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MENTAL ILL-HEALTH IN CONTEMPORARY YOUNG ADULTS

Kyriaki Kosidou

Stockholm 2013

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ISBN 978-91-7549-058-8

ABSTRACT

Young adulthood is the peak age for the onset of most mental disorders and is a period of crucial importance for the establishment of emotional well-being in adult life. Mental health problems, including psychological distress and depressive symptoms, as well as suicide attempts, are reported to be increasing among young people, especially females, in many Western countries. Thus, the overall purpose of this thesis is to examine trends and causes of mental ill-health in contemporary young adults, with a focus on gender differences.

In **Study I**, we investigated recent time trends in several indicators of mental ill-health, and the patterning of these indicators between genders and younger vs. older individuals in Stockholm County, Sweden during 1997-2006. Self-reported anxiety and psychiatric service use increased among young individuals of both genders, while attempted suicides increased only among young women. By contrast, these indicators decreased or remained stable in the older age group from year 2001 and onwards.
In **Study II**, we studied the association between social position and the risk for different severity levels of psychological distress, as well as depression in the Stockholm Public Health cohort. We found that the socioeconomic gradient for clinical depression is more pronounced than that for distress. Low income is associated with the risk of distress and the association is stronger for severe distress. Depression is markedly linked with occupational class in men and with family income in women, and this is especially true among younger individuals.
In **Study III**, we explored the relationships between a number of possible causes and subsequent psychological distress as well as suicide attempts, immigrant status, age at transition into adult life (as reflected by employment status, age at becoming a parent and housing tenure), social adversity (including unemployment and financial strain), in a large population-based sample of young adults, with a focus on possible gender differences. We found that immigration from outside Europe and social adversity are associated with mental health problems in young adults, especially females. Postponed transition into adulthood furthermore appears to be associated with poor mental health in young women.
In **Study IV**, we examined the relationship between poor school performance and self-reported suicide attempts in a large sample of young adults, and the extent to which this is explained by adult health behaviours or social conditions. We also examined the potential modifying role of previous suicidal thoughts. We found that poor school performance is a strong predictor of future suicide attempts in young adults, and that this relationship appears to be strongest in individuals without a history of suicidal thoughts. Furthermore, adult socioeconomic factors and health behaviours do not seem to explain the association. Instead, other factors linked with poor school performance, such as poor coping, may explain the relationship.

In conclusion, our findings indicate a rising, and highly prevalent, mental ill-health among the young in Stockholm and underscore the importance of social factors, such as social position, social adversity, immigration, age at transition to adulthood, and school performance in the causation of mental ill-health in contemporary young adults.

LIST OF PUBLICATIONS

I. **Recent time trends in levels of self-reported anxiety, mental health service use and suicidal behaviour in Stockholm.**
Kosidou K, Magnusson C, Mittendorfer-Rutz E, Hallqvist J, Hellner Gumpert C, Idrizbegovic S, Dal H, Dalman C.
Acta Psychiatr Scand. 2010 Jul;122(1):47-55.
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II. **Socioeconomic status and risk of psychological distress and depression in the Stockholm Public Health Cohort: a population-based study.**
Kosidou K, Dalman C, Lundberg M, Hallqvist J, Isacsson G, Magnusson C.
J Affect Disord. 2011 Nov;134(1-3):160-7.
PubMed PMID: 21422028.

III. **Immigration, transition into adult life and social adversity in relation to psychological distress and suicide attempts among young adults.**
Kosidou K, Hellner-Gumpert C, Fredlund P, Dalman C, Hallqvist J, Isacsson G, Magnusson C.
PLoS One. 2012;7(10):e46284.
PubMed PMID: 23056275.

IV. **School performance and the risk of suicide attempts in young adults: longitudinal population-based study.**
Kosidou K, Dalman C, Fredlund P, Lee BK, Galanti R, Isacsson G, Magnusson C. (Submitted 2012)

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LIST OF ABBREVIATIONS

BMI	Body mass index
CI	Confidence interval
ICD	International Classification of Diseases
LISA	The Longitudinal Database for Health Insurance and Labour Market Studies
NPR	The Swedish National Patient Register
OR	Odds ratio
SES	Socioeconomic status
SPHC	The Stockholm Public Health Cohort

1 INTRODUCTION

1.1 BACKGROUND

The 21th century has been often characterized as the age of depression[1-4]. Despite enormous advances in medical science as well as societal progress and accumulation of wealth, populations in industrialized societies exhibit a high occurrence of mental health problems, particularly depressive symptoms. It is characteristic that depression has become one of the most common mental health conditions in medical and psychiatric practice, and according to a report from United States it constitutes about 40 per cent of all diagnoses[5]. In addition, it ranks fourth among the leading causes of disability worldwide and is expected to become the second leading cause by 2020[6,7]. Moreover, suicide is the second most common cause of death among adolescents and young adults in the industrialized parts of the world, including Sweden[8]. It seems that, despite huge societal and scientific progress in many parts of the world during the past decades, we have not been happier for that. However, the reasons are not well understood.

Young adulthood is a period of distinct significance for mental health. Research has shown that most mental disorders begin early in life, usually during adolescence or young adulthood, even if they might not be discovered until later in life[9-11]. Moreover, young adulthood is a pivotal turning point in the subsequent course of psychological health and is crucial for the attainment and development of career and family life. Thus, mental ill-health during that period causes significant psychosocial and physical impairment among young people[12,13].

Furthermore, there are concerns that the mental health of young people is deteriorating in many western countries. Such claims have been raised by studies examining the temporal patterning of indicators of mental ill-health, including emotional problems and self-harm, in young people. However, the evidence is equivocal. Some studies indicated an increase in rates of depression among younger generations [14-16] but a recent review did not support this notion[17]. Levels of psychological distress among adolescents appear to have increased in many European countries [18-21] in recent decades. A survey conducted in Scotland revealed an increase in psychological distress among 15-year-old girls between 1987 and 1999 but not among boys[19]. A nation-wide survey from Iceland evidenced increasing levels of self-reported anxiety from 1997 to 2006 among both girls and boys aged 14 and 15 years, with girls additionally reporting increasing depressive symptoms[19]. The same study found that mental health related visits to healthcare specialists rose for both boys and girls during the same period.

Compared to the global setting, the absolute scale of the problem seems to be especially pronounced in Scandinavia, in general, and in Sweden in particular where the increase in psychological distress among Swedish youth, especially females, has been steep ever since the early 1990s[18,22]. Feelings of nervousness and anxiety and sleep problems have also increased among Swedish youth since the early 1990s, while from 2000 onwards increases were reported only among females[23]. Furthermore, more severe mental

distress may also be increasing among the young in Sweden, since mental health service utilization has risen sharply during the past decade (except among the elderly)[24].

Concerns about deteriorating mental health of young people have, furthermore, been raised due to the temporal patterning of youth attempted and completed suicide during the past decades. Suicide rates increased between 1979 and 1996 among 15-19 years old males in 21 of 30 European countries studied[25]. A multicentre study on parasuicide in European countries found that attempted suicides in young people, particularly girls, have increased between 1989 and 2003 in all research centres taking part in the study[26]. A study from Oxford, UK, found a large increase in rates of hospitalization due to deliberate self-harming among males aged 15-24 years, and a parallel decrease in the female to male ratio, during 1985-1995[27]. According to a review from United States, non-fatal self-injury treated in hospital emergency departments (of suicidal as well as non-suicidal nature) increased among all age groups between 2001 and 2006[28]. The increase was largest among youths, but was accompanied by a contrasting decrease in youth suicide. Secular increases in rates of self-harm among young people have also been reported in other western countries[29], though not all of them[30]. For example, a study from Belgium failed to find an increase in age- and gender- specific rates of attempted suicide treated by general practitioners during 1993 and 2001[30].

Whether the occurrence of mental ill-health among young people is rising in contemporary western societies like Sweden or not is an important, yet evasive, public health issue. There are several methodological difficulties in addressing trends in mental health, including a lack of comparable indicators of mental health over time, and changes in diagnostic criteria and in ascertaining methods for mental health problems. Furthermore, most previous studies on trends in mental health have focused on one specific or a few indicators ranging from lack of well-being to more serious psychiatric diseases. Thus, studies examining a variety of mental health indicators among the young during the same period are lacking.

Lastly, in light of the impact of circumstances of young adulthood on future mental health and psychosocial well-being, there is a need for studies on possible explanations of the hitherto reported trends as well as on other important causal factors for mental health problems among young people.

1.2 RISK FACTORS FOR MENTAL ILL-HEALTH AMONG THE YOUNG

1.2.1 Factors possibly associated with trends in mental ill-health

Despite apparent importance for individuals and for societies, the reasons for the reported rise in mental ill-health among the young in many Western countries remain largely unknown. A study from United Kingdom suggested that family and educational factors such as increased school disengagement, increased worries about school, and arguments with parents could partly explain the increases in rates of psychological distress among young people between 1987 and 2006[31]. Another study from United Kingdom found that secular increases in maternal emotional problems might have

contributed to increases in psychological distress and emotional problems in the youth over the same ten-year period [32]. The evidence remains limited, however.

Trends in mental ill-health among young people have been paralleled by major societal changes in recent decades. For example, migration rates have increased, and immigrant populations have more than tripled in most western countries since the 1960s[33, 34]. It is characteristic that in Sweden, about 15% of the population in 2011 was born abroad. Furthermore, youth unemployment in the European Union has been twice as high as that of the total population over the past decade. Employment and income have changed little for young people in Sweden since the 1980s while, during the same period, older generations have seen their income rise[35]. Thus, relative to their elders, the younger generation has lagged behind. It may be that these kinds of societal factors have contributed to the increasing occurrence of psychological distress and self-harm among the young in Sweden and in other western countries in recent years.

Other societal changes may be important, as well. Entering the work force, attaining residential independence and becoming a parent are core role transitions signalling the entry into adulthood. The pattern of this transition to adult life has changed considerably in Sweden and in other western countries in recent decades[36-40]. The attainment of employment, income, housing and family is delayed to an older age probably reflecting increasing labour market demands for an educated workforce, shortage of rental housing and women's emancipation, as well as other cultural changes[36-40]. It is not known whether or not this prolonged transition into adulthood affects the mental health of young people.

1.2.2 Socioeconomic status

As highlighted above, many studies on trends in mental ill-health have reported a rise in minor psychiatric morbidity among young people during past decades. The socio-demographic distribution and causes of this increase are not well-understood.

Low socioeconomic status (SES) is highly implicated in the aetiology of severe mental disorders like schizophrenia[41]. However, it is not known whether SES is also of importance in the causation of minor psychiatric morbidity, such as psychological distress. The association of SES with depression is also less clear. Studies on the association between SES and depression are heterogeneous with regard to the definition of SES. Indicators of SES such as occupational class, level of education and income are correlated, but they are also different entities[42-45] that may be differentially associated with the risk of psychological distress and depression. Lastly, different measures of SES (e.g., income vs. education or occupational class) may not perform consistently for men and women[46] or for different age groups.

1.2.3 School performance

Low school performance is a strong risk factor for suicide attempts in young adulthood[47,48] . Poor performance on IQ tests, which is highly correlated with poor school performance[49], is also associated with an increased risk of subsequent suicide attempts and suicide[50-56].

Some studies have suggested that the cognitive function and suicide association is partially mediated by attained socioeconomic status and psychiatric disorders. Controlling for adult life socioeconomic status and psychiatric disorders attenuated, but did not fully explain, the association in previous studies[48,53,55,57]. Furthermore, the association was not confounded by parental socioeconomic status[51,55,57,58]. Another hypothesis is that adverse health behaviours, such as drug and alcohol addiction, smoking and excessive weight gain, which correlate with cognitive ability, depressive symptoms and suicide[63-65], could mediate the association between cognitive function and self-harm, but this has not been thoroughly examined[66]. Another possible mechanism is that low cognitive function may impair individuals' ability to develop relationships and social networks, resulting in poor social support and risk of self-harm.

Furthermore, other possible explanatory mechanisms may be involved. Delayed recovery from suicidal thoughts, which was found to correlate with low cognitive function[67], may expose people to a prolonged period with a heightened risk of suicide. If this hypothesis is true, the risk for self-harm should be higher among individuals with a history of suicidal thoughts. It is also possible that individuals with low cognitive function have poor coping skills and, in time of crisis, are less able to identify solutions to their problems others than self-harm. If low cognitive performance predicts suicide attempts also among individuals without a history of suicidal thoughts that would suggest such an impairment of mechanisms that normally prevent individuals from immediate acting when suicidal thoughts emerge, for instance in stressful situations. Thus, the possibly modifying role of a history of suicidal thoughts may shed some light on the mechanism linking cognitive ability with suicide but has not yet been investigated.

In light of the increases in rates of attempted suicide among the young in many western countries in recent decades, studies that further the understanding of the cognitive performance and suicide attempts association are of importance.

2 AIMS OF THE THESIS

The overall purpose of this thesis was to examine trends and causes of mental ill-health among the young, with a focus on gender differences, in Stockholm, a region representative of urbanized, secular western societies.

For that purpose, four studies were designed based on both self-reported questionnaire data and health care registers, with specific aims as follows:

Study I To explore recent time trends in different indicators of mental ill-health, including levels of anxiety, rates of mental health service use, attempted and completed suicides in Stockholm, and to compare the patterning of these indicators between the genders and in younger versus older adults.

Study II To explore the relationships between three different indicators of socioeconomic status – occupational class, education and income – and the risk of onset of different levels of severity of psychological distress as well as of depression.

Study III To explore the relationships between immigrant status, age at transitioning into adult life (as reflected by employment status, age at becoming a parent and housing tenure), social adversity (including unemployment and financial strain) and psychological distress, as well as suicide attempts in young adults.

Study IV To examine the longitudinal association of school performance with self-reported suicide attempts in a large sample of young Swedish adults, and the extent to which this association is explained by i) adult life health behaviours, including sedentary lifestyle, body mass index and daily tobacco smoking and ii) adult social conditions, including social support, employment status and financial strain, while controlling for a range of possible confounders, and to examine the potential modifying role of previous suicidal thoughts in this association.

3 MATERIALS AND METHODS

The background population of all four studies is the population of Stockholm County, Sweden, during the respective study periods and age groups.

Studies II-IV are set within The Stockholm Public Health Cohort (SPHC), a newly established population-based longitudinal study.

3.1 THE STOCKHOLM PUBLIC HEALTH COHORT

In 2002, 2006 and 2010 the Stockholm County Council's public health population-based surveys were sent to random samples of Stockholm County residents, aged 18 to 84 years (2002 and 2006) and 18 years and above (2010). Participants in these surveys constitute the three sub-cohorts that together comprise the SPHC. Participants recruited in 2002 were resurveyed in 2007 and again in 2010, and those enrolled in 2006 were resurveyed in 2010 (Table 1).

Table 1:The Stockholm Public Health Cohort

Sub-cohort, by year of recruitment	Questionnaire-based waves of data collection						
	Recruitment in 2002		Recruitment in 2006		Follow-up in 2007	Recruitment and follow-up in 2010	
	Baseline sample	Responders	Baseline sample	Responders	Responders	Baseline sample	Responders
2002	49 909	31 182			23 794		19 327
2006			56 634	34 707			25 167
2010						55 341	30 767

Among those contacted for the first time, the response rates were 62%, 61% and 56% in the 2002, 2006 and 2010 surveys, respectively. Data were collected using postal or web-based questionnaires that elicited information on socio-demographic factors, psychological distress, suicide attempts, suicidal thoughts as well as other health and life-style characteristics. Compared with Stockholm county census data, men, those under the age of 45, those born outside Sweden, those single or separated, those unemployed and those with a low income were overrepresented among the non-responders[68]. Taking attrition due to mortality into account, follow-up response rates were 79% in 2007 and 77% in 2010.

Statistical methods for reweighting for non-response can be applied when non-respondents can be appropriately characterized, as is the case in Sweden where extensive total population registers are available[69]. Calibration weights, designed to re-calculate the population structure with compensation for systematic non-response, have been created for the Stockholm Public Health Cohort by Statistics Sweden, Sweden's official statistics agency. The weights are constructed on the basis of available auxiliary variables from national registries and their co-variation with survey data. The auxiliary variables include sex, age, country of birth, civil status, income, educational level, sickness allowance and area of residence.

The SPHC is, furthermore, linked to a range of Swedish national administrative and health data registers. The primary key for register linkage was the unique personal identification number assigned to each Swedish citizen at birth and to immigrants upon arrival in the country. The Multi-Generation Register links all Swedish residents to their parents, allowing for identification of first-degree relatives and more extended family structures. Register information on SPHC participants as well as their relatives, is continuously updated via record-linkage.

3.2 THE REGISTERS

The most important administrative and health data registers that are used for the purposes of this thesis are:

- *The Longitudinal Integration Database for Health Insurance and Labour Market Studies,* (LISA according to the Swedish acronym), a central database held by Statistics Sweden that comprises family and individual data on socioeconomic parameters, including income, educational level, country of birth and occupation. The register has complete national coverage since 1990.

- *The National Patient Register* (NPR), which is held by the National Board of Health and Welfare and contains the dates and discharge diagnoses of all inpatient (since 1973) and specialist outpatient care (since 2001, although with incomplete psychiatric outpatient data) in Sweden.

- *The Stockholm County Adult Psychiatric Outpatient Register* that records the dates and diagnoses for any contact with specialist outpatient psychiatric services in Stockholm County since 1997.

- *The Cause of Death Register,* which covers all (less than 0.5% missing) deaths in Sweden since 1961 and includes ICD-codes for main and underlying causes of death.

- *The National School Register* at the Swedish National Agency for Education, which encompasses information on grades from all public schools since 1988 and also from all non-public schools since 1993.

- *The Population and Housing Censuses* at Statistics Sweden, which were held every fifth year between 1960 and 1990.

- *The Multi-Generation Register*, which links all Swedish residents to their parents.

- *The Swedish Social Insurance register* that has national coverage and contains the primary diagnosis as the reason for receipt of a disability pension according to ICD.

3.3 STUDY I

In this study, we investigated recent time trends in several indicators of mental ill-health and the patterning of these indicators between genders and younger vs. older adults. The study population comprised of Stockholm County residents during 1997-2006 pertaining to the respective age groups.

3.3.1 Data collection and measures

We used self-reported data on levels of anxiety from the Swedish Survey of Living Conditions conducted by Statistics Sweden. This survey has been carried out annually in Sweden since 1975 and comprises a representative sample of the Swedish population aged 16 to 84 years. Statistics from the survey are presented as a two-year average. Study samples among Stockholm County inhabitants comprised of 2067 (974 men and 1093 women), 2054 (992 men and 1062 women), 2199 (1042 men and 1157 women), 2250 (1088 men and 1162 women), 1917 (917 men and 1000 women), in years 1996-7, 1998-99, 2000-01, 2002-03, 2004-05, respectively Participants were are asked to answer to the question: “Do you suffer from nervousness, uneasiness or anxiety?”. There were three response alternatives: “no, yes mild, yes severe”. Those who reported severe or mild nervousness, uneasiness or anxiety were considered to have sentiments of anxiety. Additionally, we applied a higher threshold for anxiety including only those reporting severe nervousness, uneasiness or anxiety. Prevalence of anxiety, using both thresholds, was expressed as the percentage of the study population self-reporting anxiety (i.e. point prevalence rate).

Data on population levels of inpatient and outpatient psychiatric service use during 1997-2006 was collected from the National Patient Register and the Stockholm County Adult Psychiatric Outpatient Register. Mental health service use was expressed as 12-month prevalence, corresponding to the number of individuals per 1000 inhabitants receiving outpatient and inpatient mental health care each year (i.e. period prevalence rate).

Rates of suicide attempts were expressed as the number of people per 100.000 inhabitants having been hospitalized with suicide attempt each year. Data were retrieved from the National Patient Register. Hospital admissions in Stockholm County during 1997-2004 with discharge diagnoses X60-X84 or Y10-Y34 according to ICD-10 were considered as suicide attempts. Data on completed suicides was ascertained

from the Cause of Death Register. Deaths among inhabitants in Stockholm County attributed to causes classified as X60-X84, Y10-Y34 according to ICD-10 during 1997-2004 were defined as suicides. We included both suicide and undetermined deaths by injury or poisoning (open verdict) as it customary to assume that most of these deaths were self-inflicted. Population statistics was retrieved from Statistics Sweden. Suicide rates were expressed as the number of deaths attributed to suicide per 100.000 inhabitants during a year.

3.3.2 Statistical analysis

Gender specific rates of all indicators were calculated for the young age group (15, 16, and 18-24 years) as well as in the whole population and among older adults (25+ years). Female: male ratios as well as age ratios (young age group: older age group ratio) of all rates were calculated for each year. Linear regression was performed on gender and age specific logarithmised yearly rates. An F-test was applied to test the hypothesis of a significant slope. Based on the regression coefficients, annual changes in rates were estimated and contrasted. A significance level of $p<0.05$ was applied. The SPSS statistical software (SPSS Inc., 2006) was used for analysis.

3.4 STUDY II

In this study we investigated the relationships between three different indicators of Socioeconomic status (SES) –occupational class, education and income – and the risk of onset of self-reported psychological distress and severe psychological distress, ascertained via self-reported GHQ-12 scores, as well as diagnosis of depression ascertained via health registers in the 2002-2007 sub-cohort of the Stockholm Public Health Cohort (N=23 794) (Table 1). In order to estimate the relative severity of the three outcomes, we, furthermore, related them to different indicators of illness severity. We, defined three partly overlapping analytical samples where individuals with missing data for indicators of SES (N=1563) as wells as with prevalent psychological distress, severe psychological distress and depression (see below for definitions) at baseline were excluded from the respective analytical sample. The final partly overlapping analytical samples included 17 110; 19 862 and 21 821 individuals respectively.

3.4.1 Data collection and measures

3.4.1.1 Exposures

Occupation class was assessed at baseline by a question: “What is/was your job or work duties?” If currently not working, participants were asked to answer with reference to their latest job/work duties. Occupational class was classified in six categories (unskilled workers, skilled workers, lower non-manual employees, intermediate non-manual employees, higher non-manual employees and self-employed) according to the Swedish socioeconomic classification, developed by Statistics Sweden[70].

Information regarding each participant's highest educational level at baseline was obtained by record linkage with LISA and grouped as: 0-9 years (compulsory education); 10-12 years (upper secondary education); and >12 years (higher education).

Information regarding household disposable income at baseline was obtained by linkage with LISA. This variable is the individualized weighted average income, obtained by calculating the sum of all the family members' disposable incomes multiplied by the individual consumption weights, divided by their aggregate consumption weight We categorized income in quartiles, according to the distribution among all study participants.

Outcomes

Psychological distress was assessed via the 12-item version of the General health Questionnaire (GHQ-12) at both the baseline and the follow-up[71]. We used two levels of distress: a score of 3 or more (psychological distress) and a score of 7 or more (severe psychological distress).

Depression was defined as a register-based diagnosis of depression during follow-up, identified via record linkage to the Stockholm County Adult Psychiatric Outpatient Register and to the National Patient Register. Primary but not secondary diagnoses of depression (including F32-F39 and F41.2 according to ICD, 10th revision) were considered.

3.4.1.2 Indicators of illness severity

We used three indicators of illness severity. Onsets of suicidal thoughts as well as attempted suicide during the follow-up were assessed by self-report via the follow-up questionnaire. Information regarding disability pension was obtained by record linkage to the Swedish Social Insurance register. Participants receiving a disability pension with a primary diagnosis of F00-F99 according to ICD-10 during the follow-up were considered to be recipients of such a pension due to a mental disorder.

3.4.2 Statistical analysis

We used logistic regression models to estimate crude and adjusted odds ratios (OR) and their 95% confidence intervals (CI), for the onset of psychological distress, severe psychological distress and depression, respectively, at follow-up in relation to indicators of SES. All the analyses were adjusted for age (Model 1), and then also mutually adjusted for other indicators of SES (Model 2). All the analyses were conducted separately among men and women, and, in a secondary approach, further stratified by age. We analysed data in four age strata: 18-35 and ≥ 36 years, as well as 18-49 and ≥50 years. Due to few cases of depression among men in the 18-35 years age group, analysis in men was not possible in that age group. Lastly, we calculated the prevalence rates of suicidal thoughts, suicide attempts and receipt of a disability pension in relation to the occurrence of psychological distress and depression at the follow up. All the analyses were made using SAS version 9.1

3.5 STUDY III

In this study we examined immigration, social adversity and the timing of taking on adult social roles (e.g. gainful employment, parenthood and own housing tenure) in relation to psychological distress and suicide attempts in young adults, with a focus on gender differences. The study population (N=10 081) consisted of young adults aged 18-29 who participated in the 2002 (N=4911) and 2006 (N=5170) survey waves of the Stockholm Public Health Cohort.

3.5.1 Data collection and measures

3.5.1.1 Exposures

Immigrant status was attained by linkage with LISA and categorized as native Swede, European and Non-European first generation immigrant (those born outside Sweden in Europe and elsewhere, respectively), and European and Non-European second generation immigrant (Swedish-born to parents with origins outside Sweden in Europe or elsewhere, respectively).

Employment status was assessed by self-report and grouped as: student, employed, unemployed and other (housewives, sick leave, disability pension or parental leave).

Financial strain was assessed by self-report. Responses in the following questions: i) "In the past 12 months have you spent your entire paycheque/pension or run out of money and been forced to borrow from relatives and friends in order to buy groceries or pay the rent?" and (ii) "In the past 12 months have you spent your entire paycheque or run out of money and been forced to turn to social services in order to buy groceries or pay the rent?" were combined to create a three-category variable: no financial strain; sought financial help from others; sought social benefits.

Data on study participants' age at becoming a parent were collected from the Swedish Multigenerational Register and grouped as: 14-19 years of age, 20-24 years of age, 25-29 years of age, and nonparent.

Housing tenure was measured with two questions: (i) "What kind of housing do you live in?" and (ii) "With whom do you share your housing?" Data were grouped in three categories: owning/renting (including owners and first hand renters); living with family of origin (including parents and siblings); lacking own tenure (including second hand tenures, lodgers and those in student accommodation).

3.5.1.2 Outcomes

Psychological distress was assessed via the 12-item version of the General Health Questionnaire (GHQ-12). We applied a cut-off score of ≥3 to denote cases of distress.

Lifetime suicide attempts were assessed by the question: "Have you ever made an attempt to take your life?" [72]. There were four answer alternatives: "No, never", "Yes, in the last week", "Yes, in the last year", "Yes, more than a year ago". Responders

choosing the three positive alternatives were considered as having had lifetime suicide attempts.

3.5.1.3 Confounders

We considered the following confounders: Parental socio-economic status, which was obtained through linkage to Statistics Sweden and the Swedish Population and Housing Census of 1990; parental education, obtained by linkage with LISA; school performance, defined as grade point averages in the final year of compulsory education and retrieved from the National School Register; history of in-patient psychiatric care for study participants and their parents which was defined as any admission for mental disorders (any diagnosis in Chapter V of ICD-8 and 9 or Chapter F of ICD-10) prior to completing the surveys in participants, and at any time in parents and obtained from the National Patient Register.

3.5.2 Statistical analysis

In order to increase statistical power for the analyses, the 2002 and 2006 samples were pooled. We used logistic regression models to estimate crude and adjusted odds ratios (OR) and their 95% confidence intervals (CI) of psychological distress and suicide attempts in relation to immigrant status, employment status, financial strain, age at becoming a parent and housing tenure. We used calibration weights to reweight for non-response[69]. All analyses were adjusted for age, and then further in multivariate models such that: (i) immigrant status was adjusted for parental SES, parental education and parental history of inpatient psychiatric care; and (ii) indicators of social adversity and transition into adult life were adjusted for parental SES, parental education, immigrant status, school performance, parental and individual history of inpatient psychiatric care as well as for each other. Analyses were conducted separately among men and women and, in order to evaluate whether exposures were differentially associated with psychological distress and suicide attempts in men and women, we calculated the synergy index[73]. Analyses were conducted using SAS version 9.1

3.6 STUDY IV

In this study we examined the relationship between school performance and suicide attempts in young adults and the extent to which it is explained by i) adult health behaviours or ii) social conditions. Furthermore, we examined the potential modifying role of previous suicidal thoughts in the relationship. The study population consisted of those men and women aged 18-33 who participated in the 2002 and 2006 survey waves of the Stockholm Public Health Cohort and were resurveyed in 2007 and 2010 respectively (N=7816). The final analytical sample comprised 6146 participants with complete data (2465 men and 3681 women).

3.6.1 Data collection and measures

3.6.1.1 Main exposure

School performance was defined as grade point averages in the final year of compulsory education (year 9, when participants were approximately 16 years old), retrieved from the National School Register and categorized into quartiles according to year of graduation.

3.6.1.2 Outcome

Suicide attempts were assessed at baseline and follow-up by the same question as in Study III. Answer alternatives were slightly different for the 2007 follow-up: "No, never", " Yes, in the last four years", "Yes, earlier ". Responders choosing the three positive alternatives were considered as having had suicide attempts during follow-up.

3.6.1.3 Covariates

Adult health behaviours, social conditions and suicide thoughts were assessed at baseline by self-report. Current daily tobacco smoking was categorized as "Yes", "No". Participants reported their weight and height and BMI was calculated (<20, 20-<25, 25-<30, and 30+ kg/m2). They were asked to estimate the average time per week they spent walking, cycling or getting any other form of exercise[74]. Those reporting less than 2 hours per week of exercise were classified as having a sedentary lifestyle. Employment status and financial strain were grouped similarly as in Study III. Social support was assessed via the question: "Do you know any people who can provide you with personal support for personal problems or crises in your life?" There were four response alternatives: "Yes, always", "Yes, for the most part", "No, usually not", "No, never", which were combined to create a dichotomized (Yes, No) variable. Suicide thoughts were assessed by the question: 'Have you ever been in the situation that you seriously considered taking your own life, maybe even planned how you would do that?'. There were four answer alternatives: 'No, never', 'Yes, in the last week', 'Yes, in the last year', and 'Yes, earlier than a year ago'. Responders choosing the three latter alternatives were considered as having had lifetime suicide thoughts at baseline.

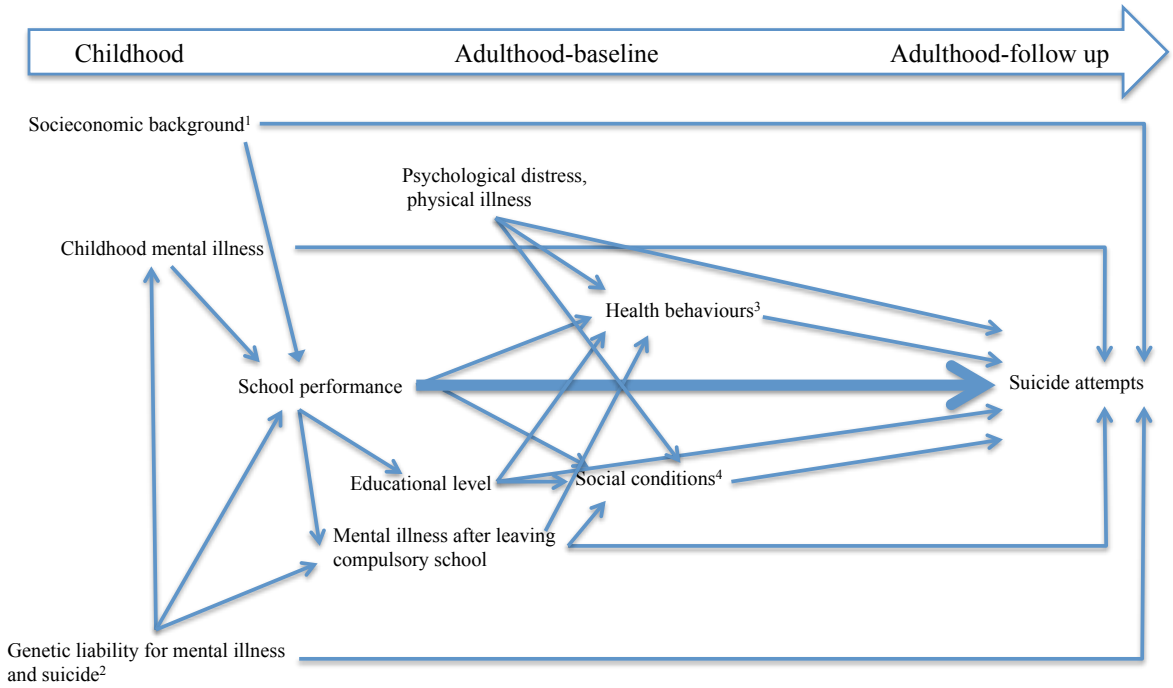
We, furthermore, considered a range of possible confounders assessed by self-report or by record linkage with registers, including immigrant status, study participants' own and parental education, adoptive parents, history of childhood and adult mental illness among study participants as well as their parents, history of attempted or completed suicide in the parents of study participants, childhood socioeconomic conditions, being born small for gestational age, civil status, history of somatic illness, psychological distress, alcohol consumption and cannabis use.

3.6.2 Statistical analysis

The 2002-2007 and 2006-2010 samples were pooled in order to increase statistical power. We used calibration weights to reweight for non-response[69]. We used survey-weighted logistic regression models to estimate crude and adjusted odds ratios (OR) and their 95% confidence intervals (CI) for self-reported suicide attempts at follow-up among individuals without a history of suicide attempts at baseline, in relation to school

performance. Adjustments were made for potential confounders following the causal model illustrated in Fig.1

Figure 1: Possible associations between school performance and suicide attempts in young adults.



1. Measured as parental SES, education and income, raised with adoptive parent or in single parent household, immigrant status, housing in childhood.
2. Measured as parental history of mental illness and of attempted and completed suicide.
3. Measured as current daily tobacco smoking, BMI, sedentary lifestyle.
4. Measured as employment status, financial strain, social support.

In multivariate models, we adjusted for i) those characteristics that were associated with the outcome and modified the sex and age adjusted association between exposure and outcome by at least 5 %, and ii) for those characteristics that were associated with the possible mediators and the outcome and modified the association between exposure and outcome, after adjusting for possible mediating factors and confounders, by at least 5%. Model 1 included the covariates age and sex. Model 2 included the covariates of Model 1 plus immigrant status, paternal education and adoptive parent. Model 3 included the covariates of Model 2 plus daily tobacco smoking, sedentary life style, BMI as well as education and history of mental illness. Model 4 included the covariates of model 2 plus social support, employment status, financial strain, education and history of mental illness.

We, furthermore, stratified the sample according to baseline history of suicidal thoughts. The Log Likelihood Ratio Test was performed to test whether the impact of school performance on the risk of suicide attempt differed by baseline history of suicidal thoughts as well as with sex. Analyses were conducted using SAS version 9.1.

3.7 ETHICS

The ethical committee at Karolinska Institutet, in Stockholm, Sweden, approved all four studies.

4 RESULTS

4.1 STUDY I

Self-reported anxiety was more common in women, especially among the young. Prevalence rates of anxiety among young adults increased considerably during the study period. Among young men, rates increased from 10.9 in 1997 to 18.8 in 2003 and slightly decreased to 17.1 in 2005 (Table 2) while a constant increase from 21.3 in 1997 to 37.7 in 2005 was observed among young women (Table 3). Although the relative increases were similar between genders (annual increases averaged 6.0 and 7.3 %, in men and women, respectively, p for both trends<0.05), the absolute change was much larger in young women. Among individuals older than 24 years, there was an upward trend of anxiety self-reports until 2001 for both genders, after when levels declined. The prevalence rates of severe anxiety among men were lower than for anxiety and oscillated during the study period. Due to small numbers we were not able to calculate trends. Rates of severe anxiety among young women increased form 3.0 to 6.1, corresponding to an average annual increase of 7.7 % (p for trend<0.05). Among women older than 25 years, there was an upward trend of severe anxiety until 2001 (from 4.0 to 5.9), after when levels declined (4.8 in 2005). There was no evidence for a significant trend (average annual increase=3.4 %, p=0.278).

The outpatient mental health service use increased between 1997 and 2006, regardless of age and gender (Tables 2 and 3). Trends were, however, more striking among young adults. Rates of service use increased on average by 7.5 and 7.0 % annually among men and women aged 18-24 years, respectively (p for trends<0.001). Thus, the use of outpatient mental health service was in 2006 more common among young adults than adults aged 25+ years, while the opposite was true until 1999. The overall female-to-male ratio ranged from 1.4 to 1.6 under the study period and it was 1.5 at the end of it. The gender gap was more pronounced among young individuals, with service use being almost twice as common among young women as compared to ditto men.

Time trends in inpatient mental health service use were clearly discrepant between young and older adults (Tables 2 and 3). Among older adults, the prevalence rate decreased by approximately 2 % annually in both genders (p for trends <0.05). In contrast, the proportion of young men and women receiving inpatient psychiatric care increased by on average 5.1 % (p for trend<0.001) and 3.3 % yearly (p for trend<0.01), respectively. At the beginning of the study period the use of inpatient mental health services was more common among adults aged 25+ while the opposite was true at the end of it in 2004. That age gap, emerging in 2000, increased with on average 5.8 and 4.4 % each year, among men and women respectively (p for both trends<0.001).

Hospitalization due to suicide attempts were much more common among women than among men, a pattern that was especially pronounced among youths and young adults (Tables 2 and 3). Rates of suicide attempts among males and older females remained fairly stable between 1997-2004. In young women, attempted suicide became instead increasingly common (annual increase=2.9 %, p for trend<0.01), and, in 2004, 284 attempts per 100.000 were recorded.

In contrast to rates of attempted, completed suicides were more common among individuals over 25 years, while consistently more men than women completed suicide regardless of age. Rates of male suicides remained quite stable among both age during the study period (Tables 2 and 3). The overall female suicide rates decreased with on average 3.1% each year (p for trend<0.05) while there was no clear temporal trend among young women.

Table 2: Rates of self-reported anxiety, mental health service use, suicide attempts and suicide in Stockholm County during 1997 through 2006, in ***males***

	Years										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average annual Change[1] %
Self-reported anxiety,%[2]											
Aged 16-24	10.9		13.8		15.6		18.8		17.1		6.0*
Aged 25+	11.8		16.7		20.1		19.4		16.7		4.3
Outpatient mental health service use, per 1000[3]											
Aged 18-24	19.6	19.1	21.3	25.2	29.5	30.2	32.2	32.3	34.5	36.0	7.5**
Aged 25+	26.7	28.8	30.8	32.4	32.8	32.3	31.9	31.6	32.8	32.7	1.7*
Inpatient mental health service use, per 1000[4]											
Aged 18-24	3.8	3.4	3.7	4.2	4.4	4.4	4.5	5.0	5.4	5.6	5.1**
Aged 25+	5.3	4.6	4.6	4.3	4.1	3.9	3.9	4.2	4.3	4.2	-2.0*
Suicide attempts, per 100,000[5]											
Aged 18-24	79	76	89	89	90	90	70	89			0.5
Aged 25+	82	74	68	66	80	75	72	70			-0.9
Suicide rates, per 100,000[6]											
Aged 18-24	14.9	9.0	16.0	16.9	16.8	19.5	14.3	13.1			2.4
Aged 25+	31.2	35.3	26.6	27.5	29.4	31.5	29.9	28.3			-1.1

* P-value significant at the <0.05 level; ** P-value significant at the <0.001 level; [1] P for trend was assessed from the test of zero overall slope (F-test); [2] Proportion of individuals reporting sentiments of anxiety in the Living Conditions Survey; [3] Proportion of the population coming in contact with public outpatient mental health care in Stockholm County during one year; [4] Proportion of the population receiving in-patient care in psychiatric clinics in Stockholm County during one year; [5] Proportion of the population being hospitalized with suicide attempt as the discharge diagnosis, during one year; [6] Annual rates of death from suicide in Stockholm County

Table 3: Rates of self-reported anxiety, mental health service use, suicide attempts and suicide in Stockholm County during 1997 through 2006, in ***females***

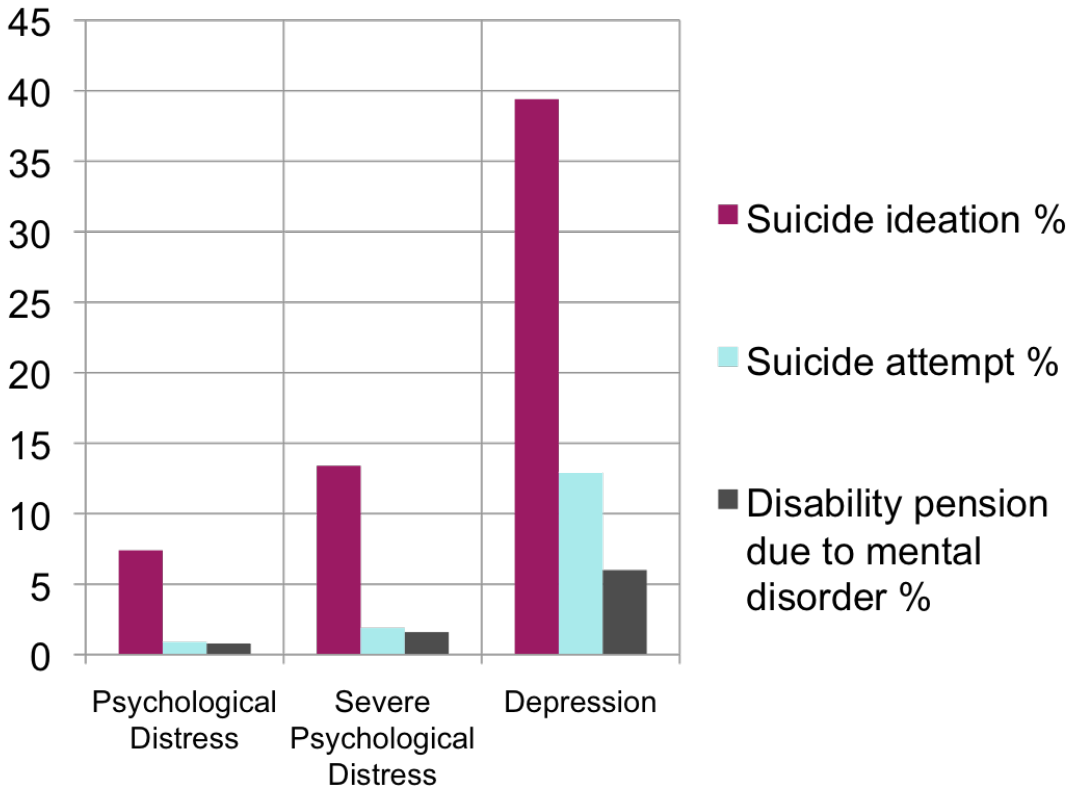
	Years										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average annual change[1], %
Self-reported anxiety,%[2]											
Aged 16-24	21.3		23.2		30.9		31.6		37.7		7.3*
Aged 25+	19.6		24.2		30.2		28.1		23.5		2.6
Outpatient mental health service use, per 1000[3]											
Aged 16-24	40.2	39.6	42.3	51.1	56.2	60.3	65.5	66.6	68.6	67.1	7.0**
Aged 25+	36.1	40.6	43.9	47.0	47.8	47.4	48.3	47.7	48.8	48.4	2.7*
Inpatient mental health service use, per 1000[4]											
Aged 16-24	3.8	3.4	3.7	4.2	4.4	4.4	4.5	5.0	5.4	5.6	3.3**
Aged 25+	5.3	4.6	4.6	4.3	4.1	3.9	3.9	4.2	4.3	4.2	-1.9*
Suicide attempts, per 100,000[5]											
Aged 16-24	246	230	241	256	280	261	286	284			2.9*
Aged 25+	104	93	95	104	119	105	108	108			1.7
Suicide rates, per 100,000[6]											
Aged 16-24	12.9	7.0	8.0	5.0	3.0	10.8	5.8	8.5			-4.1
Aged 25+	14.5	16.3	16.4	13.8	15.8	13.5	14.8	11.6			-3.0

* P-value significant at the <0.05 level; ** P-value significant at the <0.001 level; [1] P for trend was assessed from the test of zero overall slope (F-test); [2] Proportion of individuals reporting sentiments of anxiety in the Living Conditions Survey; [3] Proportion of the population coming in contact with public outpatient mental health care in Stockholm County during one year; [4] Proportion of the population receiving in-patient care in psychiatric clinics in Stockholm County during one year; [5] Proportion of the population being hospitalized with suicide attempt as the discharge diagnosis, during one year; [6] Annual rates of death from suicide in Stockholm County

4.2 STUDY II

There were 2 796 cases of psychological distress, 1 351 cases of severe psychological distress and 384 cases of depression with onset during the follow up. The three outcomes were associated with indicators of illness severity in a graded manner (Figure 2).

Figure 2: Prevalence of suicidal behaviour and disability pension in relation to level of mental ill-health at follow up in the Stockholm Public Health Cohort



Psychological distress: Male workers and lower non-manual female employees had slightly larger ORs of psychological distress than higher non-manual employees (Table 4). The relationship among men was confined to those older than 35 years. There was less risk of psychological distress among men with only compulsory education than among those more highly educated (OR 0.7, 95 % CI 0.6-0.9). This lower risk was confined to older individuals. Education was not a factor associated with any risk of psychological distress in women. Belonging to the lowest and 2nd income quartiles increased the OR of psychological distress among men by 40 and 20 percent respectively compared to those in the highest 4th quartile. Among women, belonging to the lowest or the 3rd income quartile increased the OR of distress by 20 %. The relationships between income and distress were confined to individuals older than 35 years.

Table 4: Odds ratios (OR) and 95% confidence intervals (CI) of psychological distress (GHQ-12 score ≥3) according to SES in the Stockholm Public Health Cohort

	Men (N=7981)			**Women (N=9129)**		
	All OR (95% CI)[a]	18-35 years OR (95% CI)[a]	≥36 years OR (95% CI)[a]	All OR (95% CI)[a]	18-35 years OR (95% CI)[a]	≥36 years OR (95% CI)[a]
Occupational Class						
Unskilled manual workers	1.3 (1.0-1.6)	1.0 (0.7-1.6)	1.4 (1.1-1.8)	1.0 (0.8-1.3)	1.2 (0.8-1.7)	1.0 (0.8-1.3)
Skilled manual workers	1.2 (1.0-1.6)	0.9 (0.6-1.6)	1.3 (1.0-1.8)	0.7 (0.6-1.0)	1.1 (0.7-1.7)	0.6 (0.5-0.9)
Lower non-manual employees	1.1 (0.9-1.4)	1.4 (0.9-2.2)	1.0 (0.7-1.3)	1.2 (1.0-1.5)	1.2 (0.9-1.8)	1.3 (1.0-1.6)
Intermediate non-manual employees	1.1 (0.9-1.4)	1.1 (0.8-1.6)	1.1 (0.9-1.4)	1.1 (0.9-1.3)	1.4 (1.1-2.0)	1.0 (0.8-1.2)
Higher non-manual employees	1	1	1	1	1	1
Self-employed	1.1 (0.8-1.4)	0.9 (0.5-1.7)	1.0 (0.8-1.4)	1.0 (0.7-1.3)	1.0 (0.5-2.0)	0.9 (0.7-1.3)
Education						
Compulsory	0.7 (0.6-0.9)	0.9 (0.5-1.5)	0.7 (0.6-0.9)	1.0 (0.8-1.2)	1.2 (0.8-1.8)	0.9 (0.7-1.1)
Upper secondary	0.9 (0.7-1.0)	0.9 (0.6-1.2)	0.9 (0.7-1.0)	1.0 (0.8-1.1)	1.1 (0.9-1.4)	0.9 (0.8-1.1)
Higher	1	1	1		1	1
Income						
Lowest quartile	1.4 (1.2-1.7)	1.1 (0.7-1.5)	1.7 (1.4-2.1)	1.2 (1.1-1.5)	1.1 (0.8-1.6)	1.4 (1.1-1.7)
2nd quartile	1.2 (1.0-1.4)	0.8 (0.6-1.2)	1.4 (1.1-1.7)	1.1 (0.9-1.3)	0.9 (0.7-1.3)	1.3 (1.0-1.5)
3d quartile	1.0 (0.8-1.2)	1.1 (0.8-1.5)	1.0 (0.8-1.3)	1.2 (1.0-1.4)	1.1 (0.8-1.6)	1.2 (1.0-1.4)
Highest quartile		1	1		1	1

[a]Adjusted for age, occupational class, education and income when applicable.

Severe Psychological distress: Occupation class and education appeared to be unrelated to the risk of severe psychological distress, regardless of gender or age (Table 5). In contrast, there was an almost twofold greater risk of severe distress among men in the lowest (OR 1.9, 95 % CI 1.5-2.6) than among those in the highest income quartile. The OR for men in the 2nd income quartile was 1.6 (95 % CI 1.2-2.1). The relationship between income and severe distress was confined to men older than 35 years. There was an almost equally greater risk of severe psychological distress among women in the lowest and 3rd income quartiles (OR 1.5, 95 % CI 1.2-1.9 and OR 1.4, 95 % CI 1.1-1.8 resp.) and the risk did not vary appreciably with age.

Table 5: Odds ratios (OR) and 95% confidence intervals (CI) of severe psychological distress (GHQ-12 score ≥7) according to SES in the Stockholm Public Health Cohort

	Men (N=8958)			**Women (N=10904)**		
	All OR (95% CI)[a]	18-35 years OR (95% CI)[a]	≥36 years OR (95% CI)[a]	All OR (95% CI)[a]	18-35 years OR (95% CI)[a]	≥36 years OR (95% CI)[a]
Occupational Class						
Unskilled manual workers	1.0 (0.7-1.3)	0.8 (0.4-1.5)	1.0 (0.7-1.5)	1.1 (0.9-1.5)	1.1 (0.7-1.7)	1.2 (0.9-1.6)
Skilled manual workers	1.0 (0.7-1.5)	0.9 (0.4-1.8)	1.1 (0.7-1.6)	0.7 (0.5-1.0)	0.8 (0.5-1.3)	0.7 (0.5-1.1)
Lower non-manual employees	0.9 (0.6-1.3)	0.9 (0.5-1.8)	0.9 (0.7-1.3)	1.1 (0.8-1.4)	1.0 (0.6-1.5)	1.2 (0.9-1.6)
Intermediate non-manual employees	0.9 (0.7-1.2)	0.8 (0.5-1.4)	1.0 (0.7-1.3)	0.9 (0.8-1.2)	0.9 (0.6-1.3)	1.0 (0.7-1.2)
Higher non-manual employees	1	1	1	1	1	1
Self-employed	0.8 (0.6-1.2)	0.8 (0.4-1.9)	0.8 (0.5-1.2)	1.1 (0.7-1.5)	1.0 (0.5-2.2)	1.0 (0.7-1.6)
Education						
Compulsory	0.9 (0.7-1.3)	0.8 (0.4-1.9)	1.0 (0.7-1.4)	1.0 (0.8-1.3)	1.0 (0.6-1.7)	1.0 (0.7-1.3)
Upper secondary	1.1 (0.9-1.4)	1.1 (0.7-1.7)	1.1 (0.8-1.4)	1.1 (0.9-1.3)	1.3 (1.0-1.7)	1.0 (0.8-1.2)
Higher	1	1	1		1	1
Income						
Lowest quartile	1.9 (1.5-2.6)	1.6 (0.9-2.6)	2.1 (1.5-2.9)	1.5 (1.2-1.9)	1.5 (1.0-2.3)	1.5 (1.1-2.0)
2nd quartile	1.6 (1.2-2.1)	1.1 (0.6-1.8)	1.9 (1.4-2.5)	1.2 (0.9-1.5)	1.0 (0.7-1.6)	1.3 (1.0-1.7)
3d quartile	1.1 (0.8-1.5)	1.0 (0.6-1.7)	1.1 (0.8-1.6)	1.4 (1.1-1.8)	1.4 (1.0-2.1)	1.4 (1.1-1.8)
Highest quartile		1	1		1	1

[a]Adjusted for age, occupational class, education and income when applicable.

Depression: There were strong gender differences in the relationships between the various indicators of SES and the risk of onset of depression. Among men, after adjustment for income and education, there was a threefold greater relative risk of depression among unskilled and skilled workers (OR 3.0, 95 % CI 1.5-5.9 and OR 3.0, 95 % CI 1.4-6.2 respectively) than among higher non-manual employees with a gradually decreasing relative risk among low and intermediate non-manual employees (Table 6). The association among men was confined to the younger age group. In contrast, only lower non-manual employees aged ≥36 years had a greater risk of severe distress in women (Table 7). Disposable household income was instead strongly associated with depression in women in a threshold manner, those in the highest quartile showing less risk than the other groups and this was also true in the younger age group. There was a somewhat weaker but more graded relationship between income and depression in men. That relationship was confined to older adults. Education was not associated with the risk of depression in either gender overall. However, the relationship differed by age group among women. The OR associated with only compulsory education among women aged 18-49 years was 1.7 (95 % CI 1.0-3.0) while the corresponding OR for women older than 50 years was 0.3 (95 % CI 0.1-0.6).

Table 6: Odds ratios (OR) and 95% confidence intervals (CI) of onset of depression (defined via register-based information on mental health service use) according to SES in the Stockholm Public Health Cohort, in ***males*** (N=9624)

	All **OR (95% CI)[a]**	**18-49 years** **OR (95% CI)[a]**	**≥50 years** **OR (95% CI)[a]**
Occupational Class			
Unskilled manual workers	3.0 (1.5-5.9)	10.7 (3.1-37.3)	1.0 (0.4-2.8)
Skilled manual workers	3.0 (1.4-6.2)	6.5 (1.6-25.7)	2.3(0.9-6.2)
Lower non-manual employees	2.6 (1.2-5.4)	8.0 (2.1-29.9)	1.3 (0.5-3.7)
Intermediate non-manual employees	1.8 (0.9-3.4)	5.4 (1.5-18.7)	0.9 (0.4-2.1)
Higher non-manual employees	1	1	1
Self-employed	1.1 (0.5-2.7)	3.2 (0.7-14.0)	0.7 (0.2-2.2)
Education			
Compulsory	0.9 (0.5-1.5)	1.7 (0.8-3.4)	0.5 (0.2-1.2)
Upper secondary	0.9 (0.6-1.4)	1.1 (0.6-1.9)	0.8 (0.4-1.5)
Higher	1	1	1
Income			
Lowest quartile	2.2 (1.3-3.7)	1.4 (0.7-2.7)	3.0 (1.3-7.1)
2nd quartile	1.4 (0.8-2.5)	1.0 (0.5-2.0)	2.0 (0.9-4.6)
3d quartile	1.0 (0.5-1.7)	0.6 (0.2-1.3)	1.6 (0.7-3.5)
Highest quartile	1	1	1

Table 7: Odds ratios (OR) and 95% confidence intervals (CI) of onset of depression (defined via register-based information on mental health service use) according to SES in the Stockholm Public Health Cohort, in ***females*** (N=12 197)

	All **OR (95% CI)[a]**	**18-35 years** **OR (95% CI)[a]**	**≥36 years** **OR (95% CI)[a]**
Occupational Class			
Unskilled manual workers	1.1 (0.7-1.7)	0.9 (0.5-1.8)	1.2 (0.6-2.3)
Skilled manual workers	1.3 (0.8-2.1)	0.8 (0.4-1.9)	1.6 (0.8-3.1)
Lower non-manual employees	1.3 (0.8-2.0)	0.7 (0.3-1.5)	1.8 (1.0-3.0)
Intermediate non-manual employees	1.2 (0.8-1.7)	0.8 (0.4-1.6)	1.4 (0.9-2.3)
Higher non-manual employees	1	1	1
Self-employed	0.6 (0.2-1.3)	0.6 (0.1-2.5)	0.6 (0.2-1.7)
Education			
Compulsory	0.8 (0.5-1.3)	1.6 (0.8-3.3)	0.6 (0.3-1.1)
Upper secondary	0.9 (0.7-1.3)	0.9 (0.6-1.5)	0.9 (0.6-1.4)
Higher		1	1
Income			
Lowest quartile	2.9 (1.8-4.5)	4.7 (1.7-12.5)	2.4 (1.5-4.1)
2nd quartile	1.9 (1.2-3.0)	4.1 (1.5-11.1)	1.4 (0.8-2.4)
3d quartile	2.5 (1.6-3.8)	4.7 (1.8-12.4)	2.0 (1.2-3.3)
Highest quartile	1	1	1

[a]Adjusted for age, occupational class, education and income when applicable

4.3 STUDY III

The prevalence of psychological distress was 24% among males and 36.4% among females. Corresponding prevalence rates for suicide attempts were 4.2% and 8.6% respectively.

Psychological distress was somewhat more common in non-European second generation immigrants of both sexes, as compared to native Swedes (Table 8). In women, also first generation non-European immigrants had a higher risk of distress. For suicide attempts, the gender difference in the relationship between immigration status and suicide attempts was even more marked, and we noted a strong synergistic effect of being both female and of non-European origins (SI 4.58, 95% CI 1.97-10.67). Non-European first generation immigrant women had a more than 3-fold elevated risk of suicide attempts, while the excess risk among second generation immigrant women was less pronounced (OR 1.60, 95% CI 1.23-2.10). In contrast, there was no association between immigrant status and suicide attempts in men.

Unemployed men and women, and those reporting financial strain, had two to threefold increases in risk of distress (Table 9). Women who were students or off the labour market for other reasons also had a higher risk of distress compared to those employed, but these associations were less striking. There was also a clear gender difference, with no evidence of any relationships in men, and statistically significant SIs for female gender and being a student or being off the labour market for other reasons (SIs 1.62, 95% CI 1.15-2.27 and 1.33, 95% CI 0.73-2.41, respectively). Women who had a first childbirth as teenagers had an over three-fold risk for distress, and both women who became mothers at the age of 20-24 as well as those not having children had less marked but still statistically significantly elevated risks of distress compared to women who became mothers at the age of 25-29. Parenthood did not, however, seem to be related to men's distress, although SIs were not statistically significant (SIs 2.42, 95% CI 0.31-18.74 and 3.83, 95% CI 0.41-35.94 for female gender and parenthood before the age of 25 and nonparents, respectively). The lack of one's own housing tenure slightly increased the risk of distress in women but not in men (SI 1.52, 95% CI 1.01-2.28). Finally, financial strain was associated with an increased risk of suicide attempts in both sexes, but the other aspects of social adversity or the taking on of adult social roles were unrelated to such attempts.

Table 8: Odds ratios (OR) and 95% confidence intervals (CI) of psychological distress and suicide attempts in relation to immigrant status among young adults in the Stockholm Public Health Cohort.

Psychological distress		
	Men	**Women**
	OR (95%CI) †	OR (95%CI) †
Immigrant status		
Native Swede	1	1
European 1st generation immigrant	1.04 (0.73-1.49)	1.03 (0.76-1.38)
Non-European 1st generation immigrant	1.11 (0.84-1.46)	1.41(1.13-1.75)*
European 2nd generation immigrant	1.00 (0.81-1.22)	1.00 (0.84-1.19)
Non-European 2nd generation immigrant	1.26 (1.05-1.51)*	1.28 (1.08-1.51)*
Suicide attempts		
	OR (95%CI) †	OR (95%CI) †
Immigrant status		
Native Swede	1	1
European 1st generation immigrant	1.08 (0.51-2.32)	1.61 (0.97-2.65)
Non-European 1st generation immigrant	0.98 (0.53-1.82)	3.52 (2.61-4.74)*
European 2nd generation immigrant	1.06 (0.70-1.61)	1.30 (0.97-1.74)
Non-European 2nd generation immigrant	0.72 (0.47-1.10)	1.60 (1.23-2.10)*

†: Adjusted for age, parental SES, parental education and parental history of in-patient psychiatric care.
*: Significant at the .05 level, 2-sided test.

Table 9: Odds ratios (OR) and 95% confidence intervals (CI) of psychological distress and suicide attempts in relation to social adversity and transition into adult life among young adults in the Stockholm Public Health Cohort

	Psychological distress		**Suicide attempts**	
	Men	**Women**	**Men**	**Women**
	OR (95%CI) †	OR (95%CI) †	OR (95%CI) †	OR (95%CI) †
Employment status				
Student	1.03 (0.87 1.22)	1.33 (1.16-1.54)*	0.84 (0.57-1.24)	1.12 (0.86-1.47)
Employed	1	1	1	1
Unemployed	2.58 (1.99-3.34)*	2.30 (1.78-2.96)*	0.98 (0.56-1.70)	1.19 (0.79-1.77)
Other	1.20 (0.87-1.65)	1.42 (1.11-1.81)	1.17 (0.62-2.21)	1.07 (0.72-1.59)
Financial strain				
None	1	1	1	1
Sought help from others	1.93 (1.67-2.24)*	1.55 (1.37-1.76)*	2.04 (1.49-2.81)*	1.80 (1.42-2.27)*
Sought social benefits	3.11 (1.96-4.92)*	1.92 (1.37-2.71)*	1.70 (0.78-3.82)	3.57 (2.29-5.55)*
Age at becoming a parent				
14-19	1.31 (0.27-6.37)	3.68 (1.88-7.17)*	<<<<	0.83 (0.63-1.92)
20-24	1.26 (0.75-2.12)	1.54 (1.07-2.21)*	2.10 (0.90-4.89)	0.91 (0.52-1.62)
25-29	1	1	1	1
Non-parent	1.13 (0.80-1.58)	1.73 (1.29-2.34)*	0.93 (0.47-1.85)	0.89 (0.54-1.47)
Housing tenure				
Owning/ Renting	1	1	1	1
Living with family of origin	1.18 (0.97-1.44)	0.94 (0.78-1.12)	1.05 (0.68.1.62)	0.78 (0.57-1.09)
Lacking own tenure	1.11 (0.89-1.38)	1.24 (1.04-1.49)*	1.16 (0.70-1.91)	0.80 (0.56-1.15)

†: Adjusted for age, parental SES, parental education, immigrant status, school performance, employment status, financial strain, age at becoming a parent, housing tenure, parental and individual history of in-patient psychiatric care when applicable.
*: Significant at the .05 level, 2-sided test

4.4 STUDY IV

There was a strong graded relationship between school performance and the risk of suicide attempts (Table 10). ORs increased stepwise with a more than 3-fold elevated risk of suicide attempt among those in the lowest grade quartile compared to those in the highest. The relationship was somewhat attenuated but remained after adjustment for adult health behaviours and social conditions. Adding alcohol or cannabis use in the final model did not further attenuate the association.

The relationship of school performance with the risk of suicide attempts appeared to differ by baseline history of suicide thoughts (Table 11).). Among those without history of suicide thoughts, ORs ranged from 10.86 (95 % CI 2.96-39.84) for those in the lowest grade quartile to 5.67 (95 % CI 1.53-21.06) and 4.35 (95 % CI 1.18-15.97) for those in the 2nd and 3rd quartiles respectively. No significant associations were found among those with history of suicide thoughts at baseline. Lastly, the association between school performance and suicide attempts did not differ between men and women ($\chi 2=0.21$, df=3, p=0.98 for Log-Likelihood test on the school performance*sex*suicide attempts interaction).

Table 10: Adjusted Odd Ratios (OR) and corresponding Confidence Interval (CI) of suicide attempts at follow-up according to compulsory school leaving grades (N=6146).

	Model 1 *	**Model 2 ¶**	**Model 3 †**	**Model 4 ‡**
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Compulsory school leaving grades				
Lowest quartile	3.35 (1.88-5.96)	3.54 (1.94-6.47)	2.85 (1.46-5.59)	2.98 (1.54-5.78)
2nd quartile	2.60 (1.48-4.57)	2.75 (1.55-4.87)	2.72 (1.50-4.92)	2.77 (1.53-5.00)
3d quartile	1.76 (0.99-3.13)	1.75 (0.98-3.11)	1.75 (0.97-3.14)	1.75 (0.98-3.14)
Highest quartile	1	1		

* Model 1: Adjusted for age and sex.
¶ Model 2: Model 1 further adjusted for parental education, immigrant status and adoptive parent.
† Model 3: Model 2 further adjusted for BMI, sedentary life style, current daily tobacco smoking, education and history of mental illness.
‡ Model 4: Model 2 further adjusted for employment status, financial strain, social support, education and history of mental illness

Table 11: Adjusted Odd Ratios (OR) and corresponding Confidence interval (CI) of suicide attempts at follow-up according to compulsory school leaving grades, by baseline history of lifetime suicide thoughts (N=6146).

	Positive history of suicide thoughts N=1113	**No history of suicide thoughts N=5033**
	OR* (95% CI)	OR *(95% CI)
Compulsory school leaving grades		
Lowest quartile	1.38 (0.57-3.35)	10.86 (2.96-39.84)
2nd quartile	1.62 (0.76-3.45)	5.67 (1.53-21.06)
3d quartile	0.88 (0.40-1.95)	4.35 (1.18-15.97)
Highest quartile	1	1
	χ^2 (df=3)	p
School performance*suicide thoughts*suicide attempts interaction ‡	10.26	0.017

* Adjusted for age, sex, parental education, immigrant status and adoptive parent.

‡ Chi-square value is based on Log-Likelihood Ratio test.

5 DISCUSSION

5.1 MAIN FINDINGS

Findings in this thesis shed some light on recent trends and the causes of mental ill-health among contemporary young adults.

We found that self-reported anxiety and psychiatric service use increased among young individuals of both genders in Stockholm County between 1997 and 2006, while attempted suicides and severe anxiety increased only among young women. These trends did not accord with trends in the older age group, among which these indicators decreased or remained stable from year 2001 and onwards. The increases in levels of anxiety in both young men and women support the notion that minor psychiatric morbidity has risen in Stockholm since the 1990s. This is in line with a number of studies that have found increases in emotional problems among the young in western countries during the past decades[18-21]. However, the socio-demographic distribution and social causation of these secular increases in minor psychiatric morbidity have not been adequately described in previous studies.

Consequently, we explored the association between social position and the risk of psychological distress, as well as severe distress and depression. Social position appears to only have weak associations with the risk of psychological distress, regardless of gender. Low income somewhat increases the risk of distress in both genders and there is a stronger relationship between income and severe distress. In contrast, the social patterning of depression is more striking, but shows different features in men and women. We found that depression is markedly linked with occupational class in men and with family income in women, and this is especially true among younger individuals.

Furthermore, we found that immigration from outside Europe is related to mental ill-health in young people in Stockholm. Non-European immigrants, especially females, have a higher risk of psychological distress. In addition, there is a striking increase in the risk of suicide attempts in non-European immigrant women. Social adversity, particularly financial strain, is also strongly related to mental ill health in young men and women. Unemployment and financial strain both increase the risk of distress, while financial strain is markedly related to the risk of suicide attempts. Postponement of adulthood, as reflected by later attainment of employment and housing tenure as well as becoming a parent at a later age, appears to increase the risk of distress, but only in young women.

Lastly, we found that school performance during childhood predicts suicide attempts during young adulthood. Adult health behaviours and social factors did not explain the relationship. The relationship appears, furthermore, to concern only individuals without history of suicidal thoughts. These findings indicate that poor coping in situations where such thoughts emerge may instead explain the relationship.

In conclusion, our findings indicate rising, and highly prevalent, mental ill-health among the young in Stockholm and underscore the importance of social factors, especially those influenced by current societal changes, and cognitive performance in the causation of mental ill-health among the young. These findings are further discussed in the following paragraphs.

A major strength of **Study I** is that we explored both self-reported and register-based indicators of mental ill-health during the same study period in the general population of Stockholm. However, a question that is raised is whether or not the examined indicators really mirror deteriorating mental health among the young. There are objections to be made regarding both types of indicators. Mental health service utilization is strongly associated with psychiatric morbidity, but the perceived need for mental health care is also an important determinant of service use[75-77]. It could be argued that people in contemporary western societies have higher personal expectations and desires for care and, therefore, seek psychiatric care more often than previous generations did. Although we cannot rule out the possibility that such sociocultural period effects may be operating, it is unlikely that these could explain the marked increases in mental health service use during a decade in our study. Furthermore, the increase in outpatient mental health service use coincided with an augmented use of inpatient care, indicative of more severe psychiatric morbidity among young adults. In contrast, inpatient mental health service use among older adults declined. It should also be noted that the number of beds in inpatient psychiatric wards decreased considerably in Stockholm as well as all over Sweden during the study period[78]. Thus, the threshold for becoming an inpatient was increasing during the period, which supports the strength of our interpretation. On the other hand, some of the increase may be due to prioritizations of young patients. Self-reported data suffers from other weaknesses. One hypothesis is that contemporary young people are more prone to express feelings of anxiety and nervousness than were previous generations due to a lower threshold, and that could possibly explain the increased rates of anxiety and minor psychiatric morbidity found in both our study and those of others.[18-21]. Such a change in reporting attitude regarding anxiety could be due to cultural, educational and societal effects. However, it is difficult to perceive why only young people have lowered their threshold for anxiety, while older adults have not. Furthermore, individuals' own experience of suffering is undoubtedly important for mental health and life satisfaction. Thus, self-reports of mental health symptoms should be nevertheless considered as worthwhile and central in mental health evaluation, despite of any possible changes in reporting attitude. Finally, the increases in rates of anxiety were paralleled by an increase in inpatient service use, as well as an increase in rates of suicide attempts among young women. These data, taken together with data on trends in suicide rates between young and older women that disfavoured young women, provide some evidence for a deteriorating mental health among contemporary young people, especially females, in Stockholm County.

Among the strengths of **Study II** is that we assessed the impact of socioeconomic status on the risk of different severity levels of psychological distress and clinically overt depression in the same study and in a longitudinal manner. There is only one prior study[79] comparing the association of SES with different endpoints of common mental disorders in the same study population and none using a longitudinal design. However,

including the whole spectrum of common mental disorders is important, as our study shows that social pathogenesis varies between different outcomes. We found stronger associations of SES with depression than with distress and severe distress and this was especially true among younger individuals. The three outcomes were associated with indicators of illness severity in a graded manner. Thus, our findings indicate that psychological distress and depression appear to differ in their socioeconomic patterning, and that the socioeconomic gradient increases with symptom severity. We further found that the impact of SES on the risk of onset of distress and depression varies with the dimension of socioeconomic status, as well as with gender. We found a clear association between low occupational class and depression among men, but not among women. Income instead appears to be more important among women. It is noteworthy that not only low but also intermediate levels of household disposable income were strongly associated with the risk of depression in women. However, the mechanisms that could explain the steep gender-specific socioeconomic gradient in depression are not sufficiently elaborated in our study. The association between SES and depression may be due to many processes - behavioural, social, familial, psychological, environmental, and physiological - that are socially stratified and unfold over the lifespan. Income and occupational class are aggregated concepts that may reflect material resources or working conditions, prestige, social standing and social network, respectively, all of which may have health effects[42-43] and mediate the SES and depression relationship. Nevertheless, it appears that occupational class is more important for mental health in men than women, but that the opposite holds true for affluence.

The strengths of **Study III** include its large population-based sample and the combined use of self-reported and register-based data. The striking risk increase for suicide attempts in non-European immigrant women found in this study is of particular concern, since immigrant populations have increased considerably in Sweden and in other western countries in recent decades. The strong relationship between non-European origin and suicide attempts in young women could not be explained by parental or individual socio-economic conditions in our study. It may be that young non-European immigrant women face adverse living conditions and possibly cultural and family conflicts not shared by their male peers, which may be of relevance for prevention. Previous research suggests that intergenerational conflicts as well as social marginalization and discrimination[80-82] may mediate the relationship between immigration and mental ill health. Cultural differences may predict such adverse phenomena, which might explain why only non-European immigrant women ran a higher risk of distress and attempted suicides in our study.

Financial strain and unemployment were positively related to psychological distress in both sexes. Financial strain was also associated with the risk of suicide attempts, indicating that poverty is an important determinant of suicidal behaviour in young people. These relationships, however, were cross sectional, and reverse causality may explain the findings. It may be, for example, that individuals with mental ill-health tend to drift downward in the social scale and to attain low-grade jobs. Thus, they are more likely to face unemployment and poverty as a consequence of illness. This notion seems to be true in the case of severe mental disorders like schizophrenia[83] in which social factors are both causes and consequences of illness [84]. However, results from

previous studies regarding common mental disorders and depression do not support the hypothesis of selection[85,86]. Furthermore, the relationships remained after adjustment for previous severe mental illness. Thus, financial strain may play a causal role in the development of mental ill health in young people.

Postponed transition to adult roles, such as paid employment, residential independence and parenthood, was associated with poor mental health, but only among women. Correlates like physical health, unfulfilled expectations about forming a family, and deviations from culturally expected birth timing may all mediate the association between not giving birth before the age of 30, and distress. It may also be that taking on mature social roles and responsibilities such as parenthood and employment improves emotional well-being especially in women. This mechanism could possibly also explain why women lacking their own housing tenure had higher levels of distress, after adjustment for possible socio-economic confounders. Furthermore, the attainment of paid employment and a family as well as residential independence may also reflect young people´s chances and ability to make independent reproductive, occupational and lifestyle choices. The gender differences found in our study indicate that the transition into adult life and making these choices may be especially problematic for young women who encounter difficulties and ambiguities that are not paralleled among young men. Furthermore, the pattern and timing of the transition to adult life as well as youth unemployment, immigration and social adversity, all are factors reflecting the way, and the context in which, young people pave their path early in life and are influenced by societal changes. Thus, recent societal changes influencing these phenomena may have contributed to the increasing rates of mental health problems in young adults, especially young females, in Western countries.

The strengths of **Study IV** include its large population-based sample, the combined use of self-reported and register-based data, as well as its longitudinal design. Our finding that poor school performance during childhood predicts suicide attempts during adult life is in line with previous register-based studies[47-48]. To our knowledge, our study is the first to examine the association between school performance and self-reported suicide attempts in a population sample of young adults in Sweden. Previous studies have found that parental socioeconomic status or attained socioeconomic position do not seem to explain the relationship[51,53,55,57,58]. Our study also suggests that the lack of social support does not mediate the association of low school performance and suicide attempts, despite the fact that social support probably reflects important predictors of suicidal behaviour, such as relationships with friends and relatives, the ability to engage in social networks, and self-esteem[87]. One previous study found that controlling for smoking and alcohol use somewhat attenuated the association of IQ with attempted suicide in a sample of Swedish men[59]. We were able to test this hypothesis in both sexes and with a wider range of health behaviours. We found that health behaviours only accounted for a minor part of the association between school performance and self-reported suicide attempts.

Our finding, that the relationship of school performance with suicide attempts concerns individuals without history of suicidal thoughts, somewhat corroborates previous studies that failed to find a relationship in people with severe mental illness[47,56,59,88].

However, suicidal thoughts are common among young adults and not all young people with lifetime suicidal thoughts develop a severe mental illness. Thus, our findings shed some further light on the mechanisms underlying the cognitive performance and suicide attempts association. Suicidal thoughts are indicative of severe mental distress and are a risk factor for attempted suicide. It is plausible to assume that all suicidal acts are preceded by such thoughts, which, however, may differ in intensity and duration, and may be impulsive or not. It may be that low cognitive ability implicates an impairment of mechanisms that normally prevent individuals from immediately acting in situations when suicidal thoughts emerge, for instance, under stress and in life crises. Thus the mechanism linking cognitive ability with suicide attempts may be more proximal and more related to the ability to cope with acute stress and problem-solving abilities than the mechanisms operating in the course of a mental illness, such as long-lasting suicidal ideation. That could explain the strength of the association found in our study of school performance with suicide attempts in young people without a lifetime history of suicidal thoughts , as well as why previous studies failed to explain the association by controlling for severe mental illness. It may also be that suicidal thoughts are such a strong risk factor for suicide attempts that, in the presence of it, other risk factors lose in importance.

5.2 METHODOLOGICAL CONSIDERATIONS

5.2.1 Selection bias

Selection bias can occur in cohort studies when non-participation and loss to follow-up are associated with the exposure or the outcome. Non-responders in the SPHC were more likely to be men, born outside Sweden, single or separated, unemployed and with lower incomes[68]. Some of these characteristics are related to exposures in Studies II-III and to the main exposure in Study III. Participation in these studies may, thus, be somewhat biased in relation to the exposures. Since many of the characteristics of non-responders are associated with impaired mental health, it is plausible to assume that participation in SPHC was more common among individuals with fewer mental health problems. That may have led to an underestimation of the true associations between the exposures and the different mental health outcomes in our studies.

Furthermore, we studied young individuals, who are least likely to participate in surveys[89]. Non-response at baseline and loss to follow-up may have biased our results in Study II if the rates of psychological distress or depression onsets varied between participants and non-participants with the same SES. Non-responders at follow-up in 2007 were more likely to be men (74% response rate in men vs. 78% in women), to have lower SES (74% response rate among unskilled workers vs. 82% among higher employees; 67% among individuals with compulsory education vs. 81% among individuals with higher education; 69% among individuals in the lowest income quartile vs. 83% among individuals in the highest income quartile), to be unemployed (66% response rate among unemployed vs. 77% among employed), to live without a partner (72% response rate among single or separated vs. 78% among those cohabiting), and to be born outside Sweden (70% response rate among non-Swedish born vs. 78% among Swedish-born). Many of the characteristics of non-responders are

associated with impaired mental health. Thus, non-response is more likely to have biased our estimates of associations towards the null. In Studies III and IV, we used weights to adjust for non-participation[68,69]. Nevertheless, selection bias may still have influenced our results to some extent.

There is also possibility of another type of selection bias in Studies II and IV. In these studies, individuals with prevalent mental ill-health at baseline, according to the respective mental health outcomes, were excluded from analyses. This type of health selection may have led to an underestimation of the associations between SES and distress and depression in Study II, and between school performance and suicide attempts in Study IV.

5.2.2 Generalization

Participants in the SPHC are randomly selected individuals from the adult population of Stockholm County. The 2002 and 2006 surveys involved area-stratified, random samples of the population of Stockholm County, aged 18 to 84 years, as identified from the Swedish Total Population Register[90] at Statistics Sweden. The sample sizes are tailored to enable adequately powered estimations of age-, sex- as well as municipality-specific prevalence of core health determinants. The surveys used to estimate rates of self-reported anxiety in Study I also comprised representative samples of the population aged 16 to 84 years in Stockholm County. Thus, results in our studies are readily generalized to the population of Stockholm County. Although the results raise general concern and provide insights regarding the well-being of young adults in urbanized, secular Western societies, they may, however, not be readily generalized outside Stockholm County. It may also be that trends and causes of mental ill-health among the young differ between rural and urbanized areas in Sweden.

5.2.3 Information bias

5.2.3.1 Misclassification of exposure

Bias may have been introduced since we classified young people according to their current SES at baseline in Study II. Younger participants in that study were more likely to change their SES during follow-up than would older individuals. Many of the younger participants obtained a higher SES during follow-up, probably due to completion of studies and progress in the job market at the beginning of their adult lives. For example 43 per cent of unskilled manual workers aged 18-34 years obtained a higher occupational class during follow-up whereas only 18 per cent among individuals older than 35 years did so. This may have led to a dilution of associations since individuals that would eventually acquire a higher SES during follow-up, which is protective of mental ill-health, were classified as having a lower SES at baseline.

5.2.3.2 Misclassification of outcome

In Study I, levels of anxiety were assessed using one single-item measure, which is a rather crude measure of psychopathology. However, two different cut-offs were applied

and self-reported data was supplemented with register- based indicators of mental ill-health.

The centralized databases used to determine levels of mental health service utilization include almost all psychiatric care provided in Stockholm County. Data from alcohol and drug clinics, however, was not included. Yet, the use of inpatient health care in these facilities reportedly increased among young adults between 1998 and 2005 in Stockholm County while remaining fairly stable for all the other age groups[91]. The use of outpatient services in alcohol and drug clinics increased among all ages but increased most among the younger age group. These trends are similar to those demonstrated in our study for psychiatric service use. Furthermore, the databases do not contain primary care. Care-seeking behaviour and referral patterns could influence access to specialist psychiatric care and therefore affect the social gradient of depression in these data. According to studies in other countries[92], socially disadvantaged individuals are less likely to seek secondary mental health care. If this is true for Sweden, we may have underestimated the associations between SES and the risk of onset of depression. Another potential source of bias is that the registers record only public and not private psychiatric care, which may have led to an overestimation of the socioeconomic gradient in depression. However, public psychiatric care provided in Stockholm County encompasses more than 85 % of all care[91] and differential misclassification of outcome is thus unlikely to explain the large socioeconomic gradient for depression. Our restriction to diagnoses in psychiatric care increased the severity of the depression cases as we failed to capture individuals with depression treated in primary care. Thus, our findings refer to patients who experienced depression severe enough to be referred to secondary care.

In addition, we estimated rates of attempted suicides in Study I from register-based data on hospital admissions. Since not all attempters are hospitalized, reported estimates are likely underrating true levels.

Lastly, self-reports of distress are probably the only option in large-scale studies. Nevertheless, self-reports need to be critically assessed for potential bias, although a well-validated instrument was used in our studies[71,93].

5.2.4 Power issues

The analyses conducted for the purposes of this thesis were generally well powered. However, age- and gender- stratified results in Study II should be interpreted with caution because of low numbers. In Study I, the marked oscillation in suicide rates among youth and young adults, especially females, may be due to small numbers. Lastly, analyses of suicide attempts in Study III were sometimes based on small numbers.

5.2.5 Confounding

We were generally able to adjust for a range of possible confounders in Studies III and IV. In both studies, for example, we were able to adjust for confounding effects of severe parental and individual psychopathology assessed from valid psychiatric care

registers. In Study III, we did not have information on all possible determinants of mental ill health in young adulthood (e.g. childhood/teenage psychopathology or abuse), and thus confounding cannot be ruled out. In Study IV, we had access to richer data than in prior studies and could adjust for numerous potentially confounding factors. However, residual confounding by unmeasured exposures cannot be ruled out.

6 CONCLUSIONS

In **Study I**, we concluded that self-reported anxiety and psychiatric service use increased among young individuals of both genders during 1997-2006, while attempted suicides increased only among young women. In contrast, these indicators decreased or remained stable in the older age group from 2001 and onwards. These trends indicate rising, and highly prevalent, mental ill-health among the young in Stockholm County, a region representative of urbanized, secular Western societies.

In **Study II**, we concluded that the socioeconomic gradient for clinical depression is more pronounced than that for psychological distress. Clinically overt depression is markedly linked with occupational class in men and with family income in women, and this is especially true among younger individuals. Low income is associated with the risk of distress whereas the association is stronger for severe distress. The three outcomes, depression, distress and severe distress, are associated with indicators of illness severity in a graded manner. Thus, our findings indicate that psychological distress and depression appear to differ in their socioeconomic patterning and the socioeconomic gradient increases with symptom severity.

In **Study III**, we concluded that unemployment and financial strain are related to the risk of psychological distress in young adults. Financial strain is markedly linked to the risk of suicide attempts regardless of gender. Immigration from outside Europe is related to the risk of psychological distress, especially among young women. There is a striking risk increase for suicide attempts in non-European immigrant women. Postponement of the adoption of adult roles, as reflected by later attainment of employment and housing tenure, as well as becoming a parent at a later age, appear to be related to poor mental health, but only in young women. Recent societal changes influencing these phenomena may have contributed to the increasing rates of mental health problems in young adults, especially young females, in Western countries.

In **Study IV**, we concluded that school performance is a strong predictor of future suicide attempts in young adults, and that this relationship appears to be strongest in individuals without history of suicidal thoughts. Adult socioeconomic factors and health behaviours do not seem to explain this relationship. Instead, other factors linked with poor school performance, such as poor coping mechanisms and problem-solving abilities may explain the relationship.

7 ACKNOWLEDGEMENTS

I would like to sincerely thank all those that contributed to the completion of this thesis. I owe special thanks to:

My main supervisor professor **Cecilia Magnusson**, for excellent guidance, enthusiasm, support and always a positive attitude towards my needs during supervising. Thank you for teaching me so many things, in so many different ways.

My co-supervisor associate professor **Christina Dalman**. Thank you for your sincere and warm support, smart ideas and scientific accuracy and for always assisting me, especially when most needed.

My co-supervisor professor **Johan Hallqvist**. Thank you for excellent scientific contributions to my work that helped me significantly to evolve and for kindly encouraging me.

My co-supervisor associate professor **Göran Isacsson**. Thank you for contributing to my work with smart ideas and wise details, all pouring from your deep knowledge and right attitude. Also thank you for providing me with my best role model for a psychiatrist.

My co-authors **Rosaria Galanti**, **Elenor Mittendorfer-Rutz**, **Selma Idring**, **Dheeraj Rai**, **Clara Hellner-Gumpert** and **Henrik Dal** for valuable contributions and enthusiasm.

My colleagues at the Division of Public Health Epidemiology, especially **Sussane Wicks**, **Ewa Andersson** and **Henrik Dal**, for kind assistance when needed. Many thanks to **Peeter Fredlund** and **Michael Lundberg** who have supported me greatly through my doctoral studies by sharing with me their statistical competence as well as for the many in-depth discussions on almost everything during our lunches together. Thank you!

Lena Backlund, head of the Affective Section of Psychiatry Southwest at Huddinge Hospital and **Cecilia Dhejne**, head of the Gender Team, for creating supportive working conditions for research.

My mentor **Christian Rück** for sharing his experiences with me, encouraging me and supporting my ideas.

My relatives, especially **Eleni, Odysseas**, **Giannis**, **Kiki**, for many beautiful shared experiences and for unconditional support to my ambitions.

My dear friends and colleagues **Natasha** and **Elenor** and my life-long best friend **Maria** for sincere support and deep friendship. You are very important.

My parents **Aggelos** and **Katerina,** who embraced me with their love and generosity through all my steps in life. and provided me with valuable support and the blessing of a loving family. Thank you for that.

My sister **Georgia**, for the most valuable kind of support a person could ever ask, unconditional, sincere, at any time. And for her love.

My life partner **Nikos**, for love, joy, optimism and happiness through all our common years. Keep going!

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