (table 5).

Regarding region of birth, first generation immigrants from "European countries outside EU25 and Former Soviet Union" had a two-fold higher risk of mental DP in comparison to natives (table 6). The adjusted HR for first generation immigrants from the "rest of the world" was 1.46. After the adjustment, estimates showed a slight decrease. In the second-generation immigrants, half of the parents were born in Nordic countries. Compared to natives, immigrants of the second/intermediate-generation immigrants, with a mother from Sweden, another Nordic country, or "rest of the world" showed a higher risk of mental DP.

In natives the proportion of individuals granted somatic DP was 1.3%. For the first, second and second/intermediate generation the proportions were 2.1%, 1.3%, and 1.3%, respectively. The HRs for subsequent somatic DP differed between the immigrant groups (HR range 0.99 to 1.70). For younger and older first generation immigrants, the multivariate adjusted HRs related to subsequent DP due to somatic diagnoses were 1.15 and 1.70, respectively. Also, the somatic DP risk in second generation immigrants was higher in comparison to the native population. The HR was 1.30 in the younger age group and 1.10 in the older age group. In both age groups of second/ intermediate generation immigrants, there was no higher risk for somatic DP.

Compared to natives, first generation immigrants from "European countries outside EU25 and Former Soviet Union" and from the "rest of the world" showed highest estimates (HR 2.24 and 1.54, respectively). Nordic and the EU25+, were the groups with highest risks in the second generation. Additional analyses were carried out for the three main somatic diagnoses: diseases of the musculoskeletal system, injuries, and diseases of the nervous system, respectively. Similar patterns in relation to DP of the musculoskeletal system and injuries as the entire group of the somatic diagnoses among immigrants and natives were found. The only DP diagnoses

with different patterns were diseases of the nervous system, with not significant HRs in any of the immigrant groups compared to natives.

Table 5. Crude and multivariate hazard ratios (HR) and 95% confidence intervals (CI) for the risk of mental disability pension (DP) in the follow-up period (2005-2010) in relation to immigration status, stratified by age (median) and using natives as the reference group.

Age/ Immigration status	Population N (%)	Mental DP n (%)	Crude HR (95% CI)	Model 1 HR (95% CI)	Model 2 HR (95% CI)
<35 years					
Natives	1 242 910 (99.1)	11 478 (0.9)	1	1	1
First generation	253 868 (98.9)	2 820 (1.1)	1.26 (1.20-1.31)	1.13 (1.08-1.17)	1.17 (1.12-1.22)
Second generation	74 709 (98.6)	1 092 (1.4)	1.59 (1.49-1.69)	1.36 (1.28-1.45)	1.29 (1.21-1.37)
Second/ Intermediate generation	138 386 (98.7)	1 838 (1.3)	1.44 (1.37-1.51)	1.33 (1.27-1.40)	1.21 (1.15-1.27)
≥35 years					
Natives	1 292 795 (98.7)	17 240 (1.3)	1	1	1
First generation	285 984 (97.4)	7 752 (2.6)	2.08 (2.03-2.14)	1.88 (1.82-1.93)	1.74 (1.69-1.79)
Second generation	46 198 (98.2)	845 (1.8)	1.37 (1.28-1.47)	1.28 (1.20-1.36)	1.18 (1.10-1.27)
Second/ Intermediate generation	127 054 (98.4)	2 086 (1.6)	1.23 (1.17-1.28)	1.18 (1.13-1.24)	1.13 (1.08-1.18)

Model 1: adjusted for sex, educational level, family situation, residential area, and unemployment status Model 2: like Model 1 and additionally adjusted for healthcare variables (diagnosis-specific in- and specialised outpatient healthcare)

Table 6. Crude and multivariate hazard ratios (HR) and 95% confidence intervals (CI) for the risk of mental disability pension (DP) across regions of birth in the follow-up period (2005-2010), stratified by immigration status, using natives as the reference group.

Immigration status	Population n (%)	Mental DP n (%)	Crude HR (95% CI)	Model 1 HR (95% CI)	Model 2 HR (95% CI)
First generation					
Nordic	87 263 (16.1)	1 389 (1.6)	1.48 (1.41-1.55)	1.23 (1.16-1.29)	1.09 (1.03-1.15)
EU 25+	86 592 (16.0)	1 123 (1.3)	1.22 (1.15-1.30)	1.27 (1.20-1.35)	1.26 (1.19-1.34)
Other EU	116 135 (21.6)	3 621 (2.7)	2.50 (2.41-2.59)	2.12 (2.04-2.20)	2.06 (1.98-2.13)
Rest	249 862 (46.3)	4 799 (1.9)	1.74 (1.68-1.79)	1.52 (1.47-1.57)	1.46 (1.43-1.52)
Second generation					
Nordic	65 933 (54.5)	1 225 (1.8)	1.64 (1.55-1.74)	1.50 (1.42-1.59)	1.31 (1.23-1.38)
EU 25+	23 703 (19.6)	328 (1.4)	1.23 (1.10-1.37)	1.27 (1.14-1.41)	1.24 (1.14-1.38)
Other EU	21 651 (17.9)	282 (1.3)	1.15 (1.02-1.30)	1.15 (1.02-1.29)	1.18 (1.05-1.45)
Rest of the world	9 620 (8.0)	102 (1.0)	0.94 (0.77-1.14)	1.03 (0.84-1.24)	1.12 (0.92-1.36)
Second/intermediate generation					
Sweden	130 213 (49.1)	1 984 (1.5)	1.34 (1.27-1.42)	1.27 (1.20-1.34)	1.19 (1.13-1.25)
Nordic	89 657 (34.7)	1 368 (1.5)	1.13 (1.03-1.24)	1.17 (1.06-1.28)	1.13 (1.03-1.24)
EU 25+	37 007 (13.1)	474 (1.3)	1.07 (0.80-1.44)	1.13 (0.85-1.52)	1.04 (0.78-1.40)
Other EU	3 681 (1.3)	45 (1.2)	0.96 (0.73-1.24)	1.10 (0.84-1.44)	1.02 (0.78-1.34)
Rest of the world	4 882 (1.8)	53 (1.1)	1.34 (1.28-1.40)	1.34 (1.28-1.40)	1.22 (1.16-1.27)

Model 1: adjusted for sex, educational level, family situation, residential area, and unemployment status Model 2: like Model 1 and additionally adjusted for healthcare variables (diagnosis-specific in- and specialised outpatient healthcare)
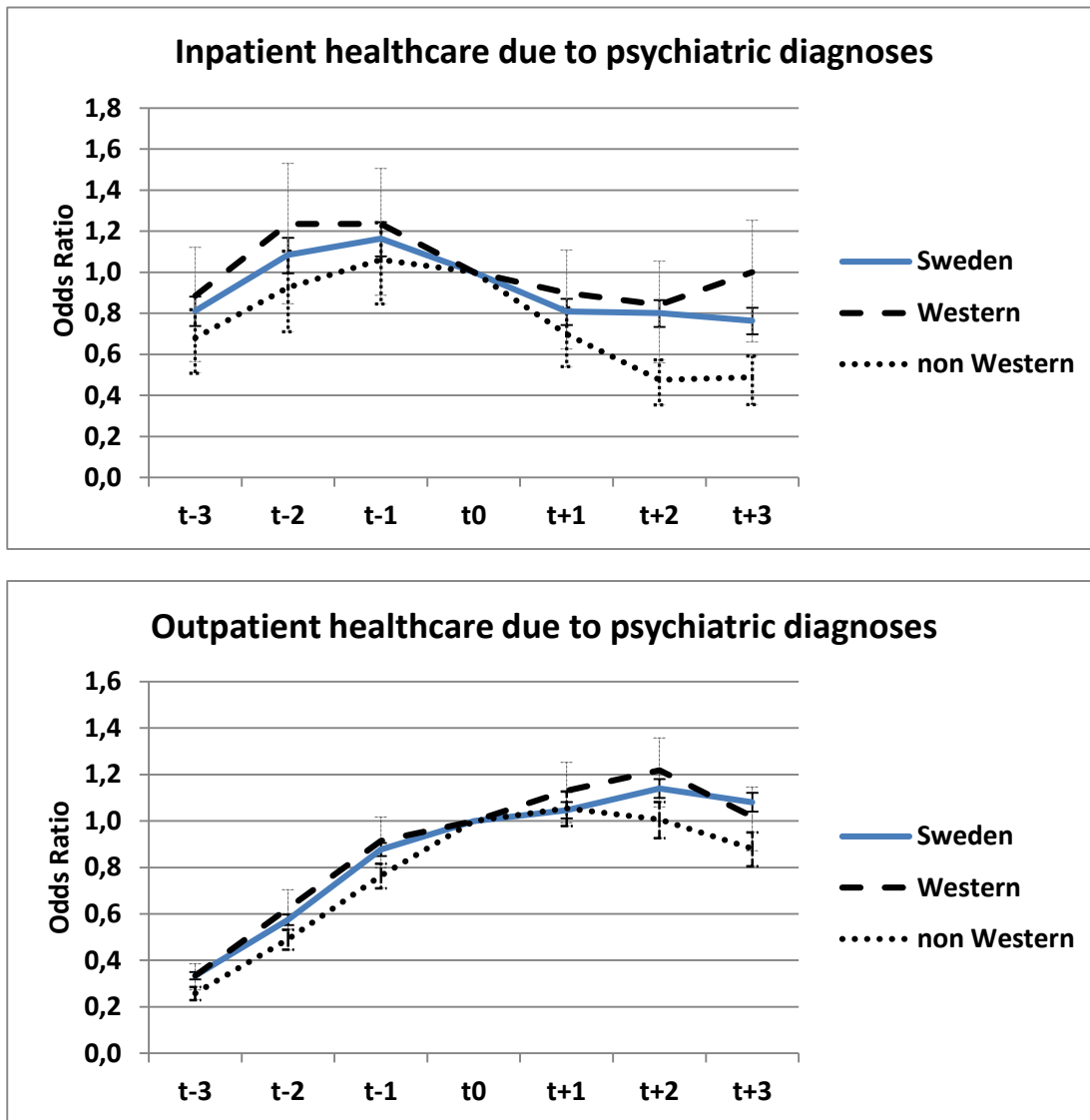
4.2 STUDY II

During the 4-year observation (2005–06 and 2009–10) a total of 28 354 individuals were granted DP due to CMD. Of those, the majority (78.1%) were born in Sweden, 6.7% were born in other Western countries and 15.2% in non-Western countries. The main DP diagnosis was depressive disorder for almost half of them (46.8%), followed by stress-related disorders (29.0%) and anxiety disorders (24.2%). Natives in comparison to non-Western immigrants, were more likely to be women (70.5% vs. 55.3%), to be young (8.4% in the 19– 29 group vs. 3.7%) and to have a college or university education (31.0% vs. 23.3%). The prevalence rates of Western immigrants were generally in between those of natives and non-Western immigrants.

When the two cohorts were combined, specialised healthcare due to psychiatric diagnoses increased before the year of granted DP (t0). The inpatient care utilization showed a decrease after t0 while outpatient psychiatric healthcare remained stable. The outpatient psychiatric healthcare utilization in natives and Western was somewhat lower compared to the group of non-Western countries (t–1: 22.9%, 21.2%, and 25.2%, respectively). In cohort 2, prevalence rates were almost two times higher in comparison to cohort 1 in both outpatient and inpatient healthcare (t–1 natives: 46.5%, Western 40.8%, non-Western 49.2%; t–1 natives 8.4%, Western 7.7%, non-Western 5.8%), respectively.

During the follow-up, the ORs of psychiatric inpatient care among natives increased from 0.81 (CI: 0.74–0.88)–1.16 (CI 1.08–1.25) (t–3 to t–1) and thereafter decreased to 0.76 (CI 0.70–0.83) at t + 3 (figure 1). Comparable pattern was found among immigrants, but with somewhat higher ORs in Western immigrants [increased from 0.88 (CI 0.65–1.20)–1.23 (CI 0.96–1.58) and decreased to 1.01 (CI 0.76–1.34) at t + 3] and lower ORs in non-Western immigrants [increased from 0.68 (CI 0.54–0.85)–1.06 (CI 0.88–1.27) and decreased to 0.48 (CI 0.38–0.62) at t + 3]. The decrease in inpatient healthcare due to psychiatric diagnoses after t0 among the non-Western immigrants was much steeper than in natives and Western immigrants. In all the three groups, the OR of outpatient psychiatric healthcare was lower in the year before DP and higher thereafter. However, the non-Western immigrants had a steeper increase up until t0 and showed a stabilization with a further decrease following 3 years after granted DP [OR 0.25 (CI 0.23–0.28), OR 1.05 (CI 0.98–1.13) and OR 0.88 (CI 0.81–0.95) at t– 3, t + 1 and t + 3, respectively].

Patterns of specialised outpatient care due to psychiatric diagnoses were similar in cohort 1 (before 2008, year of the regulatory change) as in both cohorts combined, with an increase up until 2 years after granted DP both in natives and immigrants. Different patterns were found in cohort 2 (after 2008). A strong reduction after t0, stronger in non-Western immigrants in comparison to natives, was found (data not shown).

Figure 1. Odds ratios and 95% confidence intervals of healthcare use due to psychiatric diagnoses at different time points.

DP granting year (t0) before and after being granted DP due to CMDs in the total sample (both cohorts, granted DP in year 2005, 2006, 2009 or 2010, n = 28 354,) for natives and for immigrants born in Western countries or in non-Western Countries, respectively Adjusted for sex, age, educational level, type of living area, family situation and DP diagnoses. Error bars indicate 95% CIs. t–3: 3 years before DP, t–2: 2 years before DP, t–1: 1 years before DP, t–0: year of DP grant, t + 1: 1 years after DP, t + 2: 2 years after DP, t + 3: 3 years after DP.

4.3 STUDY III

The study population comprised a total of 28 971 young adults, 25 033 (86.4%) born in Sweden, 1 645 (5.7%) Western and 2 293 (7.9%) non-Western immigrants. Compared to natives, non-Western immigrants were, more likely to be older (60.8% vs. 51.6% in the category 25-30 years, respectively), and to have elementary education (38.4% vs. 23.3%) and to live in big cities (54.3% vs 37.9%). Compared to natives, non-Western immigrants had a higher proportion of long-term unemployment at baseline (>180 days) (27.0% vs 22.7%) but similar level of previous long-term SA (9.1% vs 10.1%). The majority of immigrants, 77.5% among Western and 71.9% among non-Western had a duration of residence in Sweden >5 years.

Trajectory groups of SA/DP

Regarding SA/DP, we identified five trajectory groups, named: "Increasing high", "Fluctuating", "Increasing medium", "Increasing low", and "Constant low" (figure 2). The proportion of individuals following the "Constant low" trajectory group, with no or less than one month of SA/DP during the entire period of observation, was similar in natives (62.3%) Western (62.4%) and non-Western immigrants (63.7%). The proportion of "Increasing low" SA/DP trajectory groups was also comparable among Western (7.5%) in comparison to natives (9.4%) and non-Western immigrants (10.1%).

In the multivariate multinomial analysis, educational level and psychiatric comorbidity were significantly associated (p<0.001) with trajectory groups of SA/DP. Educational level was of higher importance of discriminating between trajectory groups among natives (difference in Nagelkerke R2 0.047) than Western (R2 0.041) and non-Western immigrants (R2 0.027). Psychiatric comorbidity had a higher importance in explaining differences in trajectory groups among immigrants (non-Western: R2 0.062 and Western: R2 0.041),in comparison to natives (R2 0.033). Among immigrants, a duration of residence >5 years in Sweden had a significant association with higher levels of SA/DP and the association showed a greater relevance among non-Western (R2 0.047) in comparison Western immigrants (R2 0.019).

Trajectory groups of unemployment

Five trajectory groups of unemployment, were identified and labelled: "Constant high", "Decreasing", "Fluctuating", "Increasing medium", and "Constant low". Non-Western immigrants had the lowest proportion in the trajectory group of "Constant low" unemployment (30.1%) (figure 3). Moreover, there was a higher proportion of non-Western immigrants in the trajectory group of "Constant/Increasing high" unemployment (20.5%) than natives (16.5%) and Western immigrants (15.0%). In this group, non-Western immigrants on average also had about 3.5 months of unemployment after 6 years of a CMD diagnosis (t6), one month more than natives (2.5 months on average) (figure 3).

Educational level was significantly (p<0.001) associated with unemployment, with a similar importance among both Western and non-Western immigrants (R2 0.032 and 0.028, respectively) and somewhat lower among natives (R2 0.023). An association between a duration of residence >5 years in Sweden and trajectories of unemployment was found among non-Western immigrants.

Figure 2. Groups-based trajectories models of net months of sickness absence/disability pension among natives, Western, and non-Western immigrants, respectively, with an incident common mental disorder in 2007 (t0). The dotted lines represent 95% confidence intervals.
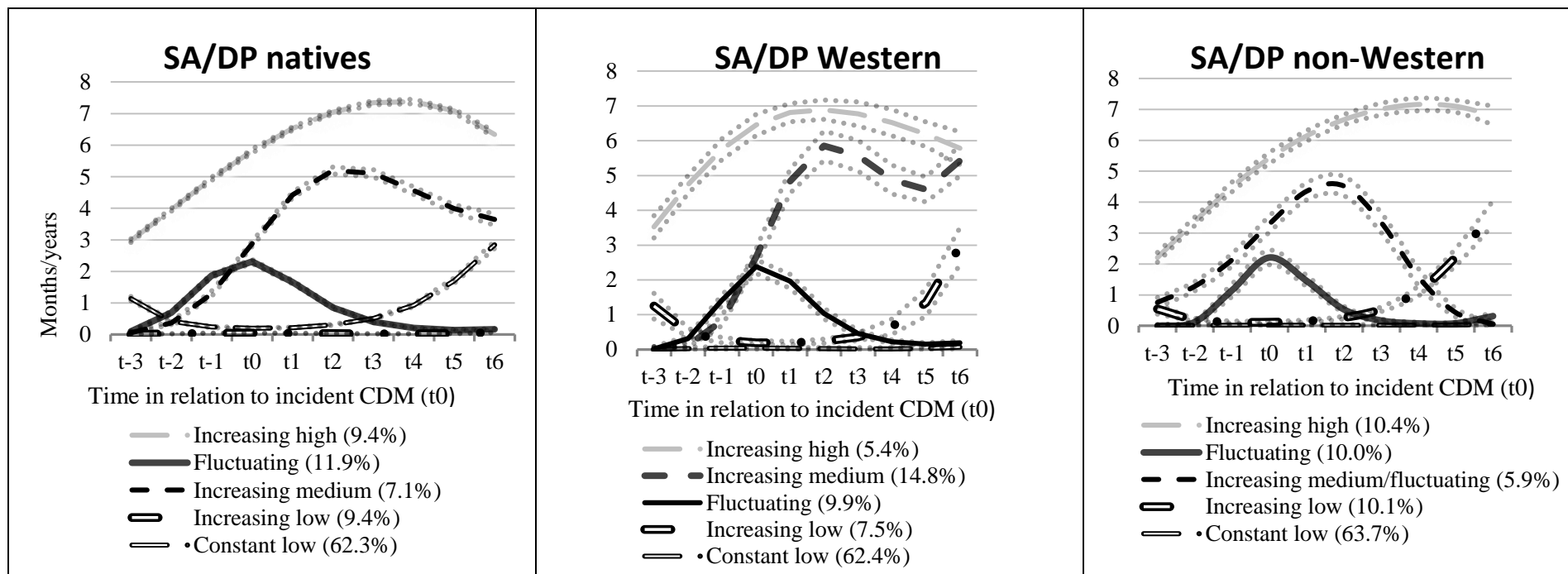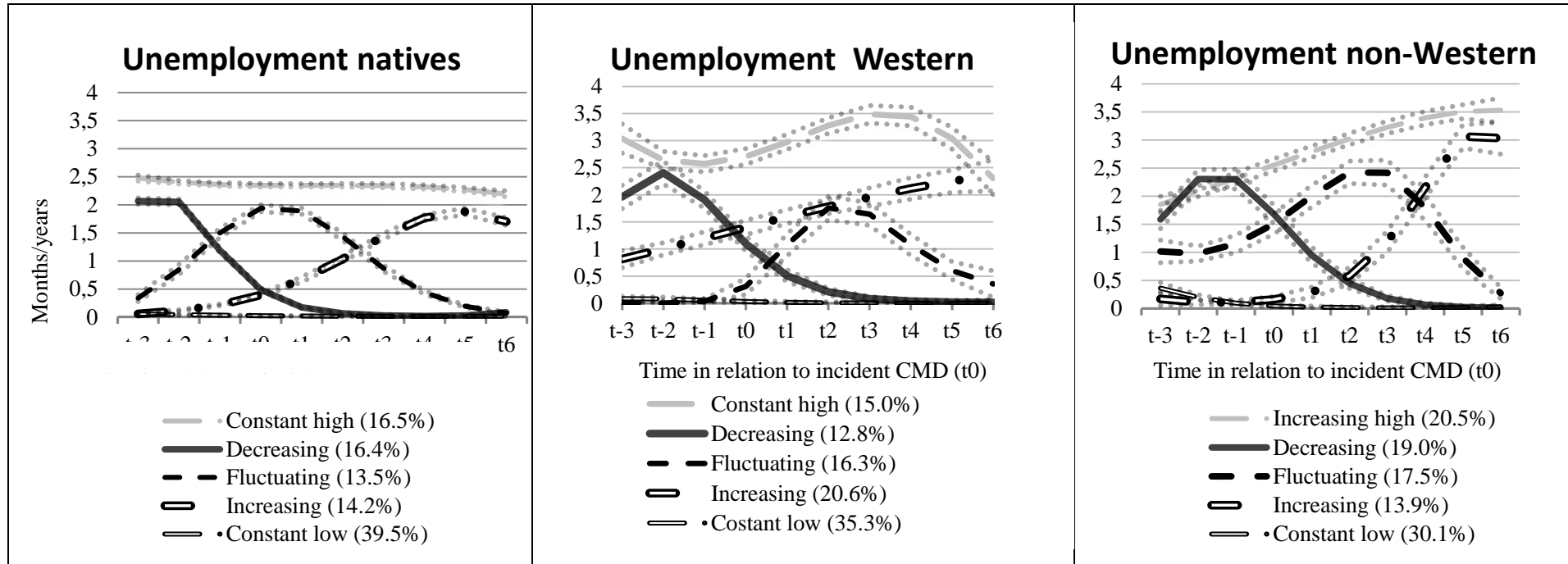
Figure 3. Groups-based trajectories models of net months of unemployment among natives, Western, and non-Western immigrants, respectively, with an incident common mental disorder in 2007 (t0). The dotted lines represent 95% Confidence intervals.

4.4 STUDY IV

In all the three groups (i.e. native Swedes, refugees and non-refugee immigrants) there was a higher proportion of women, particularly in natives (64.6%). Natives showed a higher proportion of young individuals (45.9% in the 19-24 years' group) in comparison to refugees (38.4%) and non-refugee immigrants (34.5%). Refugees had more often a low educational level (32.7%) compared to non-refugee immigrants (28.0%) and natives (21%). More non-refugee immigrants (59.9%) had a duration of residence >10 years compared to refugees (36.3%), whereas refugees were more often young (0-16 years) when arriving in Sweden compared to non-refugee immigrants (65.9% vs 42.2%, respectively).

In this study on young adults with common mental disorders, the risk of long term unemployment among refugees and non-refugee immigrants was higher in comparison to native Swedes and generally higher among refugees, especially from Somalia, Afghanistan, Syria and Iraq (table 7). According to region of birth, the risk estimates of unemployment were two times higher for refugees from Africa, Asia and Europe outside EU-25 (HR adjusted: 2.39 and HR: 2.16 and HR: 1.61, respectively). According to the country of birth, the highest risk estimates for unemployment were observed in refugees from Afghanistan (HR: 2.65), Somalia (HR: 2.49), Syria (HR: 2.58) and Iraq (HR: 2.36). Hazard ratios among non-refugee immigrants were similar to refugees, but lower. All the estimates in the multivariate analyses were statistically significant.

Regarding SA, being a refugee from Africa or Asia was associated with a lower risk in comparison to natives (HR adjusted: 0.60 and 0.72 in the multivariate analyses, respectively). According to the country of birth, the estimates were significant for refugees from Afghanistan (HR: 0.35) and Iraq (HR: 0.39), and for non-refugee immigrants from Afghanistan (HR: 0.48) and Iraq (HR: 0.58). The risk of DP was lower for refugees from Asia (HR: 0.50) and for non-refugee immigrants from Africa (HR: 0.24) and Asia (HR: 0.54) in comparison to natives.

Table 7: Crude and multivariate hazard ratios (HRs) with 95% confidence intervals (CIs) for long-term unemployment, long-term sickness absence and disability pension during 2010-2013 among 19-30 years old refugees and non-refugee immigrants (according to region and country of birth), with a common mental disorder (diagnosis and/or prescription of antidepressant) during 2009 compared with 19-30-year old natives in Sweden.

	Unemployment		Sickness Absence		Disability Pension	
	Crude HR (95% CI)	Adjusted[a] HR (95% CI(	Crude HR (95% CI)	Adjusted[a] HR (95% CI)	Crude HR (95% CI)	Adjusted[a] HR (95% CI)
Natives[b]	1	1	1	1	1	1
Refugees[c]						
Africa	**3.72 (2.97-4.66)**	**2.39 (1.91-3.05)**	**0.55 (0.33-0.89)**	**0.60 (0.36-0.98)**	0.90 (0.48-1.68)	0.60 (0.32-1.11)
Somalia	**4.09 (3.03-5.59)**	**2.49 (1.80-3.40)**	0.58 (0.29-1.16)	0.60 (0.30-1.20)	1.13 (0.51-2.53)	0.65 (0.28-1.41)
Asia	**3.12 (2.85-3.42)**	**2.16 (1.96-2.36)**	**0.68 (0.58-0.81)**	**0.72 (0.61-0.85)**	**0.70 (0.54-0.91)**	**0.50 (0.38-0.65)**
Afghanistan	**3.91 (2.93-5.21)**	**2.65 (1.98-3.53)**	**0.29 (0.12-0.71)**	**0.35 (0.14-0.84)**	0.63 (0.23-1.33)	0.37 (0.14-1.01)
Iraq	**4.12 (3.62-4.69)**	**2.36 (2.06-2.68)**	**0.37 (0.26-0.54)**	**0.39 (0.26-0.53)**	0.81 (0.54-1.20)	**0.47 (0.31-0.69)**
Iran	**2.06 (1.66-2.54)**	**1.82 (1.46-2.24)**	0.97 (0.74-1.27)	1.08 (0.76-1.34)	**0.43 (0.22-0.83)**	**0.45 (0.23-0.87)**
Syria	**4.01 (2.83-5.66)**	**2.58 (2.20-4.42)**	1.16 (0.63-1.96)	0.97 (0.50-1.75)	0.71 (0.23-2.22)	0.54 (0.17-1.68)
Europe outside EU25	**1.99 (1.75-2.27)**	**1.61 (1.42-2.01)**	1.02 (0.86-1.19)	0.99 (0.86-1.19)	**0.70 (0.54-0.91)**	0.78 (0.59-1.01)
F. Jugoslavia	**1.93 (1.68-2.21)**	**1.56 (1.35-1.78)**	1.02 (0.86-1.21)	0.98 (0.81-1.14)	0.98 (0.74-1.29)	0.79 (0.60-1.04)
South America	**1.67 (1.13-2.48)**	1.36 (0.91-2.01)	1.16 (0.77-1.78)	1.15 (0.77-1.83)	0.27 (0.69-1.10)	0.26 (0.07-1.06)
Chile	1.58 (0.96-2.58)	1.20 (0.73-1.96)	1.41 (0.90-2.21)	1.35 (0.86-2.12)	0.56 (0.18-1.74)	0.49 (0.12-1.93)
Non-refugee immigrants[d]						
Africa	**3.04 (2.49-3.71)**	**2.13 (1.74-2.59)**	0.72 (0.50-1.02)	**0.72 (0.50-1.02)**	**0.36 (0.16-0.80)**	**0.24 (0.10-0.54)**
Somalia	**3.76 (2.67-5.30)**	**2.38 (1.68-3.35)**	0.49 (0.22-1.09)	0.52 (0.22-1.16)	0.42 (0.10-1.71)	**0.20 (0.52-0.83)**
Asia	**2.71 (2.47-2.96)**	**2.01 (1.82-2.18)**	**0.70 (0.60-0.81)**	**0.68 (0.60-0.81)**	**0.73 (0.57-0.93)**	**0.54 (0.42-0.68)**
Afghanistan	**2.09 (1.39-3.15)**	1.36 (0.90-2.05)	**0.49 (0.23-0.64)**	0.48 (0.22-1.01)	**0.18 (0.26-0.89)**	0.12 (0.18-0.89)
Iraq	**3.48 (2.99-4.05)**	**2.29 (1.96-2.67)**	**0.63 (0.47-0.86)**	**0.58 (0.41-0.75)**	0.79 (0.51-1.22)	**0.44 (0.28-0.68)**
Iran	**2.70 (2.19-3.30)**	**2.20 (1.77-2.70)**	0.71 (0.50-1.01)	**0.72 (0.50-1.02)**	0.77 (0.45-1.33)	0.70 (0.39-1.21)
Syria	**3.52 (2.44-5.07)**	**2.19 (1.50-3.13)**	0.92 (0.49-1.71)	0.80 (0.40-1.40)	0.95 (0.35-2.53)	0.67 (0.24-1.81)
Europe outside EU25	**2.49 (2.11-2.94)**	**2.02 (1.82-2.19)**	1.01 (0.80-1.27)	0.95 (0.75-1.19)	0.79 (0.52 1.20)	0.70 (046 2-1.05)
F.Jugoslavia	**2.72 (2.23-3.33)**	**1.94 (1.58-2.36)**	1.13 (0.86-1.48)	0.95 (0.71-1.22)	0.93 (0.58-1.50)	0.83 (0.51-1.34)
South America	**2.09 (1.64-2.66)**	**1.99 (1.56-2.54)**	0.73 (0.50-1.05)	0.76 (0.53-1.10)	1.10 (0.68-1.77)	0.98 (0.61-1.59)
Chile	**2.85 (1.99-4.08)**	**2.43 (1.73-3.55)**	0.64 (0.33-1.24)	0.61 (0.31-1.20)	0.41 (0.10-1.64)	0.53 (0.17-1.68)

[a] Adjusted for age, sex, educational level, family situation, type of living area, labour market attachment in 2009 and in and specialised out-patient healthcare due to somatic disorders during 2009 [b.] Native Swedes is the reference group. [c] Refugee status: immigrants with reason of settlement as, refugee, humanitarian reasons, need of protection. [d] Immigrant with reason of settlement due to labour, study, family reunification

42

Duration of residence and age at arrival

In refugees from Africa and Asia, a duration of residence in Sweden ≥10 years was associated with a lower risk of unemployment, in comparison to the refugees of the same continent with a duration of residence less than 10 years. In the same groups, the risk of SA was higher in non-refugee immigrants from Africa and Asia in comparison to non-refugee immigrants from the same region of birth with a duration of residence less than 10 years. Refugees and non-refugee immigrants from Asia with a duration of residence of 10 years or more showed also a higher risk of DP (HR: 1.87 and 1.83, respectively) in comparison to their counterparts with less than 10 years. Regarding unemployment, refugees had a lower risk when the age at arrival in Sweden was 16 years or less and if from Africa, (HR: 0.50) and Asia (HR: 0.66) compared to refugees from the same regions of birth with an age at arrival >16 years. With regard to sickness absence, non-refugee immigrants from Asia and Africa arriving at 16 years of age or earlier showed lower risk estimates in comparison to those with the same region of birth whose age at arrival in Sweden was greater than 16 years. No significant association was found for DP and age at arrival of refugees and non-refugee immigrants.

5 DISCUSSION

5.1 MAIN FINDINGS

Generally, a higher risk of LMM was found among immigrants in comparison to natives in terms of unemployment. A higher risk of DP was found among immigrants in comparison to natives in the general population but not in young adults with CMDs. Immigrants, particularly from non-Western countries, showed different levels of psychiatric healthcare utilization before and after granting DP due to CMDs.

In study I, the risk of DP was higher in first but also in second/intermediate and second generation immigrants in comparison to natives. These associations were still present after the adjustment for socio-demographics, unemployment, and morbidity factors. When age is taken in consideration, in the first generation immigrants, HRs were higher in the older age group compared to natives, and were slightly higher in the younger age group as well. Opposite age patterns were found for the second and second/intermediate generation. In the first generation immigrants from "European countries outside EU25 and the Former Soviet Union" and from the "rest of the world" showed highest HRs in comparison to natives. Instead, in the second generation immigrants from Nordic countries and from EU25+ showed highest risk of subsequent DP than natives.

In study II, before granted DP due to CMDs, an increase in the psychiatric inpatient healthcare was observed and a decrease in the years afterwards. Non-Western immigrants showed lower rates of psychiatric inpatient care before and after DP in comparison to natives. For specialised psychiatric outpatient healthcare, prevalence rates tended to be higher among non-Western immigrants than natives. Regarding inpatient psychiatric healthcare non-Western immigrants showed a stronger decrease after DP granting in in comparison to the native population and Western immigrants. Patterns of specialised outpatient care among individuals granted DP after the change in legislation (2008), were similar in immigrants and natives, showing in a similar way a strong reduction after DP granting.

In study III, no differences were found in trajectories of LMM in terms of SA/DP among natives, Western, and non-Western immigrants three years before and six years after an incident CMD diagnosis/treatment. However, differences were found with regard to LMM in terms of unemployment. Non-western immigrants were to a higher degree represented in the "Constant/Increasing high" trajectory group, with one month higher unemployment level at six years after diagnosis/treatment in comparison to natives. Psychiatric comorbidity, educational level, and immigrants' duration of residence in Sweden were relevant factors in discriminating between the differences of trajectories in SA/DP. Regarding differences between trajectory groups of unemployment the factors relevant were educational level and immigrants' duration of residence (only for non-Western immigrants).

In the last study, in young adults with CMD, the risk of unemployment among refugees and non-refugee immigrants was higher in comparison to native Swedes and generally higher among refugees, especially from Somalia, Afghanistan, Syria, and Iraq. Refugees and non-refugee immigrants from Africa and Asia, who lived in Sweden for 10 years or more, showed a reduced risk to be unemployed in comparison to their respective counterparts who arrived less than 10 years ago. Regarding the age at arrival, those who immigrated when younger than 16 years had a lower risk of unemployment in comparison to those who arrived when older than 16 years. The risk of SA instead, was lower in refugees and non-refugee immigrants from Africa and Asia in comparison to natives. There was also a higher risk of SA in those with a duration of residence ≥10 years and a lower risk in those who arrived in Sweden after 16 years of age.

5.2 DISCUSSION OF THE RESULTS

Study I and II: Risk of Disability Pension in the general population and psychiatric healthcare utilization in individuals with DP due to CMD

First generation immigrants showed a higher risk of subsequent granting of DP in comparison to natives, accordingly with findings from previous studies carried out in Sweden and Norway (125, 126). We could now also show that this excess risk is regardless of DP diagnosis (somatic or mental). A Swedish study showed that the risk of granting DP was very low among recently arrived immigrants, but the rate raised continuously by year since immigration (126). Young first generation immigrants can have difficulties in being granted DP and, after years in Sweden and with more familiarity with system, difficulties disappear.

First generation immigrants born in "European countries outside EU25 and Former Soviet Union" and in "the rest of the world" showed the highest rates of DP. A previous study showed higher rates of DP among immigrants from these regions (126).In these groups, higher rates of diseases and lower access to healthcare and treatment than the native population were shown previously (145, 146). It is possible that these factors are associated with cultural differences leading to marginalisation and/or with pre-existing conditions, e.g., poor health and stressful life events. Different eligibility criteria based on the regulations of the social insurance system can result in divergent pathways to DP in immigrants and natives (133). Noteworthy, in Sweden DP can be granted without previous income from work. In contrast, to receive sickness absence benefits, usually preceding DP, it is necessary to have previous paid work or unemployment benefits (147). As immigrants have been reported to have higher risks of LMM, it is likely that transition to DP differs between immigrants and natives (14). The characteristics of the work can play a role in the risk of labour market marginalisation explaining differences between migrants and natives. Job insecurity an adverse psychosocial environment at work were reported more frequently among immigrants (148). Discrimination, both at the level of getting a job, establishment at the labour market, and at the work place can be important factors involved in differences between immigrants and natives (149). Finally, access to healthcare and adequate treatment play a crucial role in

preventing the disabling process resulting in DP (150). Adequate care, particularly in first generation immigrants might be hampered by language barriers and knowledge of the healthcare system (146). Finally, aspects of transcultural psychiatry have to be considered. Differences in the clinical manifestation and symptomatology of the underlying disease and consequently in its diagnostics and treatment, have been shown for immigrants compared to the native population (75). Moreover, competence in transcultural psychiatry and psychology in health care staff is often lacking in the host countries (75).

Compared to the native population, the second generation showed higher estimates of DP risk but lower in comparison to the estimates for the first generation. Several studies reported different rates between first generation and second generation immigrants with regard to several health issues, e.g. suicide, schizophrenia and coronary heart diseases (151-153). We could now also show these associations for DP. This finding suggests a lower risk to be marginalized at the labour market in the second generation in comparison to the first (83). A possible explanation is a higher level of integration in the society among individuals of the second generation in comparison to their parents (154). Educational investment in Sweden, such as Swedish language education for newly arrived immigrants, has been shown to have a positive effect on the individual outcomes on the labour market (14). In theory, second generation immigrants do not face the language barrier of their parents. Furthermore, the second/intermediate generation showed risk estimates more similar to natives, suggesting that having a Swedish native born parent is a protective factor mitigating the risk of DP, as already shown with regard to other health issues (151).

In the second generation, immigrants from the Nordic countries showed higher risk estimates than the native population and the risk was still present after adjustments. Immigration from the Nordic countries to Sweden is mostly from Finland (155). In previous studies, second generation immigrants from Finland showed higher rates than natives, in relation to e.g. suicide, mental disorders, or hospitalization rates due to diabetes (151-153). A study on Irish immigrants to England showed that fewer barriers and lower economical expenses for migration resulted in the absence of the "healthy migrant effect" (156). This explanatory model could possibly also be applied to the Finnish migration to Sweden.

Before granting DP (t–3 to t–1) an increase in the prevalence of psychiatric healthcare utilization both regarding inpatient and specialised outpatient healthcare and among immigrants and natives was showed. An increase in symptoms of depression and anxiety and of psychotropic drugs utilization- before granted DP, were found (157-161). In the year before being granted DP (t–1), 5.2%, 4.7% and 4.3% of the individuals born in Sweden, Western, or non-Western countries, respectively, had psychiatric inpatient healthcare. The same year (t–1) the prevalence rates of psychiatric outpatient healthcare ranged from 21.2% to 25.2%. Considering the permanent state of DP, the rates of people having had specialised healthcare can, nevertheless, be considered as low. This is of particular importance because the sick-leave guidelines recommend referral to psychiatric specialised healthcare if a sick-leave spell due to CMD lasts for longer than 6 months (162). These results are in line with

findings from a Finnish study reporting a sub-optimal quality of psychiatric healthcare before granted DP (130). In particular, compared to natives and Western immigrants, the rates of psychiatric inpatient care among non-Western immigrants were particularly low during the entire 7-year period and significantly lower in t+2 and t+3. Previous studies reported early treatment discontinuation among non-Western immigrants and a higher risk of suboptimal inpatient healthcare in comparison to natives (91, 163).

The lower rates of psychiatric inpatient healthcare among non-Western immigrants are of particular interest because of the poorer mental health and a higher risk of DP previously reported in this group (83, 126). Several explanations might be for such lower rates among non-Western immigrants. In this population, socio-cultural barriers to mental healthcare use, such as arising from cultural aspects and different values, seem to be more frequent among than structural obstacles such as lack of information or difficulties in accessing the healthcare (164, 165). A different perception of health needs, a greater degree of stigmatization of mental disorders and difficulties in medical communication were reported to be important aspects as well (165). Among Western immigrants we found rates of psychiatric healthcare utilization, which were more similar to natives. Possible explanations might be that immigrants from Western countries are more familiar with the Swedish mental healthcare system or a longer duration of stay in Sweden of this population.

The utilization of psychiatric inpatient healthcare declined after DP granting. Possible explanations might be the cessation of work demands, improvements of the symptomatology or a referral of the patient to the primary healthcare (117). Non-Western immigrants showed a stronger decrease. This finding can be interpreted by a stronger improvement in the mental health status after DP granting in this population than natives or by a higher risk of under-utilization of healthcare by non-Western immigrants.

After the introduction of stricter DP granting criteria (2008) the prevalence rates of psychiatric outpatient healthcare were generally higher. Possible explanation can be a higher severity in symptomatology among individuals granting DP after the changes of social insurance system (117, 147). In general, a strong reduction after granted DP was reported in the outpatient psychiatric healthcare in cohort 2, while it increased in cohort 1. This result was consistent with a previous Swedish study (117). In cohort 1 a possible explanation of the patterns can be a higher level of temporary DP with a lower medical severity in comparison to cohort 2. Patterns of immigrants and natives were very comparable with a stronger decrease after DP granting among non-Western immigrants. As already hypothesized for the decrease in the inpatient healthcare among non-Western immigrants, the greater decrease can be related to either an improvement of the symptomatology or to under-utilization of services.

Study III and IV: Young adults with CMD and LMM

Sickness absence and disability pension

There were rather small differences between natives and immigrants before and after a diagnosis of a CMD in trajectories of SA/DP. As already mentioned, previous studies reports higher rates of mental disorders among non-Western immigrants (83). For this reason, we anticipated higher levels of SA/DP in this population. Nevertheless, a previous study showed consistent results: lower level of SA/DP among immigrants compared to natives in patients with psychiatric disorders (97). In that study, previous labour market attachment explained part of the association. In fact, according to the Swedish regulations, it is possible to be granted SA only when having earlier income from work and DP is relatively rare in young individuals. It is possible that young immigrants are more likely to be without previous work experience compared to young Swedes, which partly explains the few differences between immigrants and natives reported (129, 133).

Psychiatric comorbidity was more relevant for discriminating trajectory groups of SA/DP among immigrants in comparison to natives. Explanations for this finding, particularly for non-Western immigrants, include barriers for seeking healthcare and cultural factors such as stigma, and thus also processes necessary to be granted SA/DP may be different for immigrants (88).For non-Western immigrants a duration of residence >5 years was important in relation to SA/DP trajectories. Previous research reported the relevance of the duration of residence in the new country among immigrants (12, 166). Duration of residence might reflect the years necessary for adapting to the host country for non-Western immigrants.

In young individuals with CMDs, a lower risk of SA among refugees and non-refugee immigrants from Africa and Asia but not from Europe outside EU-25 and South America in comparison to natives was found. The risk was particularly low in refugees from Afghanistan and Iraq. Moreover, a duration of residence longer than 10 years was on average associated with a two times higher risk of SA in refugees and non-refugee immigrants from Africa and Asia in comparison to their counterparts with less than 10 years. In these populations, age at arrival of 16 years or younger was associated with a higher risk of SA in comparison to arrival of older age groups. These data seem to suggest that with increasing time in the host country individuals from Africa and Asia become more confident with the Swedish system and/or assimilate with the culture to access the SA benefits. Moreover, with time these individuals are more likely to enter the labour market, which in turn is a prerequisite for receiving SA.

Regarding disability pension, we found a slightly lower risk in non-refugee immigrants from Asia and Africa and in some refugee groups compared to natives. This is in contrast to previous studies in the Nordic countries based on the entire population (125, 126). These discrepancies in findings are most likely due to the differences in study populations, i.e.,

general population versus young individuals with common mental disorders. Moreover, previous studies did not discriminate between refugees and non-refugee immigrants.

Unemployment

In study III and IV, we found a higher risk of unemployment among refugees and Western and non-Western non-refugee immigrants in comparison to native Swedes. Higher levels of unemployment among immigrants was already shown in two Swedish studies (14, 167). In young adults with common mental disorders, representing the selected cohort in our study, psychiatric disorders could play an additional role in the risk of unemployment. According to a previous study, refugees experience a lower psychiatric healthcare utilization and drug intake (13). These aspects may lead to negative health outcomes and consequently, affect the labour market participation (13). Other factors worth to be taken into consideration in differences between refugees and the native population are cultural aspects, i.e. stigma towards psychiatric disorders leading to a reduction in the access to psychiatric healthcare (168).

Refugees from all the countries considered showed a higher risk of unemployment compared to natives. It has been stated that refugees, in comparison to non-refugee immigrants, are not selected according to employment-related criteria, and their skills might not match local needs on the labour market (167). Moreover, the greater proportion of unskilled workers reported in refugees may contribute to the risk of marginalisation. Finally, pre-migration factors, like trauma and violence were reported to be common among refugees and can affect the ability to find and keep a job (47, 169).

According to the assimilation model, newly arrived immigrants can experience labour market marginalisation because of poor language proficiency and scarce knowledge of the culture of the host country (170). After several years, the level of employment in immigrants tends to converge with the native population (14). In our study a duration of residence longer than 10 years in non-refugee immigrants and refugees from Africa and Asia positively influenced the risk of unemployment, and age at arrival was a significant factor for most refugee groups. This is in line with previous studies, which reported that non-European immigrants, the most disadvantaged in entering the active labour market, needed more time to reach the level of employment of natives (14, 170). Moreover, the duration of residence has been shown to improve the healthcare utilization rate and psychoactive drugs intake, which in turn can have a positive effect on the health status and the ability to find a job (13).

Among non-Western immigrants but not among Western immigrants an association between duration of residence in Sweden for longer than 5 years and trajectory groups of unemployment was found. The result was consistent with previous findings, showing differences between employment rates among Western and non-Western immigrants (14). Western immigrants are represented mainly by immigrants from the Nordic countries and the

EU, with labour as reason of immigration. For this reason duration of residence may be less relevant.

5.3   DISCUSSION OF THE METHODS

The Swedish nationwide registers utilized in these four studies allowed longitudinal studies on the entire population in Sweden. Although large numbers increase the precision of the estimates it does not necessarily avoid the risk of statistical bias due, e.g., to systematic errors. Selection bias, information bias, and confounding are the main factors that can reduce the internal validity (171). External validity is the possibility to generalize the obtained results in other settings (171). These aspects are discussed below.

5.3.1   Internal and external validity

Selection bias refers to the fact when a sample, which is selected from a population, does not represent the population, meaning that selection of the sample is not adequately randomized (171). All four studies in this research project were based on nationwide register data, thus selection bias is very unlikely.

Information bias includes misclassification, which can occur in the case of exposure or outcome measurements (171). If the misclassification of exposure differs with regard to the outcome measure, then it is differential misclassification; whereas if such misclassification is not related to the outcome (random misclassification), then it is regarded as non-differential misclassification. A common way to introduce a differential misclassification is via recall bias, which should not be an issue in this project as all the studies are based on high quality nationwide Swedish registers (141, 172). In this thesis, information of sickness absence (SA) spells longer than 15 days was not available for employed individuals, because information from the Social Insurance Agency is only from day 15 and onwards. However, sick-leave spells due to CMDs are usually longer than 15 days, thus the risk of information bias is relatively small (173).

In study I and II, information on DP diagnoses was used. The validity of DP diagnoses must be discussed, although it has not been studied. The long process of medical assessment behind granting DP might, however, assure a good validity. In 1991, Ljungdahl et al. showed a high validity of SA diagnoses in comparison to diagnoses reported in medical files (174).

In study III and IV, individuals with CMD formed the study population. The definition of common mental disorders was made with information from in- and specialised outpatient care, but not from primary health care. In order to avoid a potential bias towards more severe morbidity in specialised health care, especially considering differences regarding immigrants´´ health care utilization, we added information on prescription of antidepressants.

A confounding factor is associated with the exposure and the outcome and must not be an intermediate step in the causal path between the exposure and the outcome (171). Considering the confounders while calculating the estimates for the association between exposure and outcome will lead to more accuracy. A wide range of potential confounders

including socio-demographic and medical factors were taken into account in all four conducted studies. Socio-demographics included age, sex, educational level, type of living area and family situation. Still, residual confounding is not unlikely. Data about specialised outpatient healthcare and inpatient healthcare were utilized, data from primary healthcare was not available. This means that it was not possible to control for the visits to primary healthcare thus missing a part of the picture of the morbidity. Additionally, data on health behaviour such as smoking, alcohol consumption, or work-related factors as well as type of occupation as potential confounders were not available. Educational level, as proxy of socio-economic position, was used as a confounder in all the papers (52). Several issues were already mentioned when considering education among immigrants, such as: comparability of different education systems, different effects of lack of education among immigrants and natives and over-education (52). Moreover, a higher proportion of missing values in the measure of education was reported among immigrants, especially in refugees (175).

External validity is the process of generalization, to which extent the results obtained from a study can be extended to another group (171). Studies in this thesis included the general population in Sweden (study I), individuals with incident DP due to CMD (II) or individuals with CMD (study III and IV). Other comparisons with specific settings, e.g., other countries, can only be made while considering similarities and differences in terms of social and healthcare systems. Currently, the other Nordic countries have the most similar composition regarding demography as well as social welfare and healthcare systems.

5.4 CONCLUSIONS

- In study I, in comparison to native Swedes, the future risk of DP regardless of diagnosis was higher in first, but also in second/intermediate and second generation immigrants. Immigrants from "European countries outside EU25 and the Former Soviet Union" and from the "rest of the world" showed highest HRs in the first generation. On the contrary, immigrants from the Nordic countries and from EU25+ showed highest risk of subsequent DP in the second generation, compared to natives.

- In study II, we observed an increase in the inpatient healthcare due to psychiatric diagnoses in the years before granted DP due to CMDs and a decrease in the years afterwards. Immigrants from non-Western countries showed lower rates of inpatient care before and after DP compared to natives.

- For specialised outpatient healthcare due to psychiatric diagnoses, prevalence rates of individuals with DP due to CMD tended to be higher among immigrants from non-Western countries than among natives. Patterns of psychiatric healthcare utilization after DP were comparable with one exception: non-Western immigrants had a stronger decrease after DP granting in inpatient psychiatric healthcare than natives and immigrants from Western countries.

- Patterns of specialised outpatient care due to psychiatric diagnoses of cohort 2, granted DP due to CMDs after the change in legislation in 2008, were similar in immigrants and natives, showing a strong reduction after DP granting.

- In study III, similar trajectories of LMM in terms of SA/DP among a young population of natives, Western, and non-Western immigrants in the period of three years before and six years after an incident CMD diagnosis/treatment were observed.

- However, differences were found with regard to LMM in terms of unemployment, with a higher percentage of natives represented in the trajectory group with constant low levels in comparison to immigrants. Immigrants from non-Western countries were to a higher degree represented in the "Constant/Increasing high" trajectory group, with a one month higher unemployment level at six years after diagnosis/treatment in comparison to natives (3.5 months yearly for non-Western immigrants and 2.5 for natives).

- Psychiatric comorbidity, educational level, and immigrants' duration of residence in Sweden showed relevance in discriminating between trajectories of SA/DP, whereas only educational level and immigrants' duration of residence (only for non-Western immigrants) were relevant regarding differences between trajectory groups of unemployment.

- In study IV, in young adults with common mental disorders, the risk of unemployment among refugees and non-refugee immigrants was higher in comparison to native Swedes and generally higher among refugees, especially from Somalia, Afghanistan, Syria and Iraq.

- Refugees and non-refugee immigrants from Africa and Asia, who lived in Sweden for 10 years or more, showed a reduced risk to be unemployed in comparison to their respective counterparts who arrived less than 10 years ago. Regarding the age at arrival, those who immigrated when younger than 16 years of age had a lower risk of unemployment in comparison to those who arrived when older than 16 years.

- The risk of sickness absence, instead, was lower for refugees and non-refugee immigrants from Africa and Asia in comparison to natives. There was also a higher risk of SA for those with a duration of residence ≥10 years and a lower risk in those who arrived in Sweden after the age of 16 years.

5.5 FUTURE RESEARCH

Only few studies so far have focused on immigrants or refugees and labour market marginalisation in terms of unemployment, sickness absence and disability pension. In this project we focused on common mental disorders. Future studies considering depression or anxiety or stress-related disorders separately can give more information on the patterns related to the specific diagnosis. In this thesis we could not include information on the primary healthcare utilization and psychotherapy. Information on these aspects are required to better understand patterns regarding the full range of healthcare utilization and treatment among immigrants and natives.

This project showed differences between non-Western and Western immigrants and between refugees and non-refugee immigrants, reflecting the heterogeneity of these populations. More studies with a clear distinction between the reason of immigration and particularly on refugees, which seems the most vulnerable population, are needed. By gaining knowledge on these differences, it will be possible to provide public health intervention tailored to specific groups of immigrants.

Register data allowed us to take a number of different factors into account. Future research should also include important aspects such as work environment, self-rated health, alcohol consumption and other factors, in order to better highlight the risk of labour market marginalisation among immigrants. Follow-up studies to evaluate return to work after sickness absence due to common mental disorders in immigrants are also needed.

In a more general way, at the moment research on immigrants is mostly reporting differences between immigrants and the native population in the studied host country. Future research with inter-country comparisons, i.e. focusing on the same immigrant population emigrated to different countries could give information on how different social and healthcare systems deal with immigrants' needs. Furthermore, studies using a long-term life-course perspective, able to follow from the pre-migration conditions to post-migration could add more knowledge on the importance of factors related to the time before entering the host country. In the next years, second generation immigrants will become the predominant part of the immigrant population in many OECD countries. Specific studies on factors affecting mental health and labour market integration in this population, may help to design culturally sensitive intervention programs and hereby improve the integration in the society.

6 ACKNOWLEDGEMENTS

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