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**MENTAL AND PHYSICAL HEALTH
AMONG FIRST-GENERATION AND
SECOND-GENERATION IMMIGRANTS
IN SWEDEN**

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ABSTRACT

Background Migration implies profound psychosocial and socioeconomic changes. Previous studies demonstrate an increased risk of poor health, including mental disorders, among some immigrant groups. First- and second-generation immigrants in Sweden are about one fifth of the total population, which calls for further research on the association between country of birth and health in this large population group.

Objective To examine whether second-generation immigrants have a higher risk of being hospitalized for mental disorders than the Swedish majority population after adjustment for socioeconomic status (study 1). To study whether the increased risk of being hospitalized for psychotic disorders among certain immigrant groups is present among second-generation immigrants and whether having one parent born in Sweden has a protective effect on this risk (study 2). To examine whether the increased risk of being hospitalized for alcohol and drug abuse among certain immigrant groups is present among second-generation immigrants and whether having one parent born in Sweden has a protective effect on this risk (study 3). To examine the association between acculturation (age at migration), and self-rated health among young immigrants (study 4). To examine whether the increased risk of hospitalization for mental disorders that exists among some immigrant groups in Sweden persists in the next generation and whether it varies based on the sex of the second-generation immigrant or of the immigrant parent (study 5).

Methods 1.9 million Swedish-born women and men aged 16–34 were followed from 1 January 1995 to 31 December 1998 for first hospital admissions for mental disorders, categorized in four main diagnosis groups. Second-generation immigrants were classed in four groups and the Swedish majority population used as reference group (study 1). In total 2.2 million individuals aged 20–39 years were followed from 1 January 1992 to 31 December 1999 for first hospital admission for schizophrenia and other psychoses (study 2) or alcohol abuse and drug abuse (study 3). Cox proportional hazard models were used to estimate hazard ratios (studies 1, 2 and 3). The random samples of 7,137 women and 7,415 men aged 16–34 years were obtained from the Swedish Annual Level of Living Survey during the period 1992–1999. Logistic regression was used to estimate odds ratios for self-rated health, after accounting for age, sex, father's socioeconomic status and social networks (study 4). All hospital diagnoses of mental disorders in first- and second-generation immigrants in Sweden between 1 January 1987 and 31 December 2001 were included. Standardized Incidence Ratios (SIRs) were used in the analysis (study 5).

Results Second-generation immigrants with one parent born in Sweden and second-generation Finns had higher risks of being hospitalized for psychotic, affective, neurotic, and personality disorders than the Swedish majority population. All results remained significant after adjustment for socioeconomic status (study 1). The highest risks of psychotic disorders were found among first- and second-generation Finns, after adjustment for socioeconomic status. Having one parent born in Sweden had no protective effect on the risk of being hospitalized for psychotic disorders among second-generation immigrants (study 2). The highest risks of alcohol abuse and drug abuse were found among first- and second-generation Finns, after adjustment for socioeconomic status (study 3). The risk of poor self-rated health increased with increasing age at migration to Sweden among first-generation immigrants (study 4). Several first-generation immigrant groups had increased risks of hospitalization for mental disorders. These risks persisted in some second-generation immigrant groups regardless of the sex of the second-generation immigrant or the immigrant parent or parents. Other second-generation immigrant groups evinced partial persistence of increased risk by sex or the appearance of new increased risk in the second generation (study 5).

Conclusions The disabling symptoms of severe mental disorders, leading to hospitalization, call for increased awareness among clinicians and public health planners involved in the treatment and prevention of mental disorders, especially among certain immigrant groups. This awareness should also include alcohol and drug abuse. Immigrants who arrive in Sweden at higher ages might need special attention as they are more likely to suffer from poor self-rated health, a valid health status indicator that can be used in population health monitoring.

To Astrid, Theo, and Leonor

LIST OF PUBLICATIONS

- 1 Teresa Saraiva Leão, Jan Sundquist, Leena-Maria Johansson, Sven-Erik Johansson, Kristina Sundquist. Incidence of mental disorders in second-generation immigrants in Sweden: a four-year follow-up study. *Ethnicity and Health*. 2005 Aug;10(3):243–56.
- 2 Teresa Saraiva Leão, Jan Sundquist, Gölin Frank, Leena-Maria Johansson, Sven-Erik Johansson, Kristina Sundquist. Incidence of schizophrenia or other psychoses in first- and second-generation immigrants: a national cohort study. *Journal of Nervous and Mental Disease* 2006 Jan; 194(1):27–33.
- 3 Teresa Saraiva Leão, Leena-Maria Johansson, Kristina Sundquist. Hospitalization due to alcohol and drug abuse in first- and second-generation immigrants: a follow-up study in Sweden. *Subst Use Misuse*. 2006;41(3):283–96.
- 4 Teresa Saraiva Leão, Kristina Sundquist. The influence of age at migration on self-rated health among Swedish immigrants. (submitted)
- 5 Kristina Sundquist, Teresa Saraiva Leão, Xinjun Li. Hospital admissions for mental disorders in first- and second-generation immigrants in Sweden: a population-based study. (submitted)

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CONTENTS

Introduction	1
Migration	1
Socioeconomic status	2
Ethnicity and country of birth	2
Definitions of health	3
Migration and mental disorders	3
Acculturation	4
Aims	6
General aim	6
Specific aims	6
Materials	8
MigMed Database	8
SALLS	8
Multigeneration Register	9
Methods	10
Study 1	10
Study 2	12
Study 3	14
Study 4	16
Study 5	17
Ethics	19
Results	20
Study 1	20
Study 2	23
Study 3	25
Study 4	27
Study 5	30
Discussion	37
Main findings	37
Previous studies	37
Possible pathways	39
The Finns in Sweden	44
Strengths and limitations	44
Conclusions	46
Summary in Swedish	48
Acknowledgements	51
References	52
Study 1	67
Study 2	81
Study 3	89
Study 4	103
Study 5	119

LIST OF ABBREVIATIONS

CI	Confidence Interval
HR	Hazard Ratio
ICD	International Classification of Diseases
n	Sample size
N	Population size
OR	Odds Ratio
SALLS	Swedish Annual Level of Living Survey
SES	Socioeconomic Status
SIR	Standardized Incidence Ratio
ULF	“Undersökning av Levnadsförhållanden” (Swedish)
WHO	World Health Organization

INTRODUCTION

MIGRATION

In recent decades many developed and developing countries have faced rapid demographic changes. The movement of labour migrants, refugees, and asylum seekers has affected many countries in the world. In 2004, there were more than nine million refugees and asylum seekers worldwide (UNHCR, 2005). Today, the population in most industrialized countries, including Sweden, has a large proportion of first- and second-generation immigrants.

Sweden is no longer the ethnically homogeneous society it used to be for centuries. During a short period of time Sweden has become a multicultural society with immigrants from all continents. At the turn of the century, about 20% of the Swedish population was first- or second-generation immigrants, and the figures were even higher in the large cities. Additionally, immigrant women gave birth to 17% of all newborn children in Sweden at the end of the 90s (Statistics Sweden, 2000), which means that almost one fifth of the newborn children in Sweden are second-generation immigrants. Throughout the second half of the twentieth century, substantial numbers of labour immigrants came to Sweden when the nation's industries were in need of labourers, and large waves of refugees came in order to escape from war and persecution. The first wave of immigrants came mainly from Finland, Southern Europe, and other European countries. Most of them were labour immigrants. However, there were also refugees that came to Sweden from Eastern European countries due to political persecution. After the 70s and 80s, immigrants from other parts of the world began to arrive in Sweden, for example from Latin America, Africa, and the Middle East. Most Latin-Americans in Sweden came from Chile after Pinochet's military coup. Many Iranians came to Sweden after the revolution in 1979 in order to escape the religious dictatorship. During the Balkan wars in the 90s many refugees from Bosnia arrived; a large proportion of them returned after the war had ended.

Broadly speaking, there are two types of migration, labour migration due to economic factors and forced migration due to religious, political, and ethnic persecution and/or natural disasters, starvation, and extreme poverty. The decision to migrate has been described as the result of complementary push and pull factors (Lee, 1969). For example, extreme poverty can push people to leave their homes while dreams of a better future can pull people towards the new country. Migration in Western Europe during the post-war period and until the 1970s was mainly influenced by pull factors, whereas push factors have acted after the 80s when many non-European refugees came to Western Europe to seek asylum due to political instability in their home countries. It could be supposed that those who most need to migrate, i.e. the poorest, would dominate the large groups of refugees. However, it seems that the poorest people do not migrate because they lack economic resources and knowledge of the migration process (Castles, 1993).

Three labour migration phases in Western Europe have been distinguished in previous research (Castles et al., 1984). The first phase was characterized by a large influx of labour migrants that started after the Second World War and continued until the 70s when an economic recession started, partly due to increasing oil prices. The

second phase was characterized by the immigration of relatives. The third phase was characterized by the creation of ethnic minorities, who were given the lowest-paid and heaviest jobs. Many individuals from ethnic minorities were now forced to conform to the lowest socioeconomic position in the new country.

SOCIOECONOMIC STATUS

Socioeconomic status (SES) is a multidimensional concept that describes the position that individuals hold in society. SES includes education, skills, and other qualifications which are important for the jobs, societal position, and prestige people can attain. Differences in SES between individuals and groups lead to social stratification and social inequalities. SES is largely synonymous with the terms socioeconomic position, social class, social status, and social position. Various ways to measure SES have been developed, according to different traditions and accessibility of data. The most common ways to measure SES are in terms of educational status, occupational status, income level and/or wealth. These measures could be regarded as a reflection of the individual's skills, knowledge and resources. Although these SES indicators probably measure different aspects of SES, it can be presumed that no measure is conceptually "better" than any other (Winkleby et al., 1992). They are also highly correlated to each other, at least in most Western countries where a high level of education normally has resulted in a better income. The association between SES and health has been shown in previous research (Hemingway et al., 2000, Salomaa et al., 2000, Sundquist et al., 2004).

Furthermore, many immigrant groups have low SES, which in the majority population is associated with an increased risk of hospital admission for mental disorders (Keskimaki et al., 1995, Lorant et al., 2003). SES was therefore included as an independent variable in the studies in this thesis because it seemed likely that adverse socioeconomic conditions among first- and second-generation immigrants could confound the association between immigrant status and health. However, according to Castles et al. (Castles et al., 1984) "Most members of the new ethnic minorities are still workers, but their social situation cannot be adequately explained by this fact alone. Minority status is not reducible to a specific form of exploitation in the production process. It has historical, cultural and ideological dimensions of its own, which in turn help to determine positions within the production process or exclusion from it." This implies that SES and ethnicity are two separate concepts that might have an impact on various life circumstances in immigrants, including health.

ETHNICITY AND COUNTRY OF BIRTH

Ethnicity is defined as belonging to a group of individuals who feel connectedness with each other because of a common belief in a mutual origin, sometimes a common language and/or religion, and the same traditions, which leads to a kind of collective consciousness (Weber, 1983). Ethnicity is often used as an independent variable in studies from the US of the association between migration and health, where this variable is often self-reported. Swedish studies, however, have often used country of birth as a proxy for ethnicity (Hjern et al., 2004). This approach has some limitations as

country of birth is not necessarily synonymous with ethnicity, especially in countries that include several ethnic groups. The contextual nature of the concept of ethnicity covers a wide range of experiences and complex identities, and the different ways of classifying ethnicity in health research was recently criticized due to several shortcomings (Bradby, 2003). Since four of the five studies included in the present thesis included the entire population, the only way to measure ethnicity was through the variable “country of birth”. Therefore, country of birth was used as a proxy for ethnicity in this thesis.

DEFINITIONS OF HEALTH

The World Health Organization (WHO) has defined health as “a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity.”

Disease, illness, and sickness are different definitions or aspects of health. Disease is the objective part of health from a professional point of view. Diseases are partly classified on the basis of how they are caused. Illness, on the other hand, is the subjective feeling of being unhealthy. Illness can be present without the existence of disease and vice versa. Sickness has been defined as the social dimension or the social consequence of being unhealthy.

Self-rated health is based on how a person perceives his or her general health. Self-rated health includes illness rather than disease and is therefore a more subjective health measurement than disease. However, studies from different parts of the world have shown a high association between self-rated health and mortality (Sundquist and Johansson, 1997, Mossey and Shapiro, 1982, McGee et al., 1999, Idler and Angel, 1990). In addition, the reliability of self-reported health has been shown to be high (Lundberg and Manderbacka, 1996). Self-rated health is also a useful predictor of the use of health care and can therefore be used as an indicator of health care need (Krakau, 1991, Miilunpalo et al., 1997). Therefore, self-rated health, a predictor of both mortality and the use of health care, is an applicable proxy for population health monitoring. Self-rated health was used as an outcome in study 4.

MIGRATION AND MENTAL DISORDERS

Migration is associated with profound psychosocial changes. Practically everything in the migrants’ life changes during the migration process, including housing, daily routines, work situation, sometimes family situation, social relations, climate, language and SES. These changes can sometimes lead to psychological distress.

In psychiatric health care, psychotic disorders probably represent some of the most disabling forms of mental disorders. Several previous studies have found higher rates of psychotic disorders among some groups of first-generation immigrants when compared to the majority population (Cantor-Graae et al., 2003, Harrison et al., 1997, Selten et al., 2001, Zolkowska et al., 2001). For example, increased rates of psychotic disorders were found in the United Kingdom among first-generation Caribbean immigrants (Harrison et al., 1997).

A study from Malmö, southern Sweden included all adult patients admitted for inpatient psychiatric treatment during a one-year period and found that the foreign-born

patients had an increased risk of admission for schizophrenia-like psychosis compared to the majority population (Zolkowska et al., 2001). An Australian study found that Polish and Yugoslavian immigrants had higher hospital admission rates for psychotic disorders, whereas immigrants from South-East Asia had lower admission rates than the majority population (Bruxner et al., 1997).

A study of middle-aged women showed that African American and Hispanic women had the highest odds of depression, whereas Japanese and Chinese women had the lowest odds (Bromberger et al., 2004). Jewish immigrants from the former Soviet Union had an increased risk of depression and anxiety five years after their immigration to Israel (Zilber et al., 2001). Depression and anxiety disorders were also examined in a study from Australia among elderly individuals born in Greece, i.e. first-generation immigrants. The findings showed that depression and anxiety were more common than in the Anglo-Australian reference group (Kiropoulos et al., 2004).

Immigrants in the second-generation also evince an increased risk of mental disorders. For example, a study from a psychiatric emergency unit found a higher rate of admission for psychotic disorders in second-generation adult Moroccan immigrants (Fossion et al., 2002). A cohort study from Denmark, also on adult subjects, found an increased risk of schizophrenia among second-generation immigrants (Cantor-Graae et al., 2003).

A growing body of research has investigated various aspects of mental health among second-generation children and adolescents (Brindis et al., 1995, Goodman and Richards, 1995, Hovey and King, 1996, Major, 1996, McKelvey et al., 2002, Sawyer et al., 1990, Sawyer et al., 2001, Sowa et al., 2000). For example, a study from the UK found that psychotic, autistic, and conduct disorders were more common in second-generation Afro-Caribbean children and adolescents than in the majority population (Goodman and Richards, 1995). One fourth of the second-generation Latino adolescents in California reported critical levels of depression and suicidal ideation (Hovey and King, 1996). In Australia, refugee children and adolescents from Vietnam had higher prevalence rates of emotional and behaviour disorders than non-refugees (Sawyer et al., 1990, Sawyer et al., 2001)

The number of children born by immigrant women is increasing in Sweden. The adaptation of these second-generation immigrant children to well-functioning and well acculturated healthy adults is crucial for the development of the whole society.

ACCULTURATION

It has been suggested that poor acculturation lies behind the increased risk of poor health among certain immigrant groups (Wiking et al., 2004). Acculturation includes the multidimensional and complex processes of adaptation and integration to the host country (Ryder et al., 2000). Berry (Berry, 1992) described four acculturation strategies: (1) migrants who wish to maintain their cultural identity and at the same time establish relationships with other groups in the new society were called *integrated*; (2) migrants who wish to maintain their own cultural identity without being interested in contacts with other groups were designated as *separated*; (3) migrants who did not want to maintain their original cultural identity but wanted relationships with other groups in society were considered to be *assimilated*; and (4) migrants who were neither

interested in maintaining their cultural identity nor establishing contact with other groups were called *marginalized* (Johansson, 1997).

Examples of a high level of acculturation are being employed and having good language and communicative skills (Lieber et al., 2001). Acculturation is supposed to take place in the immigrant as time passes by and could occur either continuously or stepwise (Ritsner and Ponizovsky, 1999). As it is supposed that individuals undergo a greater adaptation over time, proxy measures of acculturation have been developed that take this time into consideration. Examples of proxy measures of acculturation are age at migration or years lived in the host country (Ryder et al., 2000). It is likely that a lower age at migration to the host country implies better integration and acculturation for the individual, leading to potential health benefits. The association between level of acculturation and self-rated health in young immigrants was investigated in study 4, where age at migration was used as a proxy for acculturation.

AIMS

GENERAL AIM

To study the association between mental disorders, self-rated health and country of birth in first- and second-generation immigrants, after taking socioeconomic factors into account.

SPECIFIC AIMS

Study 1

The first aim was to examine whether second-generation immigrants have a higher risk of being hospitalized for mental disorders than the majority population. The second aim was to examine whether this hypothesized increased risk remains after adjustment for socioeconomic status (SES) (income and education).

Study 2

The first aim was to examine whether the increased risk of being hospitalized for psychotic disorders among certain immigrant groups is present in the next generation. The second aim was to examine whether having one parent born in Sweden has a protective effect on the risk of being hospitalized for psychotic disorders among second-generation immigrants. The third aim was to examine the association between individual SES, measured as income, and the risk of being hospitalized for psychotic disorders and the impact of SES on the hypothesized association between immigrant status and psychotic disorders.

Study 3

The first aim was to examine whether the increased risk of being hospitalized for alcohol abuse and drug abuse among certain immigrant groups is present in the next generation. The second aim was to investigate whether having one parent born in Sweden has a protective effect on the risk of being hospitalized for alcohol abuse and drug abuse among second-generation immigrants. The third aim was to investigate the association between individual SES, measured as income, and the risk of being hospitalized for alcohol abuse and drug abuse.

Study 4

The first aim was to examine the association between age at migration to Sweden and self-rated health after adjusting for potential confounders. The second aim was to analyse the association between country of birth and poor self-rated health among first- and second-generation immigrants.

Study 5

The first aim was to examine whether the increased risk of hospitalization for mental disorders that exists among some immigrant groups in Sweden persists in the next generation after accounting for individual SES. The second aim was to examine whether the possible increased risk varied based on the sex of the second-generation immigrant or the sex of the immigrant parent.

MATERIALS

MIGMED DATABASE

Data from MigMed, i.e. a research database at Center for Family and Community Medicine, Karolinska Institutet, were used in studies 1, 2, 3, and 5. The name MigMed is short for Migration Medicine because the database includes all individuals living in Sweden for more than six months, with the exception of asylum-seekers. This makes it possible to study various health aspects in immigrant groups. All individuals living in Sweden are assigned a unique personal number in national Swedish registers. This personal number was replaced by a serial number in order to provide anonymity for all individuals. The linkage of several national registers in the construction of MigMed was enabled by the anonymous serial numbers. The following registers were included in MigMed: The *Total Population Register* includes all individuals who have a residence permit and stay in Sweden for more than six months. The register contains annual, individual data on marriages, divorces, childbirths, and emigration from and immigration to Sweden. *Louise* is a register including the entire population aged 20 and above. Louise contains annual individual data on education, employment status, place of work, domicile, and income from various sources (e.g., employment, self-employment, unemployment, and parental leave). The *Immigration Register* contains data about country of birth, emigration, and immigration of all individuals living in Sweden. The *Swedish National Hospital Discharge Register* contains data on all hospital admissions in Sweden with dates of admission and discharge according to the International Classification of Diseases (ICD). ICD-9 was used 1987–1996 and ICD-10 from 1997 onwards. The *Cause of Death Register* contains annual information about all deaths in Sweden. All death causes are classified according to ICD-9 and ICD-10, according to WHO recommendations.

SALLS

Study 4 was based on survey data from the Swedish Annual Level of Living Survey (SALLS). The main purpose of SALLS is to collect information about the Swedish population's living conditions. Each sample is drawn on a yearly basis from the Total Population Register and represents a simple random sample of individuals aged 16–84 who are permanent residents in Sweden. The size of the annual sample has varied between approximately 6,000 and 9,000 individuals during the years. The response rate is about 80%. SALLS has been conducted by Statistics Sweden since 1974 and contains a vast number of questions about health, leisure time, family situation, social networks, employment, working environment, education, economic resources, and housing. SALLS has been widely used in research. The data are collected by trained interviewers in face-to-face interviews lasting about one hour, mostly in the participants' homes. The reliability of the variables has been analysed by re-interviews (test-retest method) giving kappa coefficients between 0.7 and 0.9 (Wärneryd, 1991). The strengths of SALLS are the sample size, representative of the entire adult

population (a national, simple random sample), and the large number of comprehensive, reliable questions.

MULTIGENERATION REGISTER

Study 5 was based on data from the Multigeneration register, which is incorporated in the MigMed database. The register includes data on 11 million people, including more than 3.2 million families with 6.9 million Swedish-born second-generation individuals who have Swedish-born or foreign-born parents. It includes data on the biological parents of index persons who have been registered (in Swedish: *folkbokförd*) in Sweden any time since 1961 and were born in 1932 or later. Thus, individual data on the second-generation immigrants' parents are included in the database. The latest version of the Multigeneration register has recently been incorporated in the MigMed database and it includes supplementary data from church records on index persons domiciled in Sweden between 1947 and 1961, including information about parents, children, and adoptions.

METHODS

Table A shows an overview of the five studies by data sources, outcome, design, population size etc.

Table A. An overview of the five studies.

	Study 1	Study 2	Study 3	Study 4	Study 5
Data source	MigMed	MigMed	MigMed	SALLS	MigMed (Multigeneration Register)
Outcome	Psychotic, affective, neurotic and personality disorder	Schizophrenia Other psychotic disorders	Alcohol abuse Drug abuse	Poor self-rated health	Mental disorders
Number of cases	15,281	16,116	31,249	1,825	212,516
Study design	Follow-up	Follow-up	Follow-up	Cross-sectional	Follow-up
Measure of risk	Hazard ratio (Cox regression)	Hazard ratio (Cox regression)	Hazard ratio (Cox regression)	Odds ratio (Logistic regression)	Standardized incidence ratio
Interview period	–	–	–	1992–1999	–
Follow-up	1 Jan 1995– 31 Dec 1998	1 Jan 1992– 31 Dec 1999	1 Jan 1992– 31 Dec 1999	–	1 Jan 1987– 31 Dec 2001
Age	16–34	20–39	20–39	16–34	18–69
Sample size	–	–	–	14,552	–
Population size	1,914,703	2,243,546	2,243,546	–	13,060,620
Response rate	–	–	–	≈80%	–

STUDY 1

The study population on 1 January 1995 consisted of 1,914,703 women and men aged 16–34 years. All individuals were followed until first hospital admission for mental disorders, death, emigration or end of study on 31 December 1998. First hospital admissions for mental disorders were defined as first admissions in four main diagnosis groups during the study period.

Outcome variable

The outcome variable was time to first hospital admission for mental disorder according to ICD-9 and ICD-10 for the following four diagnosis groups:

1. Psychotic disorders

(ICD-9: 295, 297, 298C, 298E, 298W, 298X and ICD-10: F20–F29)

2. Affective disorders

(ICD-9: 296, 298A, 298B, 300E, 301B, 311 and ICD-10: F30–F39)

3. Neurotic disorders

(ICD-9: 300A, 300B, 300C, 300D, 300F, 300G, 300H, 300W, 300X, 306, 308, 309 and ICD-10: F40–F48)

4. Personality disorders

(ICD-9: 301A, 301C, 301D, 301E, 301F, 301G, 301H, 301J, 301W, 301X, 302 and ICD-10: F60–F69)

ICD-10 replaced ICD-9 on 1 January 1997 and there is no official translation from ICD-9 to ICD-10. The diagnosis codes in ICD-10 were therefore chosen to correspond as closely as possible to the code in ICD-9.

Explanatory variables

Age was categorized into four groups: 16–19, 20–24, 25–29, and 30–34 years. The upper age cut point was chosen because there are few second-generation immigrants above this age.

Gender: women and men.

SES was measured as income and education.

Income was defined as annual family income of the parents, regardless of whether or not the individual was living in the same household, and divided into quintiles according to income level. The family income was weighted, i.e. divided by the number of people in the family. The family income measure also took into consideration the ages of the family members and used a weighted system whereby small children were given lower weights than adolescents and adults. The income variable included all kinds of registered income such as wages, subsidies, pensions etc.

Education was defined as individual education and divided into two groups: ≥ 12 years and < 12 years. Individuals aged less than 20 years were categorized in the higher educational level in order to avoid overestimation of risks.

Immigrant status was categorized into five groups according to the parents' country of birth. Group 1 represented the Swedish majority population, which was used as reference, and groups 2–5 represented second-generation immigrants defined as individuals born in Sweden with one or both parents born outside Sweden. Group 2 included one parent born in Sweden in order to examine a possible protective effect on mental health of having one parent who is integrated in Swedish society. The majority of the foreign-born parents (53%) in the category of second-generation immigrants with one parent born in Sweden were born in a refugee country, mainly Eastern Europe. The construction of the other groups was performed in order to avoid overlap between the groups. Second-generation Finns constituted a separate group because Finns represent Sweden's largest group of labour immigrants. Second-generation immigrants from refugee countries also constituted a separate group because refugees are at great risk of psychological distress (Sundquist et al., 2000).

1) *The Swedish majority population*, i.e. Swedish-born individuals with both parents born in Sweden.

2) *2nd-generation immigrants with one parent born in Sweden*, i.e. Swedish-born individuals with one parent born in Sweden and one parent born outside Sweden.

- 3) *2nd-generation Finns*, i.e. Swedish-born individuals with both parents born in Finland or one parent born in Finland and one parent born outside Sweden and Finland.
- 4) *2nd-generation labour immigrants*, i.e. Swedish-born individuals with both parents born in labour immigrant countries or one parent born in labour immigrant countries and one parent born outside Sweden, Finland, and labour immigrant countries.
- 5) *2nd-generation refugees*, i.e. Swedish-born individuals with both parents born outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).

Labour immigrant countries mainly included countries from Southern Europe and OECD:

Andorra, Australia, Austria, Belgium, Canada, Cyprus, Denmark, Fiji, France, Western Germany, Great Britain, Greece, Iceland, Ireland, Israel, Italy, Japan, Kiribati, Liechtenstein, Luxemburg, Malta, Micronesia, Monaco, Nauru, Netherlands, New Zealand, Northern Ireland, Norway, Palau, Papua New Guinea, Portugal, San Marino, the Solomon Islands, Spain, Switzerland, Tonga, Tuvalu, Vanuatu, Vatican City, Western Samoa, Yugoslavia, Zanzibar and USA. Refugee countries were defined as all countries except Sweden, Finland, and labour immigrant countries, e.g. most African countries, Albania, Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania, the Soviet Union, and all other non-European countries outside the OECD.

Statistical analysis

Age- and sex-standardized incidence rates (per 100,000 persons per year) were calculated by immigrant status and for each diagnosis group by direct standardization with Sweden as standard population. Cox regression was used (Kleinbaum, 1995) to calculate hazard ratios (HR) of first psychiatric hospital admissions with 95% confidence interval (CI) for the two models. Model 1 was adjusted for age and sex and Model 2 was adjusted for age, sex, immigrant status, income and education. The proportional hazards assumption was tested for parallelism by studying the log (-log) of survival curves. All variables met the assumption. No interactions were found. The SAS software package was used in the statistical analyses (SAS Institute Inc., 1989).

STUDY 2

The study population on 1 January 1992 consisted of 2,243,546 women and men aged 20–39 years. All individuals were followed until first hospital admission for schizophrenia or other psychoses, death, emigration or end of study on 31 December 1999. First hospital admissions for schizophrenia or other psychoses were defined as first admissions during the study period.

Outcome variable

Outcome variable was time to first hospital admission for schizophrenia or other psychoses based on the ICD-9 and ICD-10. On 1 January 1997 ICD-10 replaced ICD-9. However, there is no official translation from ICD-9 to ICD-10. Therefore the diagnosis codes in ICD-10 were chosen to correspond as closely as possible to the code in ICD-9. The hospital admissions were divided into the following two groups:

1. Schizophrenia (ICD 9: 295 and ICD 10: F20, F21, F23.1, F23.2, F25)
2. Other psychoses (ICD 9: 297, 298C, 298E, 298W, 298X and ICD 10: F22, F23.0, F23.3, F23.8, F23.9, F24, F28, F29)

Explanatory variables

Age was divided into four groups: 20–24, 25–29, 30–34, and 35–39 years.

Gender: women and men.

Income was defined as individual annual income and divided into quintiles according to income level.

Immigrant status: The Swedish majority population was used as reference, i.e. Swedish-born individuals with two parents born in Sweden. Immigrants were defined as first-generation and second-generation immigrants and classified into subcategories according to country of birth or parents' country of birth. Refugees and labour immigrants were divided into two separate groups because the reasons for migration are very different between these two groups. The categorization of the first-generation and second-generation labour immigrants took into consideration the fact that Finns represent Sweden's largest group of labour immigrants.

First-generation immigrants were categorized in three subgroups:

1. 1st-generation Finns: born in Finland.
2. *1st-generation labour immigrants*: born in labour immigrant countries.
3. *1st-generation refugees*: born in a country outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).

Second-generation immigrants were categorized in six subgroups:

1. *2nd-generation Finns*, i.e. Swedish-born individuals with both parents born in Finland.
2. *2nd-generation labour immigrants*, i.e. Swedish-born individuals with both parents born in labour immigrant countries.
3. *2nd-generation refugees*, i.e. Swedish-born individuals with both parents born outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).
4. *2nd-generation Swedes/Finns*, i.e. Swedish-born individuals with one parent born in Sweden and one parent born in Finland.
5. *2nd-generation Swedes/labour immigrants*, i.e. Swedish-born individuals with one parent born in Sweden and one parent born in labour immigrant countries.
6. *2nd-generation Swedes/refugees*, i.e. Swedish-born individuals with one parent born in Sweden and one parent born in a country outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).

In order to examine a possible protective effect of being hospitalized for psychotic disorders, groups 4–6 included one parent born in Sweden, i.e. one parent that is integrated in Swedish society. Second-generation immigrants who did not fit into any of the six subcategories, for example due to missing information about one parent's country of birth, were classified in a separate subgroup, i.e. "all others".

Labour immigrant countries mainly included countries from Southern Europe and OECD, i.e. Andorra, Australia, Austria, Belgium, Canada, Cyprus, Denmark, Fiji, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Kiribati, Liechtenstein, Luxemburg, Malta, Micronesia, Monaco, Nauru, Netherlands, New Zealand, Northern Ireland, Norway, Palau, Papua New Guinea, Portugal, San Marino, the Solomon

Islands, Spain, Switzerland, Tonga, Tuvalu, UK, USA, Vanuatu, Vatican City, Western Samoa, Yugoslavia, and Zanzibar. Refugee countries were defined as all countries except Sweden, Finland, and labour immigrant countries, i.e. African countries, Albania, Armenia, Azerbaijan, Belarus, Bosnia, Bulgaria, Croatia, the Czech Republic, Czechoslovakia, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldavia, Poland, Romania, Russia, Slovakia, Slovenia, the Soviet Union, Tadjikistan, Turkmenistan, Ukraine, Uzbekistan and all other non-European countries outside the OECD.

Statistical analysis

Age-standardized incidence rates were calculated by indirect age standardization with Sweden as standard population (Breslow and Day, 1980). A Cox regression model was used to estimate HRs for each diagnosis group (Kleinbaum, 1995). Risk time was calculated from the start of the study until the first admission to hospital due to schizophrenia or other psychoses, out-migration, death, or end of the study. The first model was age-adjusted and the second model was adjusted for all the explanatory variables simultaneously. The results are presented as HRs with 95% CI. Men and women were analysed separately. The proportional hazards assumption was tested for parallelism and proved valid for all included variables by studying the log (–log) of survival curves (Collett, 1994). The interaction between individual income and country of birth was tested for all the subgroups among the first- and second-generation immigrants. No interactions were found.

STUDY 3

In total 2,243,546 women and men aged 20–39 years were followed from 1 January 1992 until 31 December 1999 for first hospital admission due to alcohol abuse or drug abuse, death, emigration or end of study. First hospital admissions for alcohol abuse or drug abuse were defined as first admissions during the study period.

Outcome variable

The outcome variable was first hospital admissions for alcohol abuse and drug abuse during the study period according to the ICD. The first diagnosis group represented alcohol abuse (ICD 9: 291, 303, 305A and ICD 10: F10) and the second diagnosis group represented drug abuse (ICD 9: 292, 304, 305X and ICD 10: F11–F16, F18–F19). Both ICD 9 and ICD 10 were used because ICD 10 was published during 1997. All hospital admissions were due to alcohol and drug abuse and not the medical concomitants of alcohol and drug abuse.

Explanatory variables

Age was divided into four groups: 20–24, 25–29, 30–34, and 35–39 years.

Gender: women and men.

Individual income was divided into quintiles according to income level.

Immigrant status: Swedish-born individuals with two parents born in Sweden, i.e. the Swedish majority population, were used as reference. The first-generation and second-generation immigrants were divided into categories according to country of birth or parents' country of birth. Finns represented a separate group because they are Sweden's largest group of labour immigrants.

First-generation immigrants were categorized as follows:

1. *1st-generation Finns:* born in Finland.
2. *1st-generation labour immigrants:* born in labour immigrant countries.
3. *1st-generation refugees:* born in a country outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).

Second-generation immigrants were categorized as follows:

1. *2nd-generation Finns,* i.e. Swedish-born individuals with both parents born in Finland.
2. *2nd-generation labour immigrants,* i.e. Swedish-born individuals with both parents born in labour immigrant countries.
3. *2nd-generation refugees,* i.e. Swedish-born individuals with both parents born outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).
4. *2nd-generation Swedes/Finns,* i.e. Swedish-born individuals with one parent born in Sweden and one parent born in Finland.
5. *2nd-generation Swedes/labour immigrants,* i.e. Swedish-born individuals with one parent born in Sweden and one parent born in labour immigrant countries.
6. *2nd-generation Swedes/refugees,* i.e. Swedish-born individuals with one parent born in Sweden and one parent born in a country outside Sweden, Finland, and labour immigrant countries (mainly refugee countries).

Groups 4–6 included one parent born in Sweden in order to examine a possible protective effect of being hospitalized for alcohol abuse and drug abuse among second-generation immigrants if one of the parents is integrated in Swedish society. Labour immigrant countries mainly included countries from OECD and Southern Europe: Andorra, Australia, Austria, Belgium, Canada, Cyprus, Denmark, Fiji, France, Germany, Great Britain, Greece, Iceland, Ireland, Israel, Italy, Japan, Kiribati, Liechtenstein, Luxemburg, Malta, Micronesia, Monaco, Nauru, Netherlands, New Zealand, Northern Ireland, Norway, Palau, Papua New Guinea, Portugal, San Marino, Solomon Islands, Spain, Switzerland, Tonga, Tuvalu, USA, Vanuatu, Vatican City, Western Samoa, Yugoslavia, and Zanzibar. Refugee countries were defined as all countries except Finland, labour immigrant countries, and Sweden.

Statistical analysis

Age-standardized incidence rates were calculated by indirect age standardization with Sweden as standard population (Breslow and Day, 1980). A Cox regression model was used to estimate HRs for alcohol abuse and drug abuse (Kleinbaum, 1995). Risk time was calculated from the start of the study until the first admission to hospital due to alcohol abuse or drug abuse, out-migration, death, or end of the study. Two different models were used, the first adjusted for age and the second adjusted for all the independent variables simultaneously. The results are presented as HRs with 95% CI. The proportional hazards assumption was tested for parallelism by studying the log (–log) of survival curves. All variables met the assumption (Collett, 1994).

STUDY 4

This cross-sectional study was based on national random samples of the entire Swedish population, consisting of 7,137 women and 7,415 men aged 16–34 years. The samples were obtained from pooled data during the period 1992–1999 from the Swedish Annual Level of Living Survey (SALLS).

Outcome variable

Self-rated health was based on the following question in SALLS: “How would you describe your general health?” Before 1996 there were three response alternatives: good, poor, or anywhere between good and poor. After 1996 there were five response alternatives: very good, good, fair, poor, and very poor. The dichotomization was performed as follows: *Before 1996*: Those who answered that their general health was poor or anywhere between good and poor were considered as having poor self-rated health. Those who answered that their general health was good were considered as having good self-rated health. *After 1996*: Those who answered that their general health was very poor, poor, or fair were considered as having poor self-rated health. Those who answered that their general health was good or very good were considered as having good self-rated health. Self-rated health was chosen as an outcome because of its usefulness as a predictor of mortality (Idler and Angel, 1990, McGee et al., 1999, Mossey and Shapiro, 1982, Sundquist and Johansson, 1997), which indicates that a subjective health assessment is a valid health status indicator that can be used in population health monitoring.

Explanatory variables

Age was categorized by dividing the respondents into the following groups: 16–19, 20–24, 25–29, and 30–34 years of age at the time of the interview.

Gender: female or male.

Country of birth was classified into eight groups. The reference group consisted of Swedish-born individuals with two parents born in Sweden. Immigrants were defined as first-generation and second-generation immigrants and classified into subcategories according to country of birth or parents’ country of birth.

First-generation immigrants were categorized in three subgroups based on country of birth:

1. Finland (the largest immigrant group in Sweden).
2. OECD (Organisation for Economic Co-operation and Development) countries (mainly labour immigrants).
3. All other countries (mainly refugees).

Second-generation immigrants were categorized in four subgroup based on parent’s country of birth:

1. *2nd-generation immigrants with one parent born in Sweden*, i.e. Swedish-born individuals with one parent born in Sweden and one parent born outside Sweden.
2. *2nd-generation Finns*, i.e. Swedish-born individuals with both parents born in Finland or one parent born in Finland and one parent born outside Sweden and Finland.

3. *2nd-generation immigrants from OECD countries*, i.e. Swedish-born individuals with both parents born in OECD countries or one parent born in OECD countries and one parent born outside Sweden, Finland, and OECD countries.

4. *2nd-generation immigrants from all other countries*, i.e. Swedish-born individuals with both parents born outside Sweden, Finland and OECD countries (mainly refugee countries).

SES was classified according to father's occupation. The sample was divided into four categories: (1) Unskilled workers, (2) Skilled workers and lower-level employees, (3) middle-level employees and professionals, (4) All others, including self-employed individuals and farmers.

Social networks was based on the following five items: (1) Having at least one close friend (no=1 point), (2) When was the last time you were in contact with this friend? (more than four weeks ago=1 point) (2) Meeting friends and other acquaintances (seldom or never=1 point), (3) Exchanging favours with neighbours (seldom or never=1 point), (4) Casual interaction with neighbours (seldom or never=1 point). Two or more points were considered as a poor social network. Social networks were included as a variable because previous research has found a strong association between social networks and self-rated health (Finch and Vega, 2003).

Age at migration to Sweden was based on the following question: "How old were you when you came to Sweden?" Before 1996 there were three response alternatives: (1) 0–6 years, (2) 7–16 years, and (3) >16 years. After 1996 the respondent was asked about the exact age at migration to Sweden. Age at migration to Sweden was used as a proxy for acculturation.

Statistical analysis

The prevalence of poor self-rated health status was standardized by age and sex (indirect standardization) (Breslow and Day, 1980). Logistic regression was applied in the estimation of odds ratios (OR) with 95% CI. Women and men were analysed together. Three models, adjusted for age and sex, were calculated. Model 1 also included country of birth or age at migration to Sweden. Models 2 and 3 were calculated after stepwise inclusion of the other variables. In Model 2 father's SES was included and in Model 3 social networks were added. Interaction tests between country of birth or age at migration to Sweden and the other explanatory variables showed no significant interactions.

STUDY 5

Data used in this study were retrieved from the MigMed database (see above), which includes several national registers such as the Multigeneration register (Statistics Sweden, 2005). The follow-up period started on 1 January 1987 and proceeded until hospitalization for mental disorders, death, emigration, or the end of the study period on 31 December 2001. The study population consisted of 13,060,620 individuals.

Outcome variable

The outcome variable was defined as the first hospital admission during the study period for mental disorders as defined by the ICD-9 and ICD-10. The ICD-9 was used for classification up to 1997 and the ICD-10 from 1997 onward. ICD-9 codes used included: 295–297, 298A–298C, 298E, 298W, 298X, 300A–300H, 300W, 300X, 301A–301H, 301J, 301W, 301X, 302, 306, 308, 309, and 311. ICD-10 codes used included F20–F29, F30–F39, F40–F48, and F60–F69. The meaning of the ICD codes is explained below.

ICD 9

295–297: schizophrenic disorders, affective psychoses and paranoid states

298A–298C: depressive type psychosis, excitative type psychosis and reactive confusion

298E: psychogenic paranoid psychosis

298W: other and unspecified reactive psychosis

298X: unspecified psychosis

300A–300H, 300W, 300X: neurotic disorders

301A–301H, 301J, 301W, 301X: personality disorders

302: sexual deviations and disorders

306: physiological malfunction arising from mental factors

308, 309: acute reaction to stress and adjustment reaction

311: depressive disorders

ICD-10

F20–F29: schizophrenia, schizotypal and delusional disorders

F30–F39: mood disorders

F40–F48: neurotic, stress-related, and somatoform disorders

F60–F69: disorders of adult personality and behaviour

Explanatory variables

Age was defined as age at first hospitalization for mental disorder in the study period. Age at the start of the study ranged between 18 and 69 years in both the first- and the second-generation in order to match the age range in the second-generation population (born in 1932 and onwards).

Gender: Men or women.

Geographic region of residence was divided into three groups: (1) big cities (cities with a population of over 200,000, i.e., Stockholm, Gothenburg, and Malmö), (2) Southern Sweden, and (3) Northern Sweden. Geographic region was included in order to adjust for possible differences between regions in terms of hospital admissions due to mental disorders.

SES was based on occupation. Statistics Sweden, the Swedish governmental statistics bureau, uses a socioeconomic classification system based on occupation, which they developed in 1974 and revised in 1982 and 1984 (Lagerkvist, 1984). This system was used to classify SES in the current study. Occupations of persons in the economically active sector of the population were divided into different categories, which were constructed by combining occupations in which individuals had the same type of working situations. SES of the men and women was divided into six categories based on occupation. The categories were: (1) unskilled/skilled workers, (2) white-collar

workers, (3) professionals, (4) self-employed people, (5) farmers, and (6) all others. Students without an occupation were categorized based on their father's or mother's occupation. Homemakers without a paid occupation were categorized based on their husband's or wife's occupation.

First- or second-generation immigrant status was defined according to country of birth. First-generation immigrants were defined as individuals born in a country outside Sweden. Second-generation immigrants were defined as Swedish-born individuals with at least one parent born in a country outside Sweden. The following countries and combinations of countries were included in the analysis: Denmark, Finland, Norway, Italy, Greece, Spain, Germany (West and East), France, the Netherlands, the UK/Ireland, Austria, Estonia, Latvia/Lithuania, Poland, Slovakia/the Czech Republic, Hungary, Romania, Yugoslavia, Russia, and Turkey. Yugoslavia included also the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia. We chose to include these countries and combinations of countries because for many years the immigrant population in Sweden has been dominated by persons from Finland, the other Nordic countries, and other European countries, particularly the eastern and central European countries.

Mother's and father's country of birth was considered among second-generation immigrants.

Statistical analysis

Person-years were calculated from start of follow-up on 1 January 1987, until first hospitalization due to mental disorder, death, emigration, or the end of the study on 31 December 2001. Age-standardized incidence rates were calculated for the whole follow-up period, which was divided into five 3-year periods (1987–1989, 1990–1992, 1993–1995, 1996–1998, and 1999–2001). Relative weights used to calculate the hospitalization rates were based on the 1970 European standard population. Standardized incidence ratios (SIRs) were calculated as the ratio of observed to expected number of cases (Rothman and Greenland, 1998). The expected number of cases was based on the observed number of cases in the reference category. The expected number of cases was calculated by age (in 5-year groups), sex, period (in 3-year groups), geographic region, and SES. SIRs for hospitalization due to mental disorders were calculated separately for men and women. The reference group consisted of men or women who were born in Sweden to parents born in Sweden. SIRs for hospitalization due to mental disorders in second-generation immigrants were also calculated separately by father's country of birth and by mother's country of birth. Confidence intervals (95%) were calculated assuming a Poisson distribution. All SIRs were adjusted for age at first hospitalization for mental disorders in the study period, geographic region, and SES.

ETHICS

The studies in this thesis were approved by the Ethics Committee at Karolinska Institutet, Stockholm.

RESULTS

STUDY 1

Table 1 shows the distribution of the study population (in percentages) by immigrant status and the explanatory variables. In general, second-generation immigrants had lower income and lower educational level than the Swedish majority population.

Table 1. The distribution of the study population (in percentages) by immigrant status and the explanatory variables. N = 1,914,703

	Immigrant status				
	Sweden	One parent born in Sweden	2nd Finns	2nd labour	2nd refugee
N	1,656,987	176,152	43,080	4,786	33,698
Sex					
Women	48.6	48.6	48.6	48.5	48.2
Men	51.4	51.4	51.4	51.5	51.8
Age (years)					
16–19	18.7	17.4	19.8	19.0	31.3
20–24	26.9	20.0	26.6	29.1	31.1
25–29	27.6	26.0	27.1	29.5	23.0
30–34	26.8	36.6	26.5	22.4	14.6
Income					
Group 1 (lowest)	19.2	27.5	22.9	24.5	36.9
Group 2	19.8	23.4	21.1	23.0	21.2
Group 3	20.1	20.3	19.5	20.9	17.3
Group 4	20.3	16.2	18.1	20.1	14.4
Group 5 (highest)	20.6	12.6	18.1	11.6	10.2
Education					
≥ 12 years	49.2	38.3	48.9	41.2	52.6
< 12 years	50.8	61.7	51.1	58.8	47.4

The total number of events was 15,281. The highest incidence rates of psychotic disorders, neurotic disorders, and personality disorders were found among second-generation Finns. For affective disorders, the highest incidence rate was found among second-generation labour immigrants (data not shown).

Table 2 shows that men had a higher risk than women of being hospitalized for psychotic disorders. For the other diagnosis groups men had a lower risk than women.

Second-generation immigrants with one parent born in Sweden and second-generation Finns had a higher risk than the Swedish majority population of being hospitalized for psychotic disorders, affective disorders, neurotic disorders, and personality disorders after adjustment for sex and age. For second-generation Finns the HR of being hospitalized for psychotic disorders was 2.42 (CI = 2.09–2.80). Second-generation refugees had a higher risk of being hospitalized for psychotic disorders than the Swedish majority population; HR was 1.71 (1.39–2.10).

Table 2. Hazard ratios (HR) with 95% confidence interval (CI) of first hospital admissions for mental disorders in four main diagnosis groups. Cox regression analysis, adjusted for age, sex, and immigrant status. Women and men, ages 16–34 years, Sweden, followed 1995–1998. N = 1,914,703

	Psychotic disorders	Affective disorders	Neurotic disorders	Personality disorders
	HR (CI)	HR (CI)	HR (CI)	HR (CI)
Sex				
Women	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Men	1.40 (1.31–1.49)	0.64 (0.61–0.68)	0.64 (0.61–0.68)	0.69 (0.62–0.75)
Age				
16–19	0.48 (0.41–0.54)	0.66 (0.59–0.73)	0.73 (0.66–0.79)	0.51 (0.43–0.61)
20–24	1 (ref)	1 (ref)	1 (ref)	1 (ref)
25–29	1.59 (1.46–1.74)	1.24 (1.14–1.34)	1.01 (0.94–1.09)	0.98 (0.87–1.11)
30–34	2.16 (1.98–2.35)	1.65 (1.52–1.78)	1.22 (1.14–1.32)	1.08 (0.96–1.22)
Immigrant status				
Sweden	1 (ref)	1 (ref)	1 (ref)	1 (ref)
One parent born in Sweden	1.51 (1.38–1.66)	1.33 (1.22–1.46)	1.33 (1.22–1.45)	1.55 (1.35–1.78)
2nd Finns	2.42 (2.09–2.80)	1.39 (1.17–1.66)	1.61 (1.38–1.87)	2.18 (1.74–2.74)
2nd labour	1.46 (0.88–2.43)	1.52 (0.94–2.44)	1.34 (0.83–2.16)	0.72 (0.23–2.23)
2nd refugee	1.71 (1.39–2.10)	0.95 (0.74–1.22)	1.03 (0.82–1.28)	1.20 (0.84–1.71)

Table 3 shows the full models with HRs adjusted for age, sex, immigrant status, income, and education. For all diagnosis groups the increased HRs decreased slightly but remained significant even after adjustment for both socioeconomic variables. Lower income and lower educational level were both associated with an increased risk of being hospitalized for mental disorder.

Table 3. Hazard Ratios (HR) with 95% confidence interval (CI) of first hospital admissions for mental disorders in four main diagnosis groups. Cox regression analysis, adjusted for age, sex, immigrant status, income and education. Women and men, ages 16–34 years, Sweden, followed 1995–1998. N = 1,914,703

	Psychotic disorders	Affective disorders	Neurotic disorders	Personality disorders
	HR (CI)	HR (CI)	HR (CI)	HR (CI)
Sex				
Women	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Men	1.38 (1.29–1.47)	0.64 (0.60–0.68)	0.63 (0.60–0.67)	0.67 (0.61–0.74)
Age				
16–19	0.42 (0.36–0.48)	0.60 (0.54–0.67)	0.61 (0.56–0.67)	0.41 (0.35–0.49)
20–24	1 (ref)	1 (ref)	1 (ref)	1 (ref)
25–29	1.52 (1.39–1.66)	1.20 (1.11–1.31)	0.95 (0.98–1.02)	0.89 (0.79–1.01)
30–34	2.00 (1.84–2.18)	1.57 (1.45–1.70)	1.10 (1.02–1.18)	0.93 (0.82–1.05)
Immigrant status				
Sweden	1 (ref)	1 (ref)	1 (ref)	1 (ref)
One parent born in Sweden	1.49 (1.36–1.63)	1.32 (1.20–1.45)	1.30 (1.19–1.41)	1.51 (1.31–1.73)
2nd Finns	2.28 (1.97–2.63)	1.34 (1.12–1.60)	1.48 (1.27–1.72)	1.95 (1.55–2.44)
2nd labour	1.34 (0.81–2.22)	1.43 (0.89–2.30)	1.20 (0.75–1.93)	0.62 (0.20–1.92)
2nd refugee	1.64 (1.34–2.02)	0.91 (0.71–1.18)	0.96 (0.77–1.20)	1.11 (0.78–1.58)
Income				
Group 1 (lowest)	1.55 (1.41–1.72)	1.42 (1.29–1.56)	1.87 (1.70–2.05)	2.28 (1.94–2.69)
Group 2	1.36 (1.23–1.50)	1.21 (1.10–1.33)	1.63 (1.48–1.79)	1.73 (1.46–2.06)
Group 3	1.12 (1.01–1.24)	1.12 (1.01–1.23)	1.30 (1.18–1.43)	1.59 (1.34–1.88)
Group 4	0.97 (0.87–1.07)	1.00 (0.90–1.10)	1.11 (1.01–1.23)	1.12 (0.94–1.34)
Group 5 (highest)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Education				
≥12 years	1 (ref)	1 (ref)	1 (ref)	1 (ref)
<12 years	1.46 (1.36–1.56)	1.26 (1.19–1.35)	1.70 (1.60–1.80)	2.16 (1.94–2.40)

STUDY 2

Table 4 shows the study population by immigrant status and sex. Refugees constituted the largest group among the first-generation immigrants. Swedes/labour immigrants constituted the largest group among the second-generation immigrants.

Table 4. Distribution of the study population by immigrant status and sex. Women and men, aged 20–39, 1 January 1992, followed until 31 December 1999. Sweden, N = 2,243,546.

	Women	Men	Total
Reference			
Swedes	828,556	872,356	1,700,912
1st-generation			
Finns	32,627	27,946	60,573
Labour immigrants	32,549	35,556	68,105
Refugees	63,855	68,557	132,412
2nd-generation			
Finns	15,006	15,643	30,649
Labour immigrants	9,219	9,906	19,125
Refugees	3,053	3,267	6,320
Swedes/Finns	29,194	30,931	60,125
Swedes/labour immigrants	42,041	44,835	86,876
Swedes/refugees	10,753	11,191	21,944
Unclassified*	27,795	28,710	56,505
Total	1,094,648	1,148,898	2,243,546

*2nd-generation immigrants, unclassified

Most of the immigrant groups had higher age-adjusted incidence rates of schizophrenia or other psychoses than the reference group. For both women and men the highest incidence rates for schizophrenia were found among first-generation and second-generation Finns. Among first-generation Finns the incidence rates for schizophrenia were twice as high as the reference group (both women and men) (data not shown).

First hospital admissions for schizophrenia or other psychoses are referred to below as schizophrenia or other psychoses, respectively. The Swedish majority population is used as reference, i.e. Swedish-born individuals with two parents born in Sweden. For several immigrant groups the age-adjusted HRs of schizophrenia or other psychoses were increased compared to the Swedish majority population (data not shown).

Table 5 shows HRs by immigrant status, adjusted for age and income. For both women and men a gradient was found so that when income decreased the risk of schizophrenia or other psychoses increased significantly. For women, the highest risks of schizophrenia or other psychoses were found among first-generation and second-generation Finns, after adjustment for age and income. For men, the highest risks of schizophrenia were found among second-generation Finns and second-generation

Swedes/Finns. For men the highest risks of other psychoses were found among first-generation and second-generation Finns, after adjustment for age and income. For most of the other immigrant groups the risks of schizophrenia or other psychoses were increased. However, among men who were first-generation labour immigrants and first-generation refugees the risk of schizophrenia was significantly lower than in the Swedish reference group. There was no obvious pattern with regard to a possible accentuation or attenuation of the HRs of schizophrenia or other psychoses from the first generation to the second generation. Among some immigrant groups the risk of schizophrenia or other psychoses was higher in the second generation while among other immigrant groups the risk of schizophrenia or other psychoses was lower in the second generation than in the Swedish majority population. This was also the case for second-generation immigrants with one parent born in Sweden.

Table 5. Hazard ratios (HR) with 95% confidence intervals (CI) for first hospital admissions for schizophrenia and other psychoses, by immigrant status. Women and men, aged 20–39, 1 January 1992, followed until 31 December 1999, Sweden. Cox regression models, adjusted for age and income.

	Schizophrenia		Other psychoses	
	Women	Men	Women	Men
Immigrant status	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Reference				
Swedes	1 (ref)	1 (ref)	1 (ref)	1 (ref)
1st-generation				
Finns	2.48 (2.15–2.88)	1.56 (1.36–1.78)	2.31 (2.01–2.66)	2.31 (2.01–2.66)
Labour immigrants	1.23 (1.01–1.49)	0.65 (0.55–0.77)	1.38 (1.16–1.65)	1.11 (0.94–1.32)
Refugees	0.97 (0.84–1.12)	0.68 (0.61–0.76)	1.69 (1.51–1.89)	1.70 (1.55–1.87)
2nd-generation				
Finns	2.33 (1.85–2.94)	2.25 (1.89–2.67)	2.26 (1.83–2.78)	2.34 (1.93–2.83)
Labour immigrants	1.26 (0.86–1.84)	1.06 (0.79–1.42)	1.26 (0.90–1.78)	0.95 (0.66–1.37)
Refugees	2.01 (1.21–3.35)	1.55 (1.02–2.36)	1.47 (0.85–2.53)	1.58 (0.97–2.59)
Swedes/Finns	1.91 (1.60–2.28)	1.87 (1.64–2.13)	1.72 (1.46–2.04)	1.64 (1.40–1.93)
Swedes/labour immigrants	1.41(1.19–1.67)	1.17 (1.02–1.34)	1.45 (1.25–1.69)	1.30 (1.12–1.52)
Swedes/refugees	1.82(1.36–2.43)	1.68 (1.35–2.10)	1.91 (1.48–2.47)	1.43 (1.08–1.89)
All others	1.64 (1.37–1.98)	1.52 (1.32–1.74)	1.78 (1.51–2.10)	1.54 (1.30–1.82)
Income				
Q1 (highest)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Q2	1.20 (1.02–1.42)	1.90 (1.53–2.36)	1.14 (1.01–1.27)	1.38 (1.18–1.63)
Q3	2.28 (1.97–2.65)	4.74 (3.91–5.76)	1.34 (1.19–1.50)	2.49 (2.14–2.88)
Q4	4.64 (4.04–5.33)	18.31 (15.28–21.93)	1.98 (1.77–2.20)	5.67 (4.94–6.50)
Q5 (lowest)	6.53 (5.71–7.47)	36.66 (30.68–43.82)	2.36 (2.12–2.62)	8.23 (7.19–9.43)

STUDY 3

Study 3 was based on the same study population as study 2 (see Table 4).

For both women and men the highest incidence rates for alcohol abuse and drug abuse were found among first-generation and second-generation Finns (data not shown).

First hospital admissions for alcohol abuse and drug abuse are referred to below as alcohol abuse and drug abuse, respectively. The Swedish majority population is used as reference, i.e. Swedish-born individuals with two parents born in Sweden.

Table 6. Hazard ratios (HR) with 95% confidence intervals (CI) for first hospital admissions for alcohol abuse and drug abuse, by immigrant status. Women and men, aged 20–39, 1 January 1992, followed until 31 December 1999, Sweden. Cox regression models, adjusted for age.

Immigrant status	Alcohol abuse		Drug abuse	
	Women	Men	Women	Men
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Reference				
Swedes	1	1	1	1
1st-generation				
Finns	3.61 (3.29–3.96)	4.38 (4.15–4.64)	2.33 (2.04–2.66)	2.62 (2.38–2.90)
Labour immigrants	1.15 (0.97–1.35)	0.90 (0.81–1.01)	1.39 (1.17–1.65)	1.61 (1.44–1.81)
Refugees	0.57 (0.48–0.67)	0.40 (0.36–.45)	0.77 (0.65–0.90)	1.61 (1.48–1.74)
2nd-generation				
Finns	2.60 (2.19–3.10)	2.62 (2.37–2.91)	2.07 (1.69–2.52)	2.32 (2.02–2.66)
Labour immigrants	1.06 (0.76–1.47)	0.91 (0.74–1.12)	1.52 (1.13–2.04)	1.80 (1.48–2.18)
Refugees	1.38 (0.86–2.22)	0.59 (0.38–0.90)	1.22 (0.69–2.15)	1.55 (1.08–2.22)
Swedes/Finns	1.61 (1.39–1.88)	1.69 (1.55–1.85)	1.54 (1.31–1.82)	1.88 (1.69–2.10)
Swedes/labour immigrants	1.07 (0.92–1.25)	1.13 (1.03–1.23)	1.60 (1.40–1.84)	1.55 (1.40–1.71)
Swedes/refugees	1.11 (0.83–1.49)	0.98 (0.82–1.19)	1.73 (1.35–2.23)	1.74 (1.45–2.09)

Table 6 shows that, for women, the highest age-adjusted risks of alcohol abuse were found among first-generation Finns, second-generation Finns and second-generation Swedes/Finns. The age-adjusted HRs were 3.61 (CI = 3.29–3.96), 2.60 (CI = 2.19–3.10), and 1.61 (CI = 1.39–1.88), respectively. The highest risks of alcohol abuse among men were found among the same immigrants groups as for the women. For men, the age-adjusted HRs were 4.38 (CI = 4.15–4.64), 2.62 (CI = 2.37–2.91), and 1.69 (CI = 1.55–1.85) for first-generation Finns, second-generation Finns, and second-generation Swedes/Finns, respectively. A similar pattern as for alcohol abuse was observed for drug abuse. For both women and men the highest risks of drug abuse were found among first- and second-generation Finns. However, among both women and men almost all immigrant groups had an increased risk of drug abuse, with the exception of

first- and second-generation refugee women. For some immigrant groups, the age-adjusted HRs for alcohol abuse were similar to or even lower than the Swedish reference group. For example, both first- and second-generation labour immigrants had the same risk of alcohol abuse as the Swedish reference group, after adjustment for age.

Table 7. Hazard ratios (HR) with 95% confidence intervals (CI), for first hospital admissions for alcohol abuse and drug abuse, by immigrant status. Women and men, aged 20–39, 1 January 1992, followed until 31 December 1999, Sweden. Cox regression models, adjusted for age and income.

	Alcohol abuse		Drug abuse	
	Women	Men	Women	Men
Immigrant status	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Reference				
Swedes	1 (ref)	1 (ref)	1 (ref)	1 (ref)
1st-generation				
Finns	3.64 (3.32–4.00)	3.61 (3.41–3.82)	2.33 (2.04–2.65)	2.06 (1.86–2.27)
Labour immigrants	1.07 (0.90–1.26)	0.63 (0.56–0.70)	1.27 (1.07–1.52)	1.04 (0.93–1.16)
Refugees	0.50 (0.42–0.59)	0.22 (0.20–0.25)	0.66 (0.56–0.77)	0.80 (0.74–0.87)
2nd-generation				
Finns	2.65 (2.23–3.15)	2.47 (2.22–2.74)	2.09 (1.72–2.56)	2.19 (1.91–2.51)
Labour immigrants	1.05 (0.75–1.45)	0.85 (0.69–1.05)	1.48 (1.10–1.99)	1.61 (1.32–1.95)
Refugees	1.35 (0.84–2.18)	0.56 (0.36–0.85)	1.17 (0.66–2.06)	1.35 (0.95–1.94)
Swedes/Finns	1.62 (1.39–1.88)	1.60 (1.46–1.74)	1.54 (1.31–1.82)	1.77 (1.59–1.97)
Swedes/labour immigrants	1.06 (0.91–1.24)	1.06 (0.97–1.15)	1.58 (1.37–1.81)	1.41 (1.28–1.56)
Swedes/refugees	1.10 (0.82–1.48)	0.91 (0.76–1.10)	1.69 (1.31–2.18)	1.54 (1.28–1.85)
Income				
Q1 (highest)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Q2	0.85 (0.78–0.93)	1.86 (1.72–2.02)	0.82 (0.74–0.90)	1.79 (1.56–2.06)
Q3	0.93 (0.85–1.02)	3.03 (2.81–3.26)	0.71 (0.64–0.79)	3.39 (2.99–3.84)
Q4	1.20 (1.10–1.32)	6.80 (6.34–7.29)	1.01 (0.92–1.12)	9.02 (8.02–10.13)
Q5 (lowest)	1.74 (1.60–1.90)	10.22 (9.55–10.95)	1.60 (1.46–1.76)	19.59 (17.48–21.96)

Table 7 shows HRs by immigrant status, adjusted for age and income. Results decreased slightly but remained significant after the addition of the socioeconomic variable. For both alcohol abuse and drug abuse (both women and men) the highest risks were found among first- and second-generation Finns. First-generation refugees (both women and men) had a significantly lower risk of alcohol abuse and drug abuse than the reference group, after adjustment for age and income. In the second generation no increased risk of alcohol abuse was found among second-generation labour immigrants,

refugees, Swedes/labour immigrants, and Swedes/refugees. There was an obvious gradient for the socioeconomic variable among men. When income decreased the risk of alcohol abuse and drug abuse increased markedly. For men in quintile 5 (lowest income) the HRs were 10.22 (CI = 9.55–10.95) and 19.59 (CI = 17.48–21.96) for alcohol abuse and drug abuse, respectively. However, for women no gradient for income was found.

STUDY 4

Table 8. Distribution of the sample (n= 14,552) by country of birth.

		Country of birth							
		Sweden	2nd-generation immigrants				1st-generation immigrants		
			One Swedish parent	Finland	Labour	Refugees	Finland	Labour	Refugees
n		11,721	1050	254	189	39	187	193	919
Sex	Women	48.7	50.3	54.7	41.8	35.9	53.5	52.3	50.6
	Men	51.3	49.7	45.3	58.2	64.1	46.5	47.7	49.4
Age	16–19	15.5	18.8	15.0	20.6	33.3	1.6	7.8	13.9
	20–24	27.5	27.7	32.7	30.7	23.1	10.7	23.8	20.6
	25–29	28.4	27.6	29.9	25.4	23.1	31.6	29.5	29.4
	30–34	28.6	25.9	22.4	23.3	20.5	56.2	38.9	36.1
Socioeconomic status ¹	(1)	22.7	23.5	41.3	31.8	28.2	39.6	24.4	24.6
	(2)	30.4	30.3	34.3	32.3	12.8	30.0	28.0	24.4
	(3)	26.0	25.9	9.9	15.9	38.5	10.7	24.4	21.8
	(4)	20.9	20.3	14.6	20.1	20.5	19.8	23.3	29.3
Social networks	Good	64.5	61.0	53.5	58.2	53.8	64.2	52.3	44.8
	Poor	35.5	39.0	46.5	41.8	46.2	35.8	47.7	55.2
Age at migration to Sweden (years)	0–6						59.9	22.8	11.9
	7–16						11.8	23.3	24.8
	>16						28.3	53.9	63.3

¹Socioeconomic status: (1) Unskilled workers, (2) Skilled workers and lower-level employees, (3) Middle-level employees and professionals, (4) All others, including self-employed individuals and farmers.

Table 8 shows the distribution of the sample by country of birth and the other explanatory variables. Most of the second-generation immigrants had one Swedish parent. The highest proportion of unskilled workers was found among first- and second-generation Finnish immigrants. Many immigrants groups had poorer social networks than the Swedish reference group. The majority of the first generation

refugees arrived in Sweden at the age of >16 years. In contrast, most first-generation Finns arrived in Sweden at the age of 0–6 years.

First-generation refugees had the highest prevalence of poor self-rated health, while the lowest prevalence of poor self-rated health was found among the second-generation refugees (data not shown).

Table 9. Age-adjusted odds ratios (OR) with 95% confidence intervals (CI) of poor self-rated health by country of birth, after stepwise inclusion of the explanatory variables. Swedish-born individuals with two parents born in Sweden are used as reference. n = 14,552

Variable	Level	Model 1	Model 2	Model 3
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Country of birth	Sweden	Ref	Ref	Ref
	<i>2nd-generation</i>			
	One Swedish parent	1.35 (1.12–1.62)	1.35 (1.12–1.62)	1.34 (1.12–1.60)
	Finland	1.52 (1.08–2.13)	1.46 (1.03–2.05)	1.43 (1.01–2.01)
	Labour	1.08 (0.69–1.70)	1.06 (0.67–1.66)	1.05 (0.67–1.64)
	Refugee	0.97 (0.34–2.74)	0.99 (0.35–2.79)	0.97 (0.34–2.73)
	<i>1st-generation</i>			
	Finland	1.58 (1.08–2.32)	1.52 (1.04–2.24)	1.52 (1.04–2.23)
	Labour	1.53 (1.04–2.24)	1.52 (1.04–2.24)	1.49 (1.02–2.20)
	Refugee	2.61 (2.22–3.06)	2.58 (2.19–3.03)	2.49 (2.11–2.92)
Sex	Women	1.41 (1.28–1.56)	1.41 (1.27–1.55)	1.43 (1.29–1.58)
	Men	Ref	Ref	Ref
Socioeconomic status ¹	(1)		1.33 (1.15–1.54)	1.33 (1.15–1.54)
	(2)		1.23 (1.07–1.42)	1.23 (1.07–1.41)
	(3)		Ref	Ref
	(4)		1.28 (1.10–1.48)	1.28 (1.10–1.48)
Social networks	Good			Ref
	Poor			1.20 (1.09–1.33)
Hosmer-Lemeshow	p-value	0.44	0.98	0.19

¹Socioeconomic status: (1) Unskilled workers, (2) Skilled workers and lower-level employees, (3) Middle-level employees and professionals, (4) All others, including self-employed individuals and farmers.

Table 9 shows the ORs of poor self-rated health by country of birth, after stepwise inclusion of the explanatory variables in three different models. All models are adjusted for age (not shown) and sex. The reference group consisted of Swedish-born individuals with two parents born in Sweden. In all models the highest risk of poor self-

rated health was found among first-generation refugees. Their OR was 2.61 (CI = 2.22–3.06) in Model 1 and decreased only slightly after stepwise inclusion of SES and social networks. All country-of-birth groups had higher risks of poor-self rated health than the reference group, with the exception of second-generation labour immigrants and second-generation refugees. Individuals with poor social networks, low SES and women had an increased risk of poor self-rated health compared with their corresponding reference group.

Table 10. Odds ratios (OR) with 95% confidence intervals (CI) of poor self-rated health by age at migration to Sweden, after stepwise inclusion of the explanatory variables. Second-generation immigrants are used as reference. n = 2,831

Variable	Level	Model 1	Model 2	Model 3
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Age at migration to Sweden	<i>2nd-generation</i>	Ref	Ref	Ref
	<i>1st-generation</i>			
	0–6 years	0.93 (0.64–1.36)	0.91 (0.62–1.34)	0.91 (0.62–1.34)
	7–16 years	1.72 (1.25–2.36)	1.71 (1.24–2.35)	1.69 (1.23–2.32)
	>16 years	1.96 (1.55–2.47)	1.92 (1.52–2.43)	1.84 (1.45–2.33)
Sex	Women	1.37 (1.13–1.67)	1.37 (1.12–1.66)	1.39 (1.15–1.70)
	Men	Ref	Ref	Ref
Socioeconomic status ¹	(1)		1.23 (0.91–1.65)	1.23 (0.91–1.65)
	(2)		1.34 (1.01–1.79)	1.34 (1.01–1.79)
	(3)		Ref	Ref
	(4)		1.50 (1.12–2.01)	1.50 (1.11–2.01)
Social networks	Good			Ref
	Poor			1.28 (1.05–1.57)
Hosmer-Lemeshow	p-value	0.41	0.61	0.11

¹Socioeconomic status: (1) Unskilled workers, (2) Skilled workers and lower-level employees, (3) Middle-level employees and professionals, (4) All others, including self-employed individuals and farmers.

Table 10 shows the ORs of poor self-rated health among the first-generation immigrants by age at migration to Sweden after stepwise inclusion of the explanatory variables in three different models. Second-generation immigrants are used as reference. There was an apparent gradient between age at migration to Sweden and poor self-rated health; the risk of poor self-rated health increased with increasing age at migration to Sweden. For example, among first-generation immigrants who arrived in Sweden after 16 years of age the OR was almost twice as high as in the reference group. In contrast,

among first-generation immigrants who arrived in Sweden before seven years of age there was no increased risk of poor self-rated health compared to the reference group.

STUDY 5

Table 11 shows population sizes and number of hospital admissions due to mental disorders among first- and second-generation immigrant men and women. For immigrant men and women in the second generation, the numbers are shown by father's and mother's country of birth. The mean age at hospital admission due to mental disorders was 52.1 years for first-generation immigrant men, 52.8 years for first-generation immigrant women, 36.9 years for second-generation immigrant men, and 36.6 years for second-generation immigrant women (data not shown). Hospital admissions due to mental disorders are referred below to as mental disorders.

Table 12 shows the SIRs of mental disorders in first-generation male and female immigrants compared with the reference group; i.e. men or women who were born in Sweden to parents born in Sweden. All results accounted for age, geographic region, and SES (not shown). The overall SIRs for immigrant men and women were 1.23 (95%CI 1.20–1.27) and 1.44 (95%CI 1.41–1.47), respectively. The highest risks of mental disorders were found in men born in Latvia/Lithuania, Yugoslavia, and the Netherlands. In women, the highest risks were found among those born in Latvia/Lithuania, Yugoslavia, and Russia. The risks in these groups were more than double the risks of mental disorders in the reference group. Many groups of first-generation immigrants ran an increased risk of mental disorders compared with men and women with no immigrant background, with the exception of several groups of men and some groups of women. First-generation male and female immigrants from Italy, Greece, Spain, Turkey, and the UK/Ireland had no increased risk of mental disorders (data not shown).

Table 13 shows the SIRs of mental disorders in second-generation immigrant men compared with men born in Sweden to Swedish-born parents. The overall risk of mental disorders was similar for sons of immigrant mothers and sons of immigrant fathers. The only exceptions were second-generation immigrant men from Spain and Latvia/Lithuania where results were discordant, i.e., different by father's or mother's country of birth. Increased risk was associated with having a mother from one of these places, but not with having a father from either area. Second-generation men whose father or mother came from the Nordic countries, Poland, Hungary, Yugoslavia, or Russia exhibited an increased risk of mental disorders. The highest risks in second-generation men were found in those with a Finnish father, Finnish mother, or Spanish mother. Their respective risks were more than 50% higher than the risk found in the Swedish reference group.

Table 11. Population and number of hospital admissions for mental disorders in first- and second-generation immigrants (aged 18–69 years) in Sweden.

Country of Birth	First Generation				Second Generation							
	Men		Women		Men				Women			
					By Father's Birth		By Mother's Birth		By Father's Birth		By Mother's Birth	
	Population	No. of Cases	Population	No. of cases	Country	No. of Population	No. of Cases	Country	No. of Population	No. of Cases	Country	No. of Population
Sweden	2755900	33244	2771073	52379	3069762	45740	3086989	45843	2925851	53925	2944324	54256
Denmark	22315	333	20121	436	26070	495	23309	398	24734	522	21870	420
Finland	91100	1597	118667	3396	105979	2078	137612	2932	100617	2233	130381	3136
Norway	19924	262	27284	613	21979	367	29986	573	20806	428	28395	699
Italy	5461	76	2421	43	5512	78	2402	34	5048	88	2260	27
Greece	8864	140	6160	105	9367	88	6580	68	9048	88	6297	52
Spain	3230	67	1809	38	3405	32	1855	27	3094	35	1786	19
Germany	17426	230	18588	419	18595	293	19991	332	17579	351	18986	418
France	2418	37	1820	39	2377	25	1836	15	2397	40	1771	23
The Netherlands	2529	45	1669	25	2750	28	1854	15	2651	45	1746	19
The U.K./Ireland	7794	111	4775	97	7885	52	5134	38	7557	43	4906	57
Austria	3842	55	2589	66	3970	57	2744	40	3777	65	2463	42
Estonia	6354	43	5764	70	6659	144	5907	133	6504	186	5780	163
Latvia and Lithuania	1296	14	1260	22	1288	34	1188	30	1299	44	1110	43
Poland	9614	261	15569	510	9015	128	13859	125	8518	128	13217	137
Slovakia and the												
Czech Republic	3580	68	3459	100	3595	43	3412	41	3450	86	3188	55
Hungary	6950	139	5158	163	7121	140	5107	87	6662	164	4697	114
Romania	3046	58	3209	98	2729	17	2836	16	2562	35	2621	36
Yugoslavia*	42025	867	37569	1134	46395	340	41845	277	43437	345	38946	292
Russia	3848	36	5034	115	3929	96	4574	80	3825	118	4384	93
Turkey	13585	294	11132	320	19501	128	17020	116	18493	182	16061	158
All foreign born	275201	4733	294057	7809	308121	4663	329051	5377	292058	5226	310865	6003

*Yugoslavia included also the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia.

Table 12. Standardized Incidence Ratios (with 95% confidence intervals) of mental disorders in first- generation immigrants aged 18–69 years.

Country of Birth	Men			Women		
	SIR	95% CI		SIR	95% CI	
Denmark	1.31	1.18	1.46	1.38	1.25	1.52
Finland	1.11	1.06	1.17	1.35	1.31	1.40
Norway	1.27	1.12	1.44	1.65	1.52	1.79
Italy	1.08	0.85	1.35	1.30	0.94	1.76
Greece	0.93	0.79	1.10	0.85	0.69	1.02
Spain	1.23	0.95	1.56	1.04	0.73	1.43
Germany	1.06	0.93	1.21	1.40	1.27	1.54
France	1.18	0.83	1.62	1.45	1.03	1.98
The Netherlands	1.59	1.16	2.12	1.00	0.64	1.47
The UK/Ireland	0.98	0.80	1.18	1.16	0.94	1.41
Austria	1.02	0.76	1.32	1.53	1.19	1.95
Estonia	1.13	0.82	1.52	1.42	1.11	1.79
Latvia and Lithuania	2.20	1.20	3.70	2.62	1.64	3.97
Poland	1.44	1.27	1.62	1.26	1.15	1.37
Slovakia and the Czech Republic	1.33	1.03	1.69	1.46	1.18	1.77
Hungary	1.15	0.96	1.35	1.36	1.16	1.59
Romania	1.00	0.76	1.29	1.43	1.16	1.75
Yugoslavia*	1.95	1.82	2.09	2.37	2.23	2.51
Russia	1.49	1.05	2.07	2.19	1.81	2.63
Turkey	0.99	0.88	1.11	1.06	0.95	1.19
All foreign-born	1.23	1.20	1.27	1.44	1.41	1.47

O = observed number of cases; SIR = standardized incidence ratio; CI = confidence interval. Bold type: 95% CI does not include 1.00. Reference groups: Population of Swedish-born men or women with both parents born in Sweden.

*Yugoslavia also included the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia.

Table 13. Standardized Incidence Ratios (with 95% confidence intervals) of mental disorders in second-generation immigrant men aged 18–69 years by father’s country of birth and mother’s country of birth.

Parental country of birth	By father’s birth country			By mother’s birth country		
	SIR	95% CI		SIR	95% CI	
Denmark	1.35	1.23	1.47	1.23	1.11	1.36
Finland	1.56	1.49	1.63	1.55	1.50	1.61
Norway	1.28	1.15	1.42	1.28	1.18	1.39
Italy	1.20	0.94	1.49	1.19	0.83	1.67
Greece	1.12	0.90	1.39	1.07	0.83	1.36
Spain	1.07	0.73	1.51	1.53	1.01	2.23
Germany	1.05	0.93	1.17	0.98	0.88	1.09
France	1.39	0.90	2.05	1.03	0.58	1.71
The Netherlands	0.90	0.60	1.30	0.81	0.45	1.34
The UK/Ireland	1.35	1.01	1.77	1.08	0.76	1.48
Austria	0.98	0.74	1.27	0.91	0.65	1.24
Estonia	1.00	0.84	1.17	1.05	0.88	1.25
Latvia and Lithuania	1.29	0.89	1.80	1.49	1.01	2.13
Poland	1.44	1.20	1.71	1.25	1.04	1.49
Slovakia and the Czech Republic	0.86	0.62	1.16	0.92	0.66	1.26
Hungary	1.35	1.14	1.60	1.28	1.03	1.58
Romania	0.88	0.51	1.41	0.84	0.48	1.37
Yugoslavia*	1.50	1.35	1.67	1.43	1.27	1.61
Russia	1.44	1.17	1.76	1.46	1.16	1.82
Turkey	1.13	0.94	1.34	1.12	0.92	1.34
All foreign-born	1.36	1.32	1.40	1.36	1.33	1.40

SIR = standardized incidence ratio; CI = confidence interval.

Bold type: 95% CI does not include 1.00. Reference group: Swedish-born men with both parents born in Sweden. *

*Yugoslavia also included the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia.

Table 14 shows the SIRs of mental disorders in second-generation immigrant women compared with women born in Sweden to Swedish-born parents. The overall risk of mental disorder was similar for daughters of immigrant mothers and daughters of immigrant fathers, although there were several exceptions. Results were discordant, i.e., different by father’s or mother’s country of birth for second-generation immigrant women from Italy, France, the UK/Ireland, Poland, and Slovakia/the Czech Republic. Second-generation women whose father or mother came from the Nordic countries, Latvia/Lithuania, Hungary, Romania, Yugoslavia, Russia, or Turkey exhibited an increased risk of mental disorders. The highest risks in second-generation immigrant women were found in those with a mother from Latvia/Lithuania, a mother from

Romania, or a father from France. Their respective risks were 70% to 90% higher than the risk found in the Swedish reference group.

Table 14. Standardized Incidence Ratios (with 95% confidence intervals of mental disorders in second-generation immigrant women aged 18–69 years by father’s country of birth and mother’s country of birth

Parental country of birth	By father’s birth country			By mother’s birth country		
	SIR	95% CI		SIR	95% CI	
Denmark	1.26	1.16	1.38	1.16	1.05	1.27
Finland	1.46	1.40	1.52	1.45	1.40	1.50
Norway	1.30	1.18	1.43	1.38	1.28	1.48
Italy	1.27	1.02	1.57	0.92	0.61	1.35
Greece	1.03	0.82	1.27	0.78	0.59	1.03
Spain	1.06	0.74	1.48	1.00	0.60	1.56
Germany	1.10	0.99	1.22	1.10	1.00	1.21
France	1.81	1.30	2.47	1.45	0.92	2.18
The Netherlands	1.35	0.98	1.81	0.94	0.57	1.48
The UK/Ireland	0.91	0.65	1.22	1.35	1.02	1.74
Austria	0.99	0.76	1.26	0.89	0.64	1.20
Estonia	1.09	0.94	1.26	1.08	0.92	1.26
Latvia and Lithuania	1.40	1.02	1.88	1.87	1.35	2.52
Poland	1.26	1.05	1.50	1.14	0.96	1.35
Slovakia and the Czech Republic	1.47	1.18	1.82	1.08	0.81	1.41
Hungary	1.38	1.17	1.61	1.49	1.23	1.79
Romania	1.60	1.11	2.23	1.74	1.22	2.41
Yugoslavia*	1.35	1.22	1.51	1.36	1.21	1.52
Russia	1.48	1.23	1.78	1.45	1.17	1.77
Turkey	1.41	1.21	1.63	1.36	1.16	1.59
All foreign-born	1.34	1.30	1.37	1.34	1.30	1.37

SIR = standardized incidence ratio; CI = confidence interval.

Bold type: 95% CI does not include 1.00. Reference group: Swedish-born women with both parents born in Sweden.

*Yugoslavia also included the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia.

The risk of mental disorders among second-generation immigrants with two foreign-born parents was also analysed. The results showed the same pattern as was found when the father and mother were treated separately (data not shown).

Table 15. Presence or absence of increased risk of mental disorders by generation, sex, country of birth, and parental country of birth.

	First generation		Second generation			
	Men	Women	Men		Women	
Country of birth			father's birth country	mother's birth country	father's birth country	mother's birth country
Denmark	+	+	+	+	+	+
Finland	+	+	+	+	+	+
Norway	+	+	+	+	+	+
Italy	-	-	-	-	+	-
Greece	-	-	-	-	-	-
Spain	-	-	-	+	-	-
Germany	-	+	-	-	-	+
France	-	+	-	-	+	-
The Netherlands	+	-	-	-	-	-
The UK/Ireland	-	-	+	-	-	+
Austria	-	+	-	-	-	-
Estonia	-	+	-	-	-	-
Latvia/Lithuania	+	+	-	+	+	+
Poland	+	+	+	+	+	-
Slovakia/Czech Republic	+	+	-	-	+	-
Hungary	-	+	+	+	+	+
Romania	-	+	-	-	+	+
Yugoslavia*	+	+	+	+	+	+
Russia	+	+	+	+	+	+
Turkey	-	-	-	-	+	+
All	+	+	+	+	+	+

+ indicates increased risk compared to the Swedish reference group

- indicates no increased risk compared to the Swedish reference group

*Yugoslavia also included the different independent countries that were established after the split of Yugoslavia, such as Bosnia and Croatia.

Table 15 provides an overview, by country, of the presence or absence of increased risk in each of the six subgroups of immigrants, i.e., first-generation men, first-generation women, second-generation men by father's country of birth, second-generation men by mother's country of birth, second-generation women by father's country of birth, and second-generation women by mother's country of birth. The plus symbol (+) indicates increased risk of mental disorders compared to the reference group, and the minus symbol (-) indicates no such increased risk. The overall SIRs showed that all six subgroups of immigrant men and women (both first- and second-generation) exhibited an increased risk of mental disorders. However, the categorization of results by country revealed diverse results depending on subgroup. For some countries or groups of countries, all six subgroups exhibited an increased risk of mental disorders, whereas for other countries or groups of countries only a few

subgroups exhibited increased risk of mental disorders. For example, all subgroups from the Nordic countries, Yugoslavia, and Russia had increased risks. Only immigrants from Greece had no increased risk in any of the six subgroups. For some countries or groups of countries, the increased risk was present only in the first generation, only in the second generation, or only in men or women. For Turkey, increased risk was present only among second-generation women.

DISCUSSION

MAIN FINDINGS

Second-generation immigrants with one parent born in Sweden and second-generation Finns had a higher risk of being hospitalized for psychotic disorders, affective disorders, neurotic disorders, and personality disorders than the Swedish majority population. Second-generation refugees had a higher risk of being hospitalized for psychotic disorders than the Swedish majority population. All results remained significant after adjustment for SES (study 1).

The increased risk of psychotic disorders among certain immigrant groups is also present in the next generation. For example, both first-generation and second-generation Finns had a higher risk of being hospitalized for psychotic disorders than the Swedish majority population. Having one parent born in Sweden had no protective effect on the risk of being hospitalized for psychotic disorders among second-generation immigrants. Low individual SES, measured as income, was associated with an increased risk of being hospitalized for psychotic disorders. The impact of income on the association between immigrant status and hospitalization due to psychotic disorders showed no specific patterns in the interaction tests (study 2).

The highest risks of being hospitalized for alcohol abuse and drug abuse were found among first- and second-generation Finns. Among second-generation Finns with one parent born in Sweden the increased risk of being hospitalized for alcohol abuse and drug abuse was lower than among second-generation Finns with both parents born in Finland. For some immigrant groups, the risks were similar to or even lower than the Swedish reference group. For example, first-generation refugees had a lower risk of being hospitalized for alcohol abuse and drug abuse, after adjustment for income. Among all men the risk of being hospitalized for alcohol abuse and drug abuse increased markedly when income decreased. However, for women no gradient for income was found (study 3).

The risk of poor self-rated health increased with increasing age at migration to Sweden among first-generation immigrants after adjustment for potential confounders. In addition, most of the immigrant groups had higher risks of poor-self rated health than the reference group (study 4).

When first- and second-generation European immigrants were categorized into subgroups by country of birth, sex, and father's and mother's country of birth, there was large heterogeneity in the risk of hospitalization for mental disorders. The increased risk among some first-generation immigrants persisted among the second-generation immigrants, whereas in other immigrant groups, the risk observed in the first-generation disappeared in the second-generation or appeared in the second-generation without being present in the first-generation (study 5).

PREVIOUS STUDIES

In the UK several studies in the 1980s and 1990s found that the risk of schizophrenia was higher among certain immigrant groups than in the majority population (Bhugra,

2000). Other studies from different parts of the world demonstrate similar results, with higher rates of psychotic disorders among some groups of first-generation immigrants (Cantor-Graae et al., 2003, Harrison et al., 1997, Selten et al., 2001, Zolkowska et al., 2001), which is in agreement with study 2.

Our findings of an increased risk of hospitalization for mental disorders among first- and second-generation Finns is in accordance with previous studies from Sweden of first-generation immigrants from Finland (Johansson et al., 1998). Additionally, Finnish immigrants in Sweden have an increased risk of alcohol-related deaths compared to the majority population (Hallberg and Mattsson, 1991) and the general Finnish population (Agren and Romelsjo, 1992). Previous studies of second-generation Finns in Sweden have also shown an increased risk of hospitalization due to alcohol-related disorders (Hjern and Allebeck, 2004) and drug abuse (Hjern, 2004) compared to the majority population, which is in agreement with the findings in study 3.

In contrast, a previous study from Sweden found that first- and second-generation immigrants from southern Europe, the Middle East and other non-European countries had lower risks of alcohol-related disorders than the majority population (Hjern and Allebeck, 2004). A Dutch study found elevated rates of drug abuse in refugees and immigrants from the former colonies, which was explained by their disadvantaged situation in society (van de Wijngaart, 1997). Our finding that European first- and second-generation immigrants presented a large heterogeneity in the risk of hospitalization for mental disorders when categorized into subgroups is in accordance with a recent study from Norway that collected data from immigrants with 11 different ethnic origins. The authors of the Norwegian study found that different gender, generation, and ethnic groups differed in their vulnerability to psychiatric morbidity (Oppedal et al., 2005). A study of Greek-Cypriot immigrants in London found that the age-specific incidence of psychiatric disorder was the same as that seen in a native British sample (Mavreas and Bebbington, 1989). A study from Israel of 10,902 patients hospitalized for schizophrenia between 1978 and 1992 found considerable gender differences and variations between immigrant groups in age at onset and first hospitalization rates for schizophrenia (Rabinowitz and Fennig, 2002). The findings from Israel underscore the heterogeneity between population groups in mental disorders, which is consistent with the studies included in the present thesis.

Heterogeneity between different ethnic groups in mental health has also been found in studies from the US. For example, middle-aged Hispanic and African-American women had higher risks of depression than white non-Hispanic women, whereas Chinese and Japanese women had lower risks (Bromberger et al., 2004). In contrast, a study of young adults found that African Americans had substantially lower rates of depressive disorders than non-Hispanic white participants (Turner and Gil, 2002). A comparison between black and white patients in the US found that black patients had a lower risk of being diagnosed with depression and a higher risk of being diagnosed with schizophrenia (Strakowski et al., 1996). A study among middle-aged Americans found higher rates of depressive symptoms among certain immigrants (Wilmoth and Chen, 2003).

The findings of study 4 showed that most of the immigrant groups had higher risks of poor-self rated health than the reference group, which is in accordance with several previous studies from different parts of the world (Baron-Epel and Kaplan, 2001, Lindstrom et al., 2001, Reijneveld, 1998, Ren and Amick, 1996, Sundquist, 1995). For example, previous studies from Sweden have found ethnic differences in self-rated

health in Malmö, a city in southern Sweden (Lindstrom et al., 2001), and population-based differences in self-reported illness among immigrants groups (Sundquist, 1995). A Dutch study found that immigrants from Turkey, Morocco, and former Dutch colonies had a higher risk of poor self-rated health than the majority population (Reijneveld, 1998). Racial differences in self-rated health were found in the USA (Ren and Amick, 1996), and among immigrants from the former Soviet Union in Israel a higher risk of poor self-rated health was found (Baron-Epel and Kaplan, 2001).

POSSIBLE PATHWAYS

Although the studies included in the present thesis do not allow the drawing of inferences about causal relationships, there are several possible explanations for our findings.

Many immigrant groups have a low SES, which could act as a mediator in the association between migration and mental disorders. Low SES is associated with increased psychiatric admission rates (Boardman et al., 1997). In addition, many immigrant groups have higher unemployment rates than the majority population, which could lead to social exclusion and alienation. However, it is important to note the difference between the social selection processes and the social causation processes. The social selection theory states that downward social mobility occurs in individuals predisposed to mental disease, whereas the social causation theory states that the development of mental disease is caused by the stress that is associated with low SES (Dohrenwend et al., 1992). Although this issue is not fully clarified, it is necessary to include SES as a potential confounder in studies of the association between migration and mental health. In the present study most results remained significant after accounting for SES, which indicates that SES alone cannot explain the increased risk of hospital admissions for mental disorders in some immigrant groups. Other factors must play a role.

Humans have migrated alone or in groups since the beginning of the human race. Practically no human civilization has existed without the presence of migrants. Migration is associated with profound psychosocial changes, which have sometimes been considered to be an aetiological factor in the development of mental disorders. Genetic differences between populations and a differential genetic vulnerability between population groups have also been suggested to play a role in the development of mental disorders. However, although there is a strong heritable component to several mental disorders (obsessive-compulsive disorder, panic disorder, major depressive disorder, bipolar disorder, and schizophrenia), the search for specific genes of these complex disorders continues (Shih et al., 2004). Therefore, before the differences between population groups can be explained by genetic causes it is necessary to detect the specific gene for the mental disorder in question and show that this specific gene is more common in certain population groups. In order to shed light on the aetiology behind the increased risk of schizophrenia in certain immigrant groups, Bhugra studied rates of first-onset schizophrenia in Trinidad and London and found that the sending countries have low rates. He concluded that the impact of migration produces high stress that is likely to play a role in the genesis of schizophrenia. In addition, rates of schizophrenia were even higher in the second generation (Bhugra, 2000). A large-scale Swedish study of psychoses in two generations of immigrants found that controlling for

psychotic illness in parents did not alter the results in the second generation. The authors concluded that factors related to the new society were more important than factors related to the country of origin in the development of psychosis (Hjern et al., 2004). Exposure to viral infections in the host country has also been discussed as a possible explanation to the epidemiology of schizophrenia in certain immigrant groups (Gupta, 1993). It has also been hypothesized that obstetric complications and perinatal infections, rather than psychosocial explanations, provide more plausible aetiological models for the raised rates of schizophrenia among second-generation Afro-Caribbean immigrants in the UK (Eagles, 1991).

Urban birth seems to be a risk factor for psychosis. Previous studies from Europe and Scandinavia found a twofold increase in risk in individuals born in the city compared with individuals born in rural regions (Marcelis et al., 1998, Mortensen et al., 1999). If these findings are valid, urban birth could act as a mediator in the increased risk of psychosis in second-generation immigrants because many second-generation immigrants in Sweden are born in the cities. Two large-scale studies from Sweden found associations between urbanization, defined as population density, and hospitalization for psychotic disorders, depression, and substance abuse (Sundquist et al., 2004, Sundquist and Frank, 2004). In addition, chronic abuse of cannabis has been pointed out as a mediating factor in schizophrenia (Zammit et al., 2002). Hospital admission due to illicit drug abuse is more common in second-generation immigrants and in socially adverse environments (Hjern, 2004). The elevated rates of psychopathology in US-born Mexican Americans compared to Mexico-born immigrants may be related to easier access and a higher prevalence of substance abuse among the US-born (Escobar et al., 2000).

Many immigrants in Sweden live in poor, segregated, urban areas (The National Board of Health and Welfare, 2002), which could have a negative impact on their mental health. Previous studies from Sweden have found associations between neighbourhood segregation (defined as proportion of individuals with low income in the neighbourhood) and hospital admissions for mental disorders (Sundquist and Ahlen, 2006) and self-reported anxiety (Lofors et al., 2006). However, an Australian study from Brisbane found that neither migrant status nor urban birth was associated with psychosis. The authors concluded that environmental risk factors may operate in Europe but not in Australia and suggested that the built environment might have an effect on mental health. For example, most dwellings in Brisbane are detached, single-family occupancy houses on at least 1,000 square metres of land whereas Northern European cities have more apartments (McGrath et al., 2001). Living in high-rise flats in city areas is associated with increased levels of psychological distress (McCarthy et al., 1985). In Sweden, newly arrived immigrants were directed by the authorities to municipally owned multioccupancy blocks with low status (Kuusela, 1993), which increases ethnic segregation. Possible features in poor, segregated neighbourhoods with a negative impact on people's mental health could include violent and non-violent crime, litter, broken glass, unleashed dogs, and abandoned cars. This kind of features could make people feel unsafe and increase negative feelings. Living in poor, segregated areas could also lead to alienation and insufficient social networks and social support.

A great deal of social support is offered by the traditional Mexican family, which could explain why Mexican-born immigrants, despite significant socioeconomic disadvantages, have better mental health profiles than US-born Mexican Americans

where the traditional family ties are weaker (Escobar et al., 2000). Among second-generation Latin-Americans poor family networks increased the risk of depression (Hovey and King, 1996). Furthermore, first-generation immigrants may have lower expectations than second-generation immigrants of educational and income achievements, which may, especially if the family ties are weakened and the expectations are not fulfilled, lead to worsened mental health in the second-generation.

Bhugra conducted a review article of migration and depression and found that rates of depression varied by immigrant group. Some groups were more likely to suffer from depression whereas other groups were less likely to report depressive symptoms (Bhugra, 2003). Several possible explanations behind these findings were discussed by Bhugra, such as cultural differences, psychoanalytical explanations, and cognitive theories. For example, culture shock is a sudden, unpleasant experience of the new culture, which may cause the individuals to evaluate their own culture negatively. Culture shock could also be described as an inability to understand, control, and predict the new environment, which causes an emotional stress reaction including anxiety, confusion, and anger until some kind of adaptation has been achieved. Culture conflict, on the other hand, is often seen in adolescents who are able to adjust at school but not with their parents. The second-generation may sometimes adopt more modern approaches to the new culture than their parents, which could lead to isolation and feelings of alienation in the second generation.

Psychoanalytical explanations behind the increased rates of depression in some immigrant groups include mourning due to a sense of loss. Migration inevitably leads to loss of social networks including friends and relatives. The loss also includes occupational status, at least temporarily. Cognitive models of depression could vary according to cultural differences. For example, some immigrants could feel ashamed of their depressive symptoms, which could lead to somatization. However, the impact of migration on depression seems to vary by immigrant group, educational status, and income and time since migration (Bhugra, 2003).

Although the present study did not investigate causal mechanisms, it is possible that the various reasons for migration could have a different effect on immigrants, at both individual and group level. For example, labour immigration could lead to expectations of economic success that are not always fulfilled, whereas forced migration could lead to feelings of entrapment because of inability to return. In addition, some refugees carry on double burdens as they both experience the stress of the migration process itself and traumatic memories of torture, war, and persecution in the home country. A previous study found that traumatic events and human rights violations before migration increased the risk of mental disorders in refugees. The increased risk was maintained 20 years after migration (Sabin et al., 2003). Dutch-Australian immigrants who had experienced the Second World War often suffered from posttraumatic stress disorder (PTSD) (den Velde et al., 2000). In addition, anxiety and depression were associated with each traumatic event before migration in refugees from Somalia (Bhui et al., 2003).

Although the theories of Ødegaard date back to 1932 they are still often referred to (Ødegaard, 1932). Ødegaard found higher rates of schizophrenia in Norwegians who had immigrated to Minnesota than in the native-born population and in Norwegians who had remained in Norway. He presented a theory of selective migration where pre-schizophrenic individuals who are poorly adjusted in their home country migrate. The increased risk of psychotic disorders found among certain second-generation

immigrants in our studies could be explained by selective migration on a parental basis. However, controlling for psychotic illness in parents did not alter the results in a large-scale Swedish study of psychoses in two generations of immigrants (Hjern et al., 2004). The selective migration theory is also refuted by data from the Netherlands showing a five-fold increase in schizophrenia risk among migrants from Surinam. Almost half of the population from Surinam migrated to the Netherlands, i.e. selective migration is not likely to explain the increased risk of schizophrenia among migrants from Surinam (Selten and Sijben, 1994). Other researchers have proposed the healthy migrant theory, which means that the strongest individuals migrate. This theory suggests that a positive selection of healthy individuals leads to a better health status in certain immigrants than in the native-born population (Marmot et al., 1984).

It has been suggested that discrimination on the basis of ethnic background could lead to psychosis-like phenomena and psychotic disorders (Gilvarry et al., 1999, McKenzie et al., 1995, Janssen et al., 2003, Karlsen and Nazroo, 2002). However, psychiatric patients could also misinterpret the intention and motives of others, which in extreme forms could lead to persecutory delusions. For example, Gilvarry et al. found that some migrant patients were more prone to interpret negative events as part of a continuous discrimination on account of their ethnic background (Gilvarry et al., 1999).

Acculturation involves the complex processes of integration and adaptation to the host country (Ryder et al., 2000). It includes having good language skills and being gainfully employed (Lieber et al., 2001). Acculturation could be regarded as a complex process that occurs in the immigrant as time passes by (Ritsner and Ponizovsky, 1999, Ryder et al., 2000) and is normally associated with positive health benefits.

However, a review from the US found that acculturation had a negative effect on mental health among Mexican Americans, i.e. the lower the level of acculturation and the shorter the time since immigration, the lower the prevalence of mental disorders. The authors concluded that acculturation could lead to an erosion of traditional Mexican family networks (Escobar et al., 2000), which could lead to a higher prevalence of poor mental health. It is possible that acculturation in certain immigrant groups ideally should occur stepwise in order to act optimally. For example, some second-generation immigrants might experience weakened ties with their traditional culture and poorly established ties with the new culture. A study of Latinos living in California found that self-rated health is negatively associated with acculturation stressors (Finch and Vega, 2003). A study of Mexican Americans in Texas found that self-rated mental and physical health outcomes differed by level of acculturation (Franzini and Fernandez-Esquer, 2004), which is in accordance with the findings in study 4. Finally, acculturation could lead to negative health effects on immigrants if a poor lifestyle, heavy drinking, and substance abuse are more common in the host country than in the country of origin. However, it could also lead to positive health effects if these factors are less common in the host country than in the country of origin.

Patterns of alcohol and drug abuse vary considerably between societies, urban/rural areas, countries and population groups. These variations are sometimes due to differences in religion, culture, availability, legal restrictions, social factors, and social norms. For example, Moslems are less likely to enter into alcohol abuse because of religious traditions. In Sweden, alcohol is exclusively sold in government-owned stores at a relatively high cost due to high taxes on alcohol. In addition, restaurants in Sweden need a licence to sell alcoholic beverages.

The risk of alcohol-related disorders varied considerably between immigrant groups in Sweden in a large-scale cohort study from Sweden. In addition, the authors concluded that patterns of alcohol abuse in the country of origin are strong determinants of alcohol-related disorders and that second-generation immigrants are influenced both by patterns in the country of origin and by the patterns in the host country (Hjern and Allebeck, 2004). A study from the US found lower rates of substance abuse among foreign-born youths compared to US-born youths. However, the risk of substance abuse increased when the length of residence increased, which indicates that acculturation does not always bring health benefits (Gfroerer and Tan, 2003).

Several studies have investigated mental health among immigrant children and adolescents (Brindis et al., 1995, Goodman and Richards, 1995, Hovey and King, 1996, Major, 1996, McKelvey et al., 2002, Sawyer et al., 1990, Sawyer et al., 2001, Sowa et al., 2000). Some studies have also investigated possible explanations behind the increased risk of mental health problems among certain groups of immigrant children and adolescents. Turkish immigrants in the Netherlands often have high unemployment rates, poor education, low income and a poor knowledge of the Dutch language and their children often have behavioural and emotional problems, which indicates that poor acculturation in the first generation could lead to problems in the second generation of Turks. A Dutch study investigated factors associated with problem behaviours in Turkish immigrant children. The authors found that migration history alone did not contribute to behavioural problems. Rather, factors in the family such as quarrels, divorce and conviction had a stronger impact on behavioural problems among the children. In addition, increased integration (children born in the Netherlands and older children) lowered the risk of behavioural problems (Sowa et al., 2000). Children of immigrant parents often experience the same acculturative stress as their parents, i.e. learning a new language and adapting to a new culture. Acculturative stress has its source in the acculturative process (Berry and Kim, 1988, Williams and Berry, 1991) and may lead to depression, anxiety, feelings of marginalization and alienation, identity problems, and psychosomatic symptoms (Williams and Berry, 1991). In addition, certain variables may act as “buffers” in reducing acculturative stress. Examples of such buffers are social support within the new community and the family, socioeconomic conditions such as having a job and a good education, cognitive attributes such as expectations and attitudes, and the degree of tolerance towards cultural diversity within the new country (Berry and Kim, 1988, Williams and Berry, 1991).

A study from a southern California high school of male and female students found that one fourth of the Latino adolescents reported critical levels of depression and suicidal ideation, which were associated with acculturative stress. In addition, perceived family dysfunction and negative expectations for the future were significant predictors of both acculturative stress and depression (Hovey and King, 1996).

A study of refugee children from Chile and the Middle East found that exposure to organized violence was a strong determinant of poor mental health (Hjern and Angel, 2000). Data from 99 Bosnian school children living in Sweden revealed significant associations between war stress and current psychological problems (Angel et al., 2001). Two comparative studies, conducted in Australia and the US, found that first- and second-generation adolescents of Chinese descent had more structured family

environments than non-immigrant adolescents (Rosenthal and Feldman, 1990), which partly could explain the lower risk of poor mental health in Asian immigrants.

THE FINNS IN SWEDEN

Finnish migrants constitute by far the largest immigrant group in Sweden. First- and second-generation immigrants in Sweden evinced particularly high risks of hospitalization for mental disorders and alcohol abuse in the studies included in the present thesis. Attitudes and drinking habits could be carried over from the first to the second generation of Finns. For example, heavy drinking leading to intoxication is more common in Nordic countries than in Southern Europe. A study of episodic heavy drinking in the Nordic countries found that the frequency of intoxication was highest in Finland (Mäkelä et al., 2001). It is possible that some Finns are poorly acculturated in Sweden, which means that these individuals will not evince the protective effect of acculturation on drinking patterns. Many Finns in the first generation have poor language skills in Swedish, which could be explained by the large language differences between Swedish and Finnish. Swedish belongs to the Indo-European language group while Finnish belongs to the Finno-Ugric language group. Although we lacked information about language spoken, the large difference in language is probably a significant barrier for many Finns living in Sweden, which could have a negative impact on health. In addition, Finland's history has been much more dramatic than that of Sweden. Sweden did not take part in the First or the Second World War, whereas in Finland the first half of the 20th century was characterized by wars and internal instability. During the Second World War many refugees from Finland arrived in Sweden. Among them 70,000 were evacuated children (in Swedish: *krigsbarn*) and nearly 25% of them stayed in Sweden. For many of these children this experience was highly traumatic. "These children had experienced separation and break-up from the biological family, confrontation with the foster family or orphanage, sometimes difficult experiences from the war itself and a change of language and culture, all of which can be very traumatic" (Lagnebro, 1994). Finally, Finns have not only poorer mental health profiles than Swedes. They also have a higher risk of cardiovascular diseases (Gadd et al., 2003) and overall mortality (Bayard-Burfield et al., 1998), which shows that this particular immigrant group needs special attention in both somatic and psychiatric care.

STRENGTHS AND LIMITATIONS

There are some limitations to the present study. First, the national database of the whole Swedish population included only hospital admissions for mental disorders and substance abuse, i.e. outpatients were not included in this study. Since out-patients were not included, it is possible that selection bias existed. It is possible that migrants are more or less likely than the majority population to seek psychiatric hospital care. Second, we had no data on social services. This implies that the possible determinants for referral to services and possible differences between immigrants and the majority population were not available to us. Third, it is possible that residual confounding exists. For example, in a study of SES in blacks and whites it was found that years of

education do not capture the quality of the education (Kaufman et al., 1997). Fourth, it was not possible to include individual social networks in studies 1, 2, 3, and 5 since the data consisted of the entire Swedish-born population. Fifth, there is no official translation from ICD-9 to ICD-10. For this reason the codes in ICD-10 were chosen to correspond as closely as possible to the previous codes in ICD-9. This might constitute a bias if this switch from one classification to another entailed significant differences between diagnostic categories. However, our study compared differences in hospitalization between immigrants groups and not differences in hospitalization between two time periods. This possible bias would therefore have affected all the immigrant categories equally and only to a small extent affected the results. Sixth, even though the concept of “risk” is often used in the literature, the estimated hazard ratios cannot fully describe its dimensions, which include complex, multidimensional and non-linear processes. In addition, these processes are bound to culture, time, and place, and the necessary conditions for these processes to occur could not be measured simply by the use of our statistical models. These linear models can only capture linear associations, which represent a blunt tool in the context of human behaviour. Seventh, since our study was based on the entire population it was not possible to include complex information that gives a sense of the person, i.e. the types of resources that help the individual to adapt daily in a variety of roles, environments and contexts. Such internal resources could be described as individual skills, abilities, and values that together with external resources, e.g. membership and identification in networks, help the person to maintain healthy lifestyle behaviours. In addition, language difficulties could also hinder a correct diagnosis. Selten et al. (Selten et al., 2001) underlined that ideas of witchcraft and sorcery that are common in some cultures are considered to be delusional in another culture. Psychiatrists might not be aware of such cultural differences, which could lead to overdiagnosis of psychoses in some immigrant groups. However, underestimation of the actual prevalence of psychotic disorders in certain immigrant groups is also likely if a strong cultural stigma is associated with acquiring a psychiatric diagnosis. Eighth, the variable country of birth is not equal to an individual’s ethnicity. The contextual nature of the concept of ethnicity covers a wide range of experiences and complex identities, and the different ways of classifying ethnicity in health research were recently criticized due to several shortcomings (Bradby, 2003). Since our study was based on a research database of the entire Swedish-born population the only way to measure ethnicity was through the variable “country of birth”. In addition, country of birth has been used in other comparable cohort studies as a proxy for ethnicity (Hjern et al., 2004). Finally, and possibly most importantly, the studies included in the present thesis did not investigate causal relationships.

However, the limitations of this study are balanced by its strengths. Our study population consisted of practically all Swedish-born and foreign-born women and men. Data from the national database were nearly 100 percent complete for all variables. The unique population registers in Sweden are highly complete; very few pieces of data are missing. In 2001, personal identification numbers were missing in 0.4% of number of hospitalizations and the main diagnosis was missing in 0.9% of the hospitalizations (Rosen and Hakulinen, 2005). The quality of the Multigeneration part of the MigMed database is very high, including information about parents, children, siblings and adoptions for index persons born 1932 or later and domiciled in Sweden any time between 1947 and 2001. For example, for Swedish-born index persons (including

second-generation immigrants), data on mothers are missing for 3% of persons, and on fathers for 5% (Statistics Sweden, 2005). In addition, we adjusted our models for important socioeconomic variables such as income and educational status. Because of the unique Swedish identification number it was possible to follow each individual during the whole follow-up period. Key strengths of study 4 are that we included SES and social networks as potential confounders. Other important strengths of study 4 are the large sample size, representative of the entire Swedish population aged 16–34 years, and the reliability of the survey questions, collected in face-to-face interviews by well-trained interviewers. The reliability was proven to be high when a sample of the participants was re-interviewed (test-retest method) (Statistics Sweden, 1989). The non-response rate was relatively low (approximately 20%) compared to many other similar types of national surveys. Although the measure of self-rated health is merely a subjective health assessment, self-rated health is a predictor of the “hard” outcome mortality (Idler and Angel, 1990, McGee et al., 1999, Mossey and Shapiro, 1982, Sundquist and Johansson, 1997). Finally, it is likely that our measure of acculturation which separated first-generation immigrants who migrated in early childhood from first-generation immigrants who arrived in Sweden later in life is a good predictor of acculturation, as immigrants who arrive in the host country in early childhood might have better opportunities to achieve good language, communicative, and social skills.

CONCLUSIONS

Our results showed that certain groups of second-generation immigrants exhibit a higher risk than the Swedish majority population of being hospitalized for mental disorders, including psychotic disorders. The highest risks were found among Finns and the increased risk in the first generation of Finns was also present in the second generation. The highest risks of being hospitalized for alcohol abuse and drug abuse were also found among first- and second-generation Finns. In addition, having one parent born in Sweden implied an increased risk of being hospitalized for psychotic disorders, affective disorders, neurotic disorders, and personality disorders, i.e. having one parent born in Sweden had no protective effect.

Higher age at migration to Sweden was significantly associated with poorer self-rated health in first-generation immigrants. The implications of these findings are that health care workers and policy makers need to be aware that immigrants who have arrived in the host country at higher ages might need special attention as they are more likely to suffer from poor self-rated health, a valid health status indicator that can be used in population health monitoring.

Current rates of global migration make it crucial for industrialized countries like Sweden to develop and implement clinical strategies and public health policies for improving mental health in vulnerable groups of first- and second-generation immigrants. Such measures will likely need to be widely and easily accessible, not only via the social and health care services provided to immigrants, but also via the school health care system, where the proportion of second-generation immigrant children is increasing. In addition, political decision-makers, researchers and clinicians should take measures to develop effective prevention of substance abuse, which in turn increases the risk of mental disorders. Finally, the vulnerability among Finns, the largest immigrant group in Sweden, is of particular concern. Further research should focus on

factors associated with the increased risk of mental disorders and substance abuse in the Finnish immigrant group in Sweden and possible differences between Finns living in Sweden and Finns living in Finland. Collaboration between Finnish and Swedish researchers could shed new light on this area of research.

SUMMARY IN SWEDISH

BAKGRUND

Både påtvingad och frivillig migration leder till dramatiska förändringar i individens liv. Praktiskt taget allt i omgivningen förändras i samband med migrationen, t.ex. klimat, socioekonomi, sociala nätverk, arbetssituation och kultur. Den globala migrationen har även lett till stora demografiska förändringar. I alltfler industrialiserade länder utgör idag första och andra generationens invandrare en ökande andel av befolkningen. Ett flertal studier från Sverige och internationellt har påvisat att en del invandrargrupper har sämre psykisk och självupplevd hälsa än majoritetsbefolkningen. Eftersom första och andra generationens invandrare idag utgör ca en femtedel av befolkningen i Sverige behövs stora populationsbaserade studier för att undersöka eventuella skillnader i psykisk och självupplevd hälsa hos olika invandrargrupper och majoritetsbefolkningen efter att hänsyn tagits till socioekonomiska faktorer.

SYFTE

Delarbete 1

Att analysera om andra generationens invandrare har en högre risk än majoritetsbefolkningen att bli inlagd för olika psykiatriska diagnoser efter att hänsyn tagits till socioekonomiska faktorer.

Delarbete 2

Att analysera om den ökade risken för att bli inlagd p.g.a. psykos som finns hos vissa första generationens invandrare kvarstår i den andra generationen och om det har en skyddande effekt att ha en förälder som är född i Sverige.

Delarbete 3

Att analysera om den ökade risken att bli inlagd p.g.a. alkoholmissbruk och drogmissbruk som finns hos vissa första generationens invandrare kvarstår i den andra generationen och om det har en skyddande effekt att ha en förälder som är född i Sverige.

Delarbete 4

Att analysera sambandet mellan ålder vid migration och självupplevd hälsa hos unga invandrare.

Delarbete 5

Att analysera om den ökade risken som finns hos vissa första generationens invandrare för att bli inlagd p.g.a. psykiatrisk diagnos kvarstår i den andra generationen och, om ökad risk påvisas, undersöka om den varierar beroende på kön.

METOD

I delarbete 1, 2, 3 samt 5 användes databasen MigMed som innehåller avidentifierade uppgifter om hela den svenska, vuxna befolkningen. Exempel på data som ingår i databasen är ålder, kön, socioekonomiska uppgifter, slutenvårdsinläggningar, dödsorsaker samt individens och föräldrarnas födelseland. Dessutom är Flergenerationsregistret kopplat till MigMed. I delarbete 4 användes ULF (Undersökning av Levnadsförhållanden) som utgörs av Statistiska Centralbyråns årliga intervjuer av ett representativt urval av befolkningen i åldrarna 16–84 år.

Delarbete 1

Totalt 1,9 miljoner svenskfödda män och kvinnor i åldrarna 16–34 år följdes från 1 jan 1995 till 31 dec 1998 fram till den första psykiatriska inläggningen (under studietiden) p.g.a. fyra huvuddiagnosgrupper. Andra generationens invandrare delades in i fyra kategorier beroende på föräldrarnas födelseland och den svenskfödda majoritetsbefolkningen användes som referens. Cox proportional hazard models användes för att beräkna risken för psykiatrisk inläggning i en viss invandrargrupp, uttryckt som hazard ratios (HRs), jämfört med kontrollgruppen (HR=1).

Delarbete 2

Totalt 2,2 miljoner individer i åldrarna 20–39 år följdes från 1 jan 1992 till 31 dec 1999 fram till den första psykiatriska inläggningen (under studietiden) p.g.a. schizofreni eller andra psykoser. Cox proportional hazard models användes för att beräkna risken, uttryckt som hazard ratios (HRs).

Delarbete 3

Totalt 2,2 miljoner individer i åldrarna 20–39 år följdes från 1 jan 1992 till 31 dec 1999 fram till den första inläggningen (under studietiden) p.g.a. alkoholmissbruk eller drogmissbruk. Cox proportional hazard models användes för att beräkna risken, uttryckt som hazard ratios (HRs).

Delarbete 4

Ett slumpmässigt urval av 7 415 män och 7 137 kvinnor i åldrarna 16–34 år togs från ULF under perioden 1992–1999. Logistisk regression användes för att beräkna odds ratios (ORs) för självupplevd hälsa efter statistisk justering för ålder, kön, socioekonomisk status och sociala nätverk.

Delarbete 5

Alla sjukhusinläggningar i Sverige mellan 1 jan 1987 och 31 dec 2001 för samtliga typer av psykiatriska diagnoser hos första och andra generationens invandrare inkluderades. Standardized Incidence Ratios (SIRs) användes i den statistiska analysen.

RESULTAT

Delarbete 1

Andra generationens invandrare med en förälder född i Sverige samt finnar i andra generationen hade en ökad risk jämfört med majoritetsbefolkningen för att bli inlagd

för psykos, affektiva sjukdomar, neuroser och personlighetsstörningar. För flyktingar i andra generationen observerades den ökade risken endast för psykoser. Alla resultat kvarstod efter statistisk justering för socioekonomisk status.

Delarbete 2

De högsta riskerna för inläggning p.g.a. psykos observerades hos första och andra generationens finnar. Att ha en förälder som var född i Sverige hade ingen skyddande effekt mot inläggning p.g.a. psykos hos andra generationens invandrare.

Delarbete 3

De högsta riskerna för inläggning p.g.a. alkoholmissbruk och drogmissbruk observerades hos första och andra generationens finnar. Hos andra generationens finnar med en förälder född i Sverige var risken lägre än hos andra generationens finnar med båda föräldrarna födda i Finland.

Delarbete 4

Risken för dålig självupplevd hälsa ökade med ökande ålder vid invandring till Sverige. I övrigt hade de flesta invandrargrupperna en ökad risk för att uppge sin hälsa som dålig jämfört med den svenska kontrollgruppen.

Delarbete 5

Ett flertal invandrargrupper i den första generationen hade en ökad risk för inläggning p.g.a. psykiatrisk diagnos. Denna ökade risk kvarstod hos vissa invandrargrupper i den andra generationen oberoende av kön. Hos vissa invandrargrupper sågs en ökad risk för psykiatrisk inläggning i den andra generationen men inte i den första.

SLUTSATSER

Svåra psykiatriska sjukdomar som leder till inläggning innebär ett stort lidande för individen och anhöriga samt stora samhälleliga kostnader för sjukhusvård. Detta bör leda till en ökad medvetenhet om dessa svåra sjukdomar hos beslutsfattare och sjukvårdspersonal som är involverade i behandling av psykisk ohälsa, särskilt hos vissa invandrargrupper. Denna medvetenhet bör även inkludera alkohol- och drogmissbruk. Invandrare som kommer till Sverige efter eller under skolåren kan behöva särskild uppmärksamhet eftersom de har en ökad risk att ha en dålig självupplevd hälsa, en hälsoindikator som har visat sig vara användbar för att förutspå vårdbehov och dödlighet i befolkningen.

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