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Depressive Symptoms over Higher Education and the First Years in the Profession

- a Longitudinal Investigation in Swedish
Nursing Students

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Cover picture: Nursing students on night duty 1898. Courtesy of the University of Pennsylvania Archives

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Till pappa:

I min skog strilar ljus ner
genom grenverket

ABSTRACT

Background and aims: A substantial part of the population attends higher education, which makes the welfare of students a matter of concern for public health. There are indications of a high prevalence of mental distress and depressive symptoms in students, as well as an increase over the past decades. If this is an effect of education, the demographic composition of student groups or changes in mental health at the societal level is uncertain. The overall objectives of this thesis were to investigate prevalence of depression and to follow change in depression symptoms over higher education and the first professional years. The specific aims were: 1) to investigate prevalence of depression and associations with demographic and education related factors in first year students (study I), 2) to investigate effects of time in higher education and work establishment on depressive symptoms, and to map change over the period (study II), and 3) to investigate risk of conflicting demands between education/work and private life (work-home conflict) over time in higher education and work establishment, and the association with depressive symptoms (study III).

Methods: The data came from LANE (a Longitudinal Analysis of Nursing Education), a national cohort of 1,700 nursing students who responded to annual questionnaires from 2002 to 2007. Study I was cross sectional and we used data from the baseline questionnaire collected during the first year of education. Depression was measured by the Major Depression Inventory and presence calculated according to a DSM-IV based algorithm. Associations with socio-demographic and educational factors were tested in logistic regressions. Study II and III were longitudinal, and for both we used data from five consecutive years: three in education and two post graduation. In study II we measured degree of depressive symptoms by summing the symptoms reported in the Major Depression Inventory. Change over time was analysed in a linear mixed model for repeated measures. In study III we measured two directions of work-home conflict: work → home and home → work conflict by single items. Depressive symptoms were measured as in study II. Change over time was analysed using generalized estimating equations and linear mixed models.

Results: Study I showed that 10.2% (5.7% men and 10.7% women) reported depression in their first year of education. Younger age (<30), immigration from outside Europe, high workload, dissatisfaction with the education, low self efficacy and work-home conflict were associated with higher risk of depression. Prior work experience, less need of financial support and salaried work during term time were associated with less risk. In study II we found an increase in level of depressive symptoms over time in education, but a decrease to levels similar to baseline a year after graduation and work entry. Symptom levels differed between groups of different age, family status and prior nurse assistant training, but the pattern of change was similar across groups. Study III revealed that the experience of work-home conflict also increased over education, but a year after graduation and work entry the risk was lower than at any time in education. Respondents who were parents reported conflict more often. The association between work-home conflict and depressive symptoms was strong and consistent over the whole period of investigation.

Conclusions: The students investigated were a heterogeneous group consisting both of young adults and individuals with extensive experience of adult life. As a group, 10.2% reported depression in their first year of education, but the overall risk was affected by age and gender. The findings of an increase on depressive symptoms over education and a decrease a year after graduation and work entry show that there is an effect of heightened distress over education, but that it is transitional and abates once the graduate has had time to accommodate to the profession. Moreover, many students, especially parents, found it difficult to balance the demands of education with those of private life and experienced work-home conflict. The strong association with depressive symptoms suggests that measures to reduce work-home conflict, especially in education programs with many mature students, could help alleviate distress.

LIST OF PUBLICATIONS

This thesis is based on the following papers:

- I. Anna Christensson, Marjan Vaez, Paul W Dickman, Bo Runeson. Self-reported depression in first year nursing students in relation to socio-demographic and educational factors: a nationwide cross-sectional study in Sweden. *Soc Psychiatry Psychiatr Epidemiol* 2011;46(4):299-310.
- II. Anna Christensson, Bo Runeson, Paul W Dickman, Marjan Vaez. Change in depressive symptoms over higher education and professional establishment – a longitudinal investigation in a national cohort of Swedish nursing students. *BMC Public Health* 2010;10:343.
- III. Anna Christensson, Marjan Vaez, Paul W Dickman, Bo Runeson. Work-home conflict and the association to depressive symptoms over higher education and professional establishment – a longitudinal investigation in Swedish nursing students. Manuscript.

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1 INTRODUCTION

“At present I feel a little concerned about my place in existence/society. And also the role as nurse. I like the profession and the skills, but feel a bit uncertain about my role. As a guy, as inexperienced. I feel like I have to prove something.”

Nursing student in his early twenties, during the first year of education

Time in higher education is a period of opportunities and challenges. Already by applying for an education program the student invests ambitions and hopes regarding his or her future. In addition, for young individuals just out of high school, the time spent at university is often intertwined with the transition to adult life and the educational setting an arena for exploration of life choices that contribute to forming their adult identity^{1 2}. For students further into adulthood, a return to education may be the successful outcome of long held aspirations they earlier were unable to realize. Also for students of mature age, higher education can provide an opportunity for personal development and reflection, and the studies bestow a sense of accomplishment that boosts self confidence^{3 4}. But the student years can be fraught with uncertainty and doubts as well. For the young, the freedom of independence comes with the challenge of new responsibilities, and the necessity to cope with adult life. If the transfer to education involves a move, regular contact with old friends may be lost, leaving life lonely at a vulnerable time². Those who enter higher education later in adulthood sometimes struggle with the transition to a new environment they have to conquer before feeling they belong. Their new ambitions can cause upset in already established relationships if partners feel left behind, and they often have to negotiate adult responsibilities of parenthood with the demands of education^{5 6}.

All students, young or more mature, are under constant evaluation and pressure to perform as they progress through their studies and after graduation they face yet another test as they have to prove themselves capable of finding employment and to manage the skills of their chosen profession. The educational process then, including the period of work establishment, may confer a stress specific to the period, with its own developmental pattern.

1.1 Higher education in Sweden

In the academic year of 2008/09 approximately 400 600 individuals in Sweden were registered in higher education for a combined work effort equivalent of 304 200 full time students' expected annual performance. Slightly more than 49 000 of them were beginners who had entered freestanding courses or education programs for professional and/or general qualifications, distributed over some 50 higher education institutions across the country.

Due to requirements of the labour market the volume of higher education has expanded in the past decades, and an increasing proportion of the population will spend part of their lives at university: of Swedish children born in 1983, 45% entered higher education before their 25th birthday, compared with 27% of those born in 1968. There is great variation in the gender distribution across specialisations, but overall, more women than men attend and in 2008/09, 60% of all registered students were female. The age distribution also varied across specialisations, but the overall median age among beginners was 22, which in an international comparison within the industrialised countries of the Organisation for Economic Co-operation and Development (OECD) was the highest next to Iceland. In fact, one in three of all Swedish students were older than 30, and 18% of the women were above 40. Fewer men had registered late, but still, 11% were 40 or older. This shows that a substantial proportion of students do not enter tertiary level education immediately after secondary school, but return after some years of other activities. It also implies that many students are well into adulthood and may have acquired private responsibilities not usually expected in students. In fact, when the Swedish National Agency for higher Education performed a survey as part of a joint European Union project; “Eurostudent”, 42% of the respondents reported they were already married or cohabited with a partner, and 11% were parents. A third reported they were single and 12% still lived in their parental home ⁷⁻⁹.

Approximately a third of all students in 2008/09 were registered for freestanding courses, but the majority pursued programs leading to a qualification of either a general (26%) or a professional (40%) degree. Annual performances, as well as completion rates of qualifications, differ between groups, but the statistics are difficult to compare: many students who enrol in freestanding courses never qualify for a degree, but whereas some probably never intended to, others go on to register for a general qualification at a later point. This makes it difficult to follow also those in general qualification programs, as for some, part of their education may have been obtained before they registered for a degree. Students enrolled for professional qualifications are easier to track and describe: they enter education at a specific time and follow an organised program with a specified endpoint. But even between these programs the differences in throughput are considerable: the average examination rates within the stipulated period (number of registered semesters acquired) varied from 15 to 93% in 2005 – 2008 and the average examination rates for students 8 – 14 years after entry were between 37 and 91%. Education programs leading to regulated professions (generally programs for health care professions) tend to have high throughput, and a higher proportion students in programs of shorter length complete within the expected time frame compared with longer programs. In all programs, regardless of gender distribution, a higher proportion of women complete than men ¹⁰.

The volume of the higher education system has fluctuated somewhat over the past decade, and due to a change in examination structure performed as part of the harmonisation of education systems within the European Union, with a division between first cycle- (undergraduate) and second cycle programs (master), the number of students in general qualification programs has increased ^{11 12}. Otherwise the statistics

from 2008/09 are similar to those of 2002 when the students in LANE (see section 3.1.), that we study in this thesis, entered nursing education.

1.1.1 Nursing education in Sweden

Nursing education was introduced into the national Swedish academic system of higher education in 1994. Before this, nursing students were trained in specialized colleges run by county councils, the same organisations that also serve as the main employers of nurses. The colleges offered vocational training for a limited number of health care professions, taught by teachers from the profession with an additional pedagogical degree. As the academic requirements for higher education increased, the ability of the county council colleges to adjust to a higher academic standard was questioned, and they were instead integrated into the national system of higher education. After the transferral all education programs were reviewed by the National Agency for Higher Education and many of them judged inadequate due to insufficient academic training. Thus many institutions and education programs have undergone substantial and sometimes painful changes since 1994. The transferral of the county council colleges into the higher education system was completed in 2000, except for three independent foundation colleges, and did not affect any of the students in this thesis. The education program remains under scrutiny however, and after a another review in 2006 two institutions temporarily lost their rights to award the nursing certificate¹³⁻¹⁵.

Nursing education is one of the largest programs for professional qualification in Sweden, with approximately 5 000 new students accepted annually at between 23 and 26 colleges since 2002. Only the teacher education and the master program in engineering accept more students^{9 16}. Nursing education takes three years to complete, is given at undergraduate level, and subject to the criteria set up by the National Agency for Higher Education and the National Board of Health and Welfare. The students alternate between academic courses and clinical placements, but the proportion of academic work and clinical work can vary between colleges.

Far more women than men take the program (with a gender distribution of about 85% women versus 15% men over the past years) and many come to education well into adulthood: in 2002, 60% of the beginners were older than 25 years of age, and 20% older than 35, but the age of the students seems to have decreased somewhat over the past decade (statistics collected from the web page of the Swedish National Agency for Higher Education at www.hsv.se). The proportion of students that, once admitted, graduate and qualify as nurses is high: 85% graduate within seven years of admission, 91% of them within the expected three years. More women than men graduate, almost 90% of the women graduate within seven years compared with approximately 80% of the men^{10 17}. Graduates are awarded both a professional qualification and a general degree of Bachelor, but to work in the profession they first have to obtain a license from the National Board of Health and Welfare.

1.1.2 Establishment in the profession

The extent to which graduates find work, and how it fits with their education, varies between professions. As a general rule a high proportion of graduates from programs

for health care professions establish themselves in the occupation they trained for quickly. When the National Agency for Higher Education investigated professional establishment in nursing graduates of 2004/05 a year after qualification, 90% of them worked in a target month, for 5% the work status was uncertain whereas the remainder either did not reside in Sweden at the time or may have re-registered as students. Almost all former students, 87%, were employed in the occupation for which they had trained¹⁸.

1.2 Mental health and depression in the population

Mental health problems are common in the general population, but the boundaries between health and disease are difficult to define. In 2005, the National Board of health and Welfare estimated that 20 – 40% of the Swedish population suffer from symptoms of mental distress, counting lesser distress symptoms as well as severe psychiatric disease, and that 10 – 15% of them have symptoms of a degree that require medical attention. Mental health issues, together with pain, are the most frequent reasons people state when they report poor overall health^{19 20} which shows that they affect a general sense of well-being significantly even if all who report problems cannot be considered ill. On the other hand, a diagnosable psychiatric illness does not necessarily have to equate mental distress (see Figure 1.1.). Apart from individual suffering, mental health problems are costly at the societal level. In Sweden they cause a high proportion of the combined compensations for sickness absence and disability pensions, and in 2005, a third of all compensation benefits disbursements from the national social insurance office (Försäkringskassan) were caused by mental health problems²¹.

While the prevalence of severe psychiatric conditions, including major depressive disorder, is thought to be relatively stable over time, symptoms of distress fluctuate over time. In Sweden, the proportion of respondents who reported worry, anxiety or depressed mood in the national Living Conditions Survey escalated over the last decades of the twentieth century. The increase has been attributed to societal changes; the recession of the early nineties and augmented levels of work-related stress due to reorganisations, for instance²². The professions that are perceived as most mentally stressful by employees seem to be those connected with the public welfare system, but the increase in mental health complaints affect all adults, also those unemployed^{22 23}. In the last years, the rates of distress reported from the Living Conditions Survey decreased slightly, with the exception of young women who still experience an increase²⁰.

1.2.1 Depression epidemiology

The definition of what signifies depressive disorder is not absolute, but subject to change over time²⁴. The two most broadly used classification systems today are the ICD-10 (the International Classification of Diseases, 10th revision) and the DSM-IV (the Diagnostic and Statistical Manual of Mental Disorders, 4th revision). Both classify depressive disorders by descriptive criteria that define a cluster of symptoms required for diagnosis, but also exclusion criteria, to prevent diagnosis in individuals for whom depressed mood may be a reaction to bereavement, or due to physiological conditions.

Figure 1.1. Matrix describing two dimensions for the definition of mental health*

		Disease oriented dimension	
		No mental illness	Mental illness
Health oriented dimension	No distress	I	II
	Distress	III	IV

**Mental health defined either as the presence or absence of mental illness or the presence or absence of distress (the individual's own experience of mental health symptoms). The model attempts to visualize that an individual can be mentally ill, but not affected by mental distress. And that to be distressed and suffer from mental health problems is not equivalent to illness. Whereas the proportion individuals in groups II and IV are fairly constant over time, those in group I and III (typically measured in population based surveys by items asking for experiences of depressed mood, worry and sleep related problems) fluctuate over time. The model, as shown here, was originally constructed by Claes-Göran Steffansson for Folkhälsorapporten 2005²³.*

The DSM-IV criteria (see Table 1.1.) are the most commonly used criteria for research purposes in Sweden today, and the estimate preferred for calculating prevalence of disease the proportion individuals who experienced an episode of depression over a time period of a year, or the 12-month prevalence.

Next to anxiety, mood disorders are the most common causes for mental illness and in Europe and the US the 12 month prevalence estimates vary between 7 and 12% with major depressive disorder contributing between 3 and 10%²⁵⁻³¹. In Sweden, the National Board of Health and Welfare weighted results from several Swedish studies together, and estimated that between 4 and 10% percent in the adult population are afflicted²³. Depression is almost twice as common in women as in men and the prevalence varies with age. The life time risk for illness has been estimated to 13-17%^{25 30 32} in European and North American population-based samples (with a gender distribution of 9% in men compared to 17% in women in a pan-European setting where the overall life time risk was estimated to 13%²⁵). Mental disorders typically begin early in life; 75% of those who contract a mental illness over life will experience their first episode before they are 24. The age of onset for depressive disorder is somewhat higher than this average: approximately 25% will experience a first episode before 19, and 50% will have done so at 30³².

Longitudinal studies that followed children over adolescence into early adulthood indicate few incident cases of depression during childhood, but after the age of 11, and over adolescence, the incidence as well as prevalence of illness increase, with a peak of new incident cases around 18. The typical gender differences also appear over adolescence^{29 33 34}. The increase in prevalence levels out in early adulthood and seems to be replaced by a decrease between 20 and 25^{35 36} as well as over the ensuing life course^{25 30 37}. Depression is a persistent condition that affects an individual over a considerable period of time: in 2002 Spijker et al. calculated a median duration of 4.5 and a mean of 7.7 months for a single episode in a population-based sample in the Netherlands³⁸. It is also often a recurrent disease with those once afflicted at higher risk for new episodes over life³⁹. There are both biological and environmental pathways to disease, but stress can trigger and perpetuate it^{40 41}.

Table 1.1. Criteria for Major Depressive Episode according to the DSM-IV

A.	<i>Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.</i>
1.	Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful).
2.	Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)
3.	Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day.
4.	Insomnia or hypersomnia nearly every day
5.	Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
6.	Fatigue or loss of energy nearly every day
7.	Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)
8.	Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)
9.	Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide
C.	<i>The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.</i>
	<i>B, D and E criteria add that symptoms are not better explained by bereavement, that they are not caused by a general medical condition or physiological side effects of drugs, or occurred in association with a manic episode</i>

1.2.1.1 Consequences of depression

When an attempt was made to calculate the global burden of disease, using a measure of the estimated sum of life years lost to premature mortality and years lived with disability (DALY – Disability Adjusted Life Years), depression was assessed as the third leading cause for burden of disease (next to ischemic heart- and cerebrovascular disease) in high income countries, and the fourth worldwide^{42,43}. Depression is associated with both reduced quality of life and work ability: population-based studies consistently show impaired social functioning that causes interpersonal problems and isolation⁴⁴⁻⁴⁶ and increased rates of sickness absence among depressed^{31,44,47,48}, also in those with subclinical levels of depressive symptoms⁴⁹. In young adults, the traditional group of individuals attending higher education, the transition to adult life may be both a risk factor for depressed mood and depression, and a complication with regard to the developmental tasks they have to accomplish as they progress towards mature adulthood. Depression threatens to leave a young adult vulnerable to lowered self esteem and less likely to achieve independence from the family of origin, to engage with new friends, to dare experiment with romance and the possibility of a future partner or to succeed in establishing a productive work life^{1,36}. In addition, depressive illness in early adulthood is associated with renewed mental disorder, especially anxiety disorders or recurrent depression, later in life⁵⁰. With regard to educational attainment

findings are somewhat mixed; results from the American National Comorbidity Survey of 1990, for which data were collected from respondents born between 1936 and 1975, show an increased risk for failure to complete high school, failure to enter college, and failure to complete college among college entrants in those with prior depressive disorder (with a respective odds ratio of 1.5, 1.5 and 2.9 compared to those with no depression prior to the different levels of attainment)⁵¹, but in a subsequent analysis of data from the National Comorbidity Survey – Replication of 2001 – 2003 that allowed adjustment for childhood adversity (traumatic events, neglect, parent’s mental illness, family disruption and low parental educational attainment), prior mood disorders were no longer significantly associated with educational attainment at any level, suggesting early adversity rather than mood disorder may lie behind⁵². Results from the World Mental Health Initiative, with data from population-based surveys performed in 16 high and middle income countries across the world, show a risk increase of non-completion for secondary level education, and a slight risk increase for not entering tertiary education in high income countries in the previously depressed (with an odds ratio of 1.2 compared with those with no prior depression), but no difference in completion of higher education among entrants⁵³. In all surveys, to have experienced any mental disorder versus no disorder was associated with both non-entry and non-completion of higher education, but less so in middle income versus high income countries, and in all surveys the association was stronger for substance use disorders and disorders involving externalizing behaviour⁵¹⁻⁵³.

1.2.2 Measurement of depression

After the introduction of classification systems for mental disease, with standardised diagnostic criteria, a number of instruments to measure depression and other psychiatric conditions were developed. The gold standard is structured interviews in which a trained interviewer follows a predefined interview schedule composed to evaluate the existence or severity of a specific syndrome. Interviews are time and labour intensive however, and often unrealistic in large scale survey studies. Instead, depression and depressive symptoms are commonly measured by rating scales constructed for self-report. The survey participant receives a questionnaire with a number of questions representing symptoms of depression, and is usually asked to give his or her responses by ticking a box on a scale that asks for the frequency and/or severity with which a specific symptom occurs. To test the validity of the instruments – with which accuracy they measure depression – results from the questionnaires are compared with results from standardised interviews. Many scales can be used both to evaluate symptom severity, by summing a score of all responses for each participant, and to screen for depression, by using an algorithm or a cut off. Examples of rating scales often employed are CES-D (Center for Epidemiological Studies – Depression Scale), HADS (the Hospital Anxiety and Depression Scale) and the BDI (Beck Depression Inventory).

What rating scales for self-report really measure is a matter for debate, as they rely on how the respondent interprets and evaluates the requested symptoms, which may differ between groups of individuals depending on demographic factors and prior experience of disease⁵⁴. In addition, self-report scales often neglect exclusion criteria, such as the

presence of other explanatory factors for depressed mood like bereavement or physiological disorders that affect mental functioning. Thus, the measures often achieve high sensitivity: that is they detect individuals with depressive symptomatology in high degree, but, because some symptoms in the depressive syndrome also reflect anxiety, and because of the lack of exclusion criteria, specificity – with which accuracy they exclude non-depressed from classification as depressed – can be compromised. Some propose what self rating scales really measure is a general sense of negative affectivity shared by depression and anxiety disorders sometimes denoted “distress” or “psychological distress”⁵⁵.

1.3 Stress and depression

The research on the mental consequences of stress grew from observations of soldiers suffering from depression and anxiety after exposure to distressing situations and long-term trauma during the world wars of the last century. Later, attempts were made to identify events more common to ordinary life that cause noxious stress, and today few doubt that overwhelming events or pressing life circumstances can trigger or perpetuate depression^{40 41 56-59}.

Hans Selye introduced the concept of stress in 1936 as the organism’s physiological response to strain⁶⁰. A few years later Walter Cannon advanced a hypothesis of physiological homeostasis, or equilibrium, as the ideal existence the body strives for. A state ordinarily sufficiently regulated by the autonomic nervous system, but that when upset by fear or anger, through the release of epinephrine, causes both somatic and psychological reactions according to a “fight and flight” pattern⁶¹. The physiological responses described by Selye and Cannon have later been explained by activation of the sympathetic nervous system that regulates secretion of the stress hormone cortisol through the hypothalamic-pituitary-adrenic axis. Long-term exposure to heightened levels of cortisol are detrimental and affect several organs including the cardiovascular system and the brain⁶¹⁻⁶³. Following Cannon, the neuroscientist Bruce McEwen developed his theory of allostasis to explain the healthy regulation of stress hormones as a plastic process where the sympathetic nervous system adjusts the level of cortisol secretion according to the degrees of strain, or allostatic load, the organism is exposed to⁶⁴. Even if the system evolved as a defence mechanism against acute threats, McEwen argues, prolonged high levels of allostatic load reduce plasticity, which may leave the parasympathetic nervous system either in constant heightened activity or inert, and eventually cause tissue damage, immune sufficiency and/or mood disorders⁶²
⁶⁵.

Psychological theories of stress often also use the image of an equilibrium upset, such as the definition by Richard S. Lazarus and Susan Folkman, by which they describe stress as something that occurs when people appraise that the demands they are exposed to exceed their resources, thereby threatening their well-being⁶⁶. And in studies of work-related stress, the two models most often employed both describe occupational stress in terms of imbalance: in the demand – control model between the demands of the job and the control the employee has over work tasks with strain a

consequence of high demands paired with low control, and in the effort-reward model between the efforts invested in the job and the rewards returned, with strain a consequence of more effort invested than rewards returned⁶⁷.

1.3.1 Stress and vulnerability for depression

Stress and the strain of specific events or life circumstances do not affect all individuals equally however. Based on earlier theories by the English sociologist George Brown, but extended by the inclusion of personality, Johan Ormel proposed a dynamic stress-vulnerability model to explain individual differences. He argues that mental health is something quite stable over time but that different individuals experience different habitual levels of symptoms due to psychobiological and social factors that determine vulnerability for, and resilience to, distress. Negative events or life circumstances are what makes the habitual levels fluctuate, but how, and to what extent, is affected both by external features (such as the degree of unexpectedness with which they occurred and the degree of control the individual has over their effect) and intra individual features (how the individual subjectively appraises and copes with them). Personal context: age, gender, educational background, socio economic circumstances and sources of support all influence the control and the power to act an individual has in a specific situation. Psychobiological features: degree of neuroticism and regulation or dysregulation of the hypothalamic-pituitary-adrenic axis, affect subjective appraisal. Both contextual and psychobiological factors influence the individual's capability to find constructive coping strategies and thus master adversity⁶⁸. Negative events or circumstances themselves can be divided into, and were so by George Brown, those that involve loss and those that imply danger in the hypothesis of a stronger relationship between loss and depression and between danger and anxiety^{69 70}.

1.3.2 Work-home conflict

Work-home or work-family conflict is as a specific kind of stress that occurs when the demands of work are perceived as incompatible with those from home⁷¹⁻⁷⁶. In the tradition of Greenhaus and Beutell the focus of work-home conflict frequently has been that of conflict between work- and family demands and limited to the experiences of employed workers in relationships, often married parents with under age children⁷⁴. In a more general form it can be, and was already in 1946 by Robert L. Kahn, described as a conflict arising from competing pressures of the different roles an individual occupies. More and more researchers now advocate the inclusion of experiences from individuals regardless of family status⁷⁷. Work-home conflict is often separated in two dimensions: a) work demands that interfere with home life and b) demands from home/private life that interfere with work^{73 75 76 78}, but four dimensional structures that include positive aspects of the interaction between work and home have also been investigated^{77 79}. Factors at work seem to relate more strongly to work → home conflict and non-work factors more strongly to home → work conflict⁷² but the correlation between the two dimensions is typically high^{76 80}. In general more respondents report work → home conflict than home → work conflict⁸⁰⁻⁸² and even if there has been much interest in gender differences with regard to the work-home interface the associations found have been weak^{71 72 79}. Both dimensions of work-home

conflict can be associated with depression, but a number of studies found a stronger association between home → work conflict and depression⁸³⁻⁸⁵. The few longitudinal studies of work-home conflict and depression performed revealed limited long-term effects^{84 85}, but as far we are aware, no study followed change in work-home conflict, or the association with depression, over time.

1.4 Mental health in students and new graduates

While there are some studies that use complete or random samples from a study base containing students from different directions of specialisations or across schools⁸⁶⁻⁸⁸, the mental health of students has often been a concern for faculty within a specific education program. Generally the available data show high prevalence of depression and psychological distress, but in most studies they were collected from convenience samples of students at a single education site and often with little control of demographic factors that affect prevalence, like age and gender.

On a larger scale, national student counselling services who surveyed the experiences of student counsellors in the U.S.A. and in Great Britain warn that the number of students who seek help for mental problems has increased over time^{89 90}. The surveys reflect only the subjective observations of the responding counsellors, but are supported by a study in which records on mental health from 13,257 students, who attended student counselling over a period of 13 years (from 1998 – 2003) at a north American university, show an increase in stress/anxiety and depression over the period⁹¹. Whether this reflects a general increase in distress, or a change in attitude with less stigma attached to admitting problems, is uncertain⁹². If the observations reveal a true escalation, it is not necessarily caused by education related factors, but may be an effect of changes in the demographic composition of the student body as a higher proportion young adults in the population enter tertiary education⁹⁰, or of a general increase of distress in the society as a whole.

1.4.1 Stress over higher education

Factors that have been associated with stress and impaired mental health in broader categories of students include study stress and the risk for academic failure, lack of leisure time and private activities, financial constraints, family situation (to be single versus being in a relationship or married), living arrangements, lack of social support and loneliness⁹³⁻¹⁰⁵. With regard to individual risk factors, personality traits, especially perfectionism – or high and unrealistic standards combined with fierce self criticism, a trait closely related with neuroticism – have been explored and associated with adjustment difficulties, stress and depression¹⁰⁶⁻¹¹⁰.

In programs for the health professions investigators have interested themselves in the clinical part of the training where students report stress due to a gap between theoretical and practical training, strained relationships with preceptors and staff, fear of making potentially harmful mistakes in the clinic or not being able to master necessary skills, having to cope with experiences of suffering or death inadequately prepared, insecurity

in the relationship with patients in an ambiguous professional role or an overwhelming amount of responsibility^{102 111-118}.

1.4.2 Stress in new graduates

After graduation and work entry the graduate has to acclimatize to a professional role in an unfamiliar setting. In research of organizational socialization this has been described as a challenging process driven by the newcomer's need to reduce uncertainty and to increase the predictability of the work environment, that involve the resolution of role demands (understanding of job tasks and task priorities), task mastery (to learn the work tasks required and to gain self confidence in the professional role), and adjustment to the work group (to feel respected and accepted by peers). And the process can be facilitated or obstructed by formal and informal socialization tactics exercised by the organisation to help invite new employees¹¹⁹⁻¹²². In health care professions, accountability, coupled with a fear of medical errors in an overwhelming situation of increased responsibility not yet fully mastered, is often reported by the recently qualified¹²³⁻¹²⁶. Qualitative studies in which newly qualified nurses were interviewed about their experiences reveal a demanding journey through the first professional year, with the first months described as an engulfing period of uncertainty and chaos that, when survived, is gradually replaced by a growing sense of mastery that brings feelings of pride and accomplishment. The studies also speak of a journey from an idealistic, but judgmental, position with an exacting standard of nursing care expected from both self and others, to a more accepting and complex understanding of care provision that helps relax subjective perceptions of work demands^{99 127 128}.

For professions that offer uncertain employment prospects the search for work and fixed term job positions has also been associated with stress and reduced well-being in new graduates¹²⁹⁻¹³¹.

1.4.3 Depression and depressive symptoms in students

Depressive symptoms in student samples have usually been measured by self-report, often with a focus on detecting prevalence of clinical levels of distress rather than depressive disorder. The instruments most commonly employed are the Beck Depression Inventory (BDI), the General Health Questionnaire (GHQ) or the Center for Epidemiologic Studies Depression Scale (CES-D). Using recommended cut offs for the respective instruments, results from studies often show high prevalence of distress compared with validations from general samples of adults, but the estimates vary substantially between studies (with overall estimates ranging from 4 to 50%^{93 94 101 104-106 108 132-135}), and sometimes the results are purely descriptive which may have left them vulnerable to differences between the samples not accounted for.

When more stringent criteria for depression were used, employing a clinically validated self-report instrument based on the DSM-IV criteria, to analyze a random sample of 2,843 college, graduate, and professional students at a North American university, Eisenberg et al.⁹⁷, found that while 13.8% of the college students and 11.3% of the graduate/professional students reported any depression, only 5.2% (6.5% women and 3.9% men) of the undergraduates and 4.1% (4.2% women and 3.9% men) of the

graduates fulfilled the criteria for major depression. And in a nationwide, population-based study performed in the US, in which depression was assessed using a standardised interview schedule, the 12-month prevalence of any mood disorder in 20-25 year old college students was estimated to 10.62% and major depressive disorder to 6.67%⁹⁵. In an international perspective, Steptoe et al.²⁰³ found that an overall proportion of 19% male and 22% female university students across 23 high, middle and low income countries reported a high level of depressive symptoms (with a score above eight on the short Beck Depression Inventory), and 4.9% male and 4.2% female students severe depression (with a score above sixteen). Estimates varied greatly between countries however.

Studies of nursing students show similar results as those performed in other students groups. When depressive symptoms were measured by the 12 item version of the General Health Questionnaire and a cut off set to 4 (and occasionally 3) the proportion students reporting above threshold have varied between 20 and 35%^{88 136-138}. Other studies employed different versions of the GHQ or other instruments and report significant distress or depression in 8 – 55% of the investigated students¹³⁹⁻¹⁴². The majority of the studies were carried out in convenience samples at single schools.

If high levels of depressive symptoms and distress in students are an effect of education related factors is uncertain. Studies that compared mental health in samples of students with samples of non-students often show higher distress in students¹⁴³⁻¹⁴⁵ but comparisons of students and non-students performed within the same sample have shown no difference^{34 95 146}.

1.4.4 Change in mental health over education

Data on psychological distress by time in education come from a limited number of education programs, but seem to reveal a similar pattern of an increase in stress and mental distress over the course of education, despite differences in orientation and length. Longitudinal studies in medical students indicate increasing levels of stress, burnout and depression and a decrease in life-satisfaction over time¹⁴⁷⁻¹⁵⁰ and results from dental and law students were similar when psychological functioning and stress were followed over time¹⁵¹⁻¹⁵³. The same may be true of nursing students as stress levels seem to increase, and adaptive coping and self-esteem decrease¹⁵⁴⁻¹⁵⁷. Some studies measured distress only at the beginning and the end of education, but those that followed all years appear to agree in that they show a greater increase from the first to second year after which levels remain more or less stable until graduation^{150 152 153 157}. On the individual level, studies that investigated persistence of mental health problems over time in education show that students with mental distress early in education are at higher risk for distress and depression later in education compared with other students^{92 149 158}.

1.4.5 Mental health after graduation

After education, longitudinal studies in recently graduated medical doctors point to high initial levels of distress that decline over the first years in the profession^{125 130 159} and, as mentioned, qualitative studies in nurses consistently show new graduates

subject to high initial stress as they encounter the profession, but also a gain in professional confidence over the first year at work^{99 128 160}.

The only study we found that compared distress development in a cohort of 212 students with a cohort of 147 newly qualified professionals from the same college in Scotland, incidentally performed in nursing students, reported higher but decreasing levels of psychological distress (measured by the GHQ-28) over the first four professional years as nurses than in nursing students at any point in education¹⁶¹.

1.4.6 Work-home conflict in students

Studies of work-home conflict performed in students have investigated anticipations of future conflict rather than immediate experiences^{162 163} or restricted the interest to specific groups, often female students of mature age with parental responsibilities¹⁶⁴⁻¹⁶⁹. We found no study that attempted to map work-home conflict in a representative sample of students or any study that investigated the association with psychological distress over time.

1.5 Conclusions

Between 400,000 and 500,000 individuals in Sweden take part in higher education each year. A substantial proportion of the population initiate their occupational life at university which makes the welfare of students a matter of societal significance. There are indications of a high prevalence of mental distress and depressive symptoms in tertiary students across the world, as well as an increase in distress over the past decades. If this is an effect of education related factors, the composition of student groups or changes in mental health at the societal level is uncertain. Much of the available data come from convenience samples of limited size, and, perhaps owing to the relative homogeneity of many student groups, few studies investigated, or controlled for, the effects of demographic factors associated with depression.

Longitudinal investigations in which students were followed over time implicitly indicate an effect of education related factors in that they seem to reveal a similar pattern of change, with an increase of stress, mental distress or depressive symptoms, and a decrease in life satisfaction by time in education. These results come from a limited number of studies performed mainly in small samples of students. We know of no study that was able to control for differences in change between different schools. Longitudinal studies that followed newly qualified professionals over the first years at work seem to indicate an opposite direction of change with initially high levels of stress that decrease by time. We found but one study that followed change over both education and the first years in the profession using separate cohorts of students and former students from a single school. Thus, there is little data connecting mental health development over education with the first years in the profession.

Many students enter higher education at a mature age, and qualitative investigations indicate that it may be hard to combine the demands of education with those of home. While there are quantitative studies on the work-home interface performed in students, they often investigated anticipations of future work-home conflict or interested

themselves in specific groups of students only. In addition, we know of no study that followed change in work-home conflict or the association to levels of depressive symptoms over time.

2 AIM

The overall objectives of this thesis were to investigate prevalence of depression, and to follow change in self-reported symptoms of depression over education and the first professional years in nursing students and newly qualified nurses.

The specific aims were:

- To investigate prevalence of depression and associations with demographic and education related factors in students at the beginning of their studies (Study I)
- To investigate if there is an effect of time in higher education and work establishment on depressive symptoms and if so, to map the trajectory of change associated with the period (Study II)
- To investigate: a) risk for work-home conflict over time in education and work establishment, b) associations between work-home conflict and certain student characteristics and c) the association between work-home conflict and depressive symptoms over the period (Study III)

3 MATERIALS AND METHODS

3.1 The LANE study

LANE (a Longitudinal Analysis of Nursing Education) is conducted by a research group initially located at the department of nursing, now at the department of clinical neuroscience at Karolinska Institutet. The overall aim is to investigate mental health and burnout in early work life in health care workers, and in the fall of 2002 two cohorts of nursing students were established; EX 2002 and EX 2004. EX2002 consisted of nursing students in their last term of education before graduation and EX2004 of nursing students enrolled in their second term of the first year. In 2006, yet another cohort was initiated, EX2006, consisting of nursing students in their last term of education at baseline. For all three cohorts, all students in the target semesters at any of the 26 universities and university colleges that offer nursing education in Sweden were approached and invited to participate. All cohorts have been followed by annual surveys expected to continue approximately five years into work life¹⁷⁰⁻¹⁷³. For the three papers included in this thesis we used data from the first five years of follow-up in the EX2004 cohort: all three years in education plus two in the profession. My own role in LANE was to construct logistic procedures for the first data collections and to coordinate the field work.

3.1.1 Data collection procedures at baseline

Information on the expected number of students and their distribution across colleges was obtained from the Swedish Agency for Higher Education Services (Verket för högskoleservice).

A member of the research team visited all colleges to make personal contact with staff, to inform the students concerned about the study and to collect student registers. All colleges but two consented to give us access to registers that enabled us to trace and record each individual student. Initially, the questionnaires were distributed by the visiting researcher to all students who attended the information seminar, but invitations and questionnaires to absent students were sent out via mail. Due to logistical issues we changed this procedure early in the data collection process after which all questionnaires were mailed following the personal visit to the college. Non-responders were reminded three times: we sent renewed invitations three and six weeks after the initial invitation, and to those still not heard from after nine weeks we placed phone calls. For those who then declined participation the phone call gave us an opportunity to investigate reasons for withdrawal. The baseline survey of EX2004 was initiated in August 26, 2002, but the last 31 students were not contacted until January 15, 2003, a week before the official end of the fall semester.

For two smaller colleges (with a combined student body of about 100 students) we modified the contact procedure as they hesitated to give us access to student registers: one college chose to send out the questionnaires itself, and one gave us a reduced

register only after asking each individual student permission to surrender personal particulars.

Students who responded by returning completed questionnaires and who also agreed to registration of their personal identification number, were included in the cohort. Students who returned a questionnaire but did not provide us with their identification number necessary for future tracking, or who expressed they did not wish to be contacted in future, were not included.

3.1.2 Data management

Returned questionnaires were optically scanned and study data transferred into a database for storage and analysis. The scanned images of the questionnaires were saved for easy retrieval of the original data. Any identifying particulars on respondents: personal identity number, name, address, information on attended college and participation status were stored in a separate database constructed for logistical purposes only. A unique study number entered in both databases served as a key necessary to connect data from the same individuals over time.

3.1.3 Data collection procedures post-baseline

To increase efficiency, and to reduce workloads and costs, the logistics for the surveys following baseline were performed in collaboration with Statistics Sweden (Statistiska centralbyrån). The research group sent a list of personal identity numbers of cohort members to be contacted. Statistics Sweden checked current addresses and availability in the Swedish Population Register (folkbokföringsregistret), sent out questionnaires and contacted non-responders in a procedure similar to baseline: thank you- and reminder cards were sent after three weeks, a new questionnaire after six weeks and a phone call placed after nine weeks. When a data collection was completed, a data file and scanned images of the questionnaires were sent back to the research group. All cohort members located through the population register were re-contacted for all new survey waves regardless of post baseline response, unless they actively chose to decline further participation.

3.1.4 Data collection instruments

3.1.4.1 Baseline questionnaire

The initial questionnaire was designed to capture the demographic composition of the student group, mental well-being in connection with education, and evaluations of the work environment in nursing education. It was 32 pages long and comprised 10 sections divided into questions on background demographics, health- and health behaviour, alcohol- and drug habits, study environment and psychosocial work climate at school, personality, psychological mood and stress, and motivation for the choice of nursing education. Some areas of interest were covered by already existing and validated survey instruments whereas for others, for which we wanted specific information or could not find a suitable instrument, we constructed new questions and instruments to be tested within LANE. The questionnaire ended with two open ended

questions inviting students to give any additional information they deemed relevant or felt was not covered elsewhere, or to write down particulars about their own situation. Some 300 respondents took the opportunity to give feed-back and share their experiences of student life. Their comments were used to improve subsequent questionnaires and to assist interpretations of the quantitative data.

3.1.4.2 Follow-up questionnaires

The following two questionnaires distributed over the remaining time in education were similar in content. After expected graduation and work entry, year four and five, all questions on study environment were exchanged for survey instruments that investigated work environment and psychosocial work climate in general as well as questions more specific for the working conditions of nurses. The first questionnaire after expected graduation also contained a section on the transition from education to work and experiences from the first employment in the profession. All questionnaires over time have a similar structure, and the main outcomes: mental health, stress and work-related stress have been measured using the same instruments in all follow-ups.

3.1.5 Ethical considerations

The participants in LANE have been followed with repeated data collections over an extended period of several years. They are asked to give intimate information about themselves and we store sensitive data that can be traced back to them, as we need to be able to connect data from the same individuals over time. These are the measures we took in an effort to reduce the risk for discomfort or invasions of privacy among invited students, and later cohort members, over the five years covered here:

All students were explicitly asked to give their personal identity number in the baseline questionnaire in order to ensure their identity. They were informed that we intended to store the information for future tracing. Students who were not comfortable with this were not included in the cohort.

To avoid identification of individuals in connection with the data they contributed, study data and person data were kept separate in different data bases. In all files containing study data, personal particulars were replaced by a study number. The only connection between cohort members' national personal identity number and their LANE study number was a key in a data base constructed for logistic purposes only. The logistic data base was stored on a secured server to avoid access by others than those directly involved in the coordination of the study. For each of the four questionnaires post baseline, we sent a file of the cohort members' identity number to Statistics Sweden. Statistics Sweden was not given access to the LANE study number and did not register any lists of participants after the termination of a data collection.

The cover letters that accompanied the questionnaires all contained contact details to an appointed member of the research team for communication on any issue related to the study, including respondents' concerns regarding their own mental health. The cover letters also contained information on how to withdraw from the study.

The LANE-study was approved by Ethical Review Board at Karolinska Institutet and the papers included in this thesis are covered by the original application (KI 01-045) and an additional application, recorded under the same registration number in 2003.

3.2 Measures and methods in papers I – III

3.2.1 Outcome measures

3.2.1.1 Depression and depressive symptoms

Data on depression and depressive symptoms were measured by the Major Depression Inventory (MDI). It was developed to cover the descriptive criteria of major depression in the international classification systems DSM-IV and ICD-10 and has been validated both as a continuous scale measuring severity of depressive states and a dichotomous classification of disease^{174 175}. The MDI has been used in Swedish surveys, also in students, previously^{96 176 177}.

The instrument contains 12 items that follow the nine DSM-IV or ten ICD-10 symptoms of major depression. Four items ask for two symptoms of opposite directions, insomnia or excessive sleep and weight loss or -gain. They are combined and reduced into two counting only the item with the highest score. All items are answered on a Likert scale indicating frequency of symptoms during the past two weeks. The original Likert scale comprised six points, but in LANE it was simplified to four points with the answer format: all the time, most of the time, a minor part of the time or almost never/never (see Table 3.1).

In study I we classified respondents into those with self-reported depression versus those with no depression according to a DSM IV-based algorithm for the MDI¹⁷⁴. We made two modifications to the original algorithm: a) Because of the simplified Likert scale we made no distinction between core criteria and other criteria and dichotomised all items with a cut off between the response options “most of the time” and “a minor part of the time” and b) in accordance with the C-criterion in DSM-IV, which states that the declared symptoms need to cause significant distress or impairment for a valid diagnosis of major depression, we added a global item that asked whether the symptoms had caused significant distress in the past two weeks. The item was treated as a core criterion necessary for a positive screen for depression in analysis (see Table 3.1.). The same modifications were used in two earlier Swedish surveys^{96 176}.

In studies II and III, as our focus was change in depressive symptoms over time rather than presence of disease, we chose to analyse the instrument as a summated score¹⁷⁵: The MDI items were coded from 0 (almost never/never) to 3 (all the time) yielding a scale with a possible range of 0-30 (see Table 3.1.). Cronbach’s alpha for the scale varied between 0.88 and 0.89 over the five time points which is similar to validation studies of the original scale¹⁷⁵ (see Table 3.2 for information about the use of MDI as a summated scale versus a dichotomised measure in LANE).

Table 3.1. The modified Major Depression Inventory as employed in the LANE-study

<i>Questionnaire items in LANE</i>						<i>Study I</i>	<i>Study II and III</i>
To what extent have you felt low mood in the past two weeks? How often have you...							
		All the time	Most of the time	Some of the time	At no time	Algorithm for depression*	Summated scale**
1.	Felt low in spirits or sad?	3	2	1	0	2-3 = presence (core)	0-3
2.	Lost interest in your daily activities?	3	2	1	0	2-3 = presence (core)	0-3
3.	Felt lacking in energy and strength?	3	2	1	0	2-3 = presence	0-3
4.	Felt less self confident?	3	2	1	0	Highest score of 4 or 5, 2-3 = presence	0-3
5.	Had bad conscience or feelings of guilt?	3	2	1	0	2-3 = presence	0-3
6.	Felt that life wasn't worth living?	3	2	1	0	2-3 = presence	0-3
7a.	Had difficulty concentrating, e.g. when reading the newspaper or watching TV?	3	2	1	0	Highest score of 7a or b, 2-3 = presence	Highest score of 7a or b, 0-3
7b.	Had difficulty making decisions?	3	2	1	0		
8a.	Felt very restless?	3	2	1	0		
8b.	Felt irritated or angry?	3	2	1	0	Highest score of 8a or c (b not used), 2-3 = presence	Highest score of 8a or c (b not used), 0-3
8c.	Felt subdued or slowed down?	3	2	1	0		
9a.	Had trouble sleeping at night?	3	2	1	0	Highest score of 9a or b, 2-3 = presence	Highest score of 9a or b, 0-3
9b.	Slept more than usually?	3	2	1	0		
10a.	Suffered from reduced appetite lately?	3	2	1	0	Highest score of 10a or b, 2-3 = presence	Highest score of 10a or b, 0-3
10b.	Suffered from increased appetite lately?	3	2	1	0		
11.	If you suffered from any of the above described symptoms, did it cause you any marked suffering in the past two weeks?						
	Yes	1				1 = presence	
	No	0					

* The criteria required for a positive screen of depression were: Presence of at least five of items 1-10, plus presence of at least one core criteria (1 or 2 or both), plus presence of item 11.

** The score for all included items were summed, yielding a scale with a possible range of 0-30.

Table 3.2. The major depression inventory over time, depression and depressive symptoms

Year	Year 1	Year 2	Year 3	Year 4	Year 5
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
Depression according to DSM-IV algorithm					
Yes	171 (10.1)	189 (11.1)	159 (11.3)	108 (7.7)	99 (7.7)
No	1522 (89.9)	1354 (89.6)	1251 (88.7)	1286 (92.3)	1184 (92.3)
<i>Missing</i>	7	24	8	7	9
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
Depressive symptoms, summated scale	7.72 (5.28)	8.79 (5.41)	8.85 (5.18)	7.66 (4.95)	7.77 (4.89)
<i>Missing</i>	20	53	24	19	35
Cronbach's alpha	0.88	0.89	0.88	0.88	0.89

3.2.1.2 Work-home conflict

We investigated two dimensions of work-home conflict: work → home and home → work conflict. Both dimensions were measured by single items collected from the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS-Nordic)^{178,179}. The original items, which were used after expected graduation in year four and five, were phrased: 1) “Do the demands of work affect your home/family life in a negative way?”, and 2) “Do the demands from home/family affect your work in a negative way?”. In the first three years, during education, the items were rephrased into 1) “Do the demands of education affect your home/family life in a negative way?”, and 2) “Do the demands from home/family affect your studies in a negative way?”. Both items were answered on five graded Likert scales but the response options differed between the original frequency scale and a modified quantity scale over time (see Table 3.3. and 3.4 for a description of the scales and response on the original scales over time). In analyses, we dichotomised the response scales for two reasons: 1) as our main interest was to study which students experienced conflict of a degree that may affect their well-being, rather than investigate mean levels of conflict, we chose to classify respondents into those who reported high levels of conflict in order compare them with those who reported less conflict, 2) in addition to the differences in wording, in year four, the Likert scales were cut to four response options by mistake. These changes may have affected also the validity of the dichotomised measure, but in our opinion, would have made evaluations of mean levels of change over time even less appealing.

3.2.2 Design of study I

The aim of study I was to investigate prevalence of depression and associations with demographic and education related factors in students at the beginning of their studies. It was cross-sectional in design and we used data from the baseline questionnaire of LANE, collected in the second term of the respondents’ first year of nursing education. We included students from the 24 colleges for which we had access to complete student registers only (see Figure 3.1.).

Table 3.3. Work-home conflict items and response options as they were formulated in the LANE-study

In education, year 1 to 3						
1.	Do the demands of education affect your home/family life in a negative way?					
2.	Do the demands from home/family affect your studies in a negative way?					
After graduation, year 4 and 5						
1.	Do the demands of work affect your home/family life in a negative way?					
2.	Do the demands from home/family affect your studies in a negative way?					
Description of variations in response options over time						
	<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Seldom</i>	<i>Never</i>	Cut offs
Year 1 and 3	5	4	3	2	1	4-5 = presence
Year 4	4	3	-	2	1	3-4 = presence
	<i>To a very high degree</i>	<i>To a high degree</i>	<i>Partly</i>	<i>To a small degree</i>	<i>To a very small</i>	
Year 2 and 5	5	4	3	2	1	4-5 = presence

Table 3.4. Work-home conflict: description of results on the original response scales over time

	Year 1	Year 2	Year 3	Year 4	Year 5
Work → home conflict	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
1 Never/very small degree	181 (10.72)	358 (23.80)	110 (8.14)	227 (16.33)	222 (17.43)
2 Seldom/small degree	517 (30.61)	361 (24.00)	335 (24.78)	490 (35.25)	407 (31.95)
3 Sometimes/partly	729 (43.16)	525 (34.91)	604 (44.67)	566 (40.72)	495 (38.85)
4 Often/high degree	228 (13.50)	184 (12.23)	252 (18.64)	107 (7.70)	109 (8.56)
5 Always/very high degree	34 (2.01)	76 (5.05)	51 (3.77)	-	41 (3.22)
<i>Missing</i>	11	63	66	11	18
Mean (SD)	2.65 (0.91)	2.51 (1.13)	2.85 (0.94)	2.40 (0.85)	2.48 (0.98)
	Year 1	Year 2	Year 3	Year 4	Year 5
Home → work conflict	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
1 Never/very small degree	481 (28.51)	610 (40.61)	331 (24.65)	601 (43.27)	558 (44.11)
2 Seldom/small degree	626 (37.11)	425 (28.30)	480 (35.74)	576 (41.47)	487 (38.50)
3 Sometimes/partly	452 (26.79)	343 (22.84)	408 (30.38)	197 (14.18)	185 (14.62)
4 Often/high degree	111 (6.58)	97 (6.46)	113 (8.41)	15 (1.08)	27 (2.13)
5 Always/very high degree	17 (1.01)	27 (1.80)	11 (0.82)	-	8 (0.63)
<i>Missing</i>	13	65	75	12	27
Mean (SD)	2.14 (0.94)	2.01 (1.03)	2.25 (0.95)	1.73 (0.74)	1.77 (0.82)

The outcome measure was self-reported depression and the students were classified into depressed versus not depressed according to an algorithm (see Table 3.1.). In the analyses we investigated associations with age, gender, country of birth, family status, prior experiences of higher education, prior training as nurse assistant, work experience before nursing education and financial issues: that is whether the respondents received financial support in the form of study grants or performed salaried work during term time. We also added information on the students' evaluations of some education related issues: the estimated amount of time spent on studies, evaluations of the quality of the attended education program, perceptions of work-home conflict and self efficacy beliefs in relation to education. All covariates except age and gender, which we calculated from the respondents' personal identification numbers, were self-reported and collected from the baseline questionnaire (see Table 3.5.). The three self efficacy items: a) Belief in ability to focus on study tasks, b) Belief in social ability and capacity to communicate educational needs and c) Belief in ability to stand up for own needs

and views in class, were indices created from an inventory of eight items constructed for LANE (see Table 3.6.).

3.2.2.1 Statistical analysis

To examine associations between the included factors and depression we began by calculating descriptive statistics of the number and proportion depressed in subgroups of the respective covariates. We then calculated odds ratios and 95% confidence intervals in logistic regression models in three steps: 1) For all covariates we computed crude odds ratios and confidence intervals in bivariable models containing the outcome and a single factor, 2) we adjusted the crude models for age and gender and 3) other socio-demographic factors (country of birth, family status, prior work experience, prior nurse assistant training, prior experience of higher education, financial support, salaried work during term time) to control for their effect on the association with depression. In order to investigate the association between age, work-home conflict and depression further we performed analyses stratified for these factors.

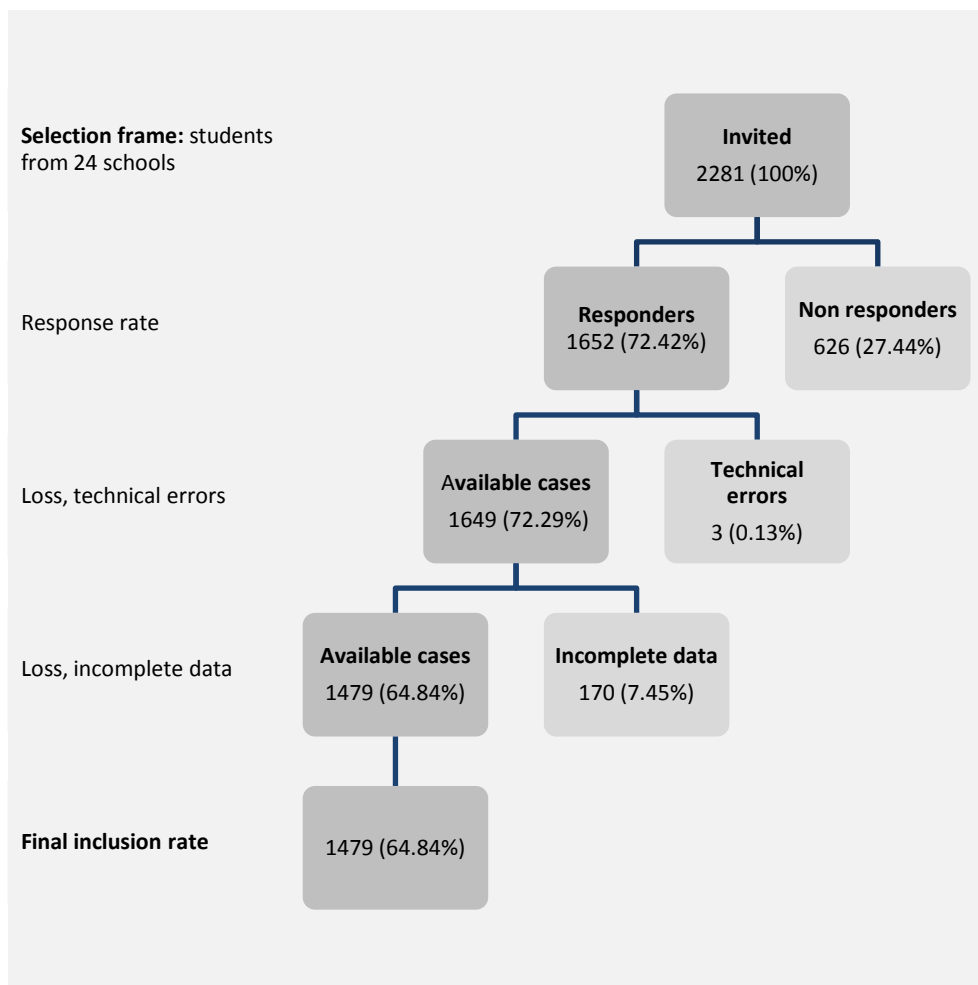
For this analysis we chose not to investigate associations between attended college and depression because of the variation in response rates between colleges (arguing that if response to LANE was associated with depression, this may have biased results on depression at individual colleges). We did, however, assess the effect of college on other associations investigated by adjusting for it.

3.2.3 Design of study II

The aims of study II were to investigate if we could identify an effect of time in higher education and work establishment on depressive symptoms, and if so, to map the trajectory of change associated with the period. We used data from the first five consecutive data collections in LANE to cover time in education, and an expected time of two years after graduation (see Figure 3.2.). We used all available cases, and included the complete cohort of 1700 respondents from all 26 colleges in the analyses, but tested our results by also running all models on the subset of responders still in study year four who reported they had graduated as expected, by year four (n=1306).

Because our main interest was change in depressive symptoms over time rather than identification of individuals with a clinical level of depression, we chose to analyse a summated score of the Major Depression Inventory to estimate levels of symptoms (see Table 3.1.). To test the hypothesis that change in mean levels of depressive symptoms over the period was an effect of time in education and work establishment we included information on demographic factors (age, gender and family status), factors related to experience attained before entering nursing education (prior work experience, prior training for health care as nurse assistant and prior experience of higher education) and attended college to: a) adjust the analyses for confounding due to their effect on change in symptoms over time, and b) investigate potential differences in change in depressive symptoms across subgroups of the included factors. All factors were collected at baseline and entered as time constant covariates in the analyses, except for family status that was allowed to vary over time (see Table 3.5.).

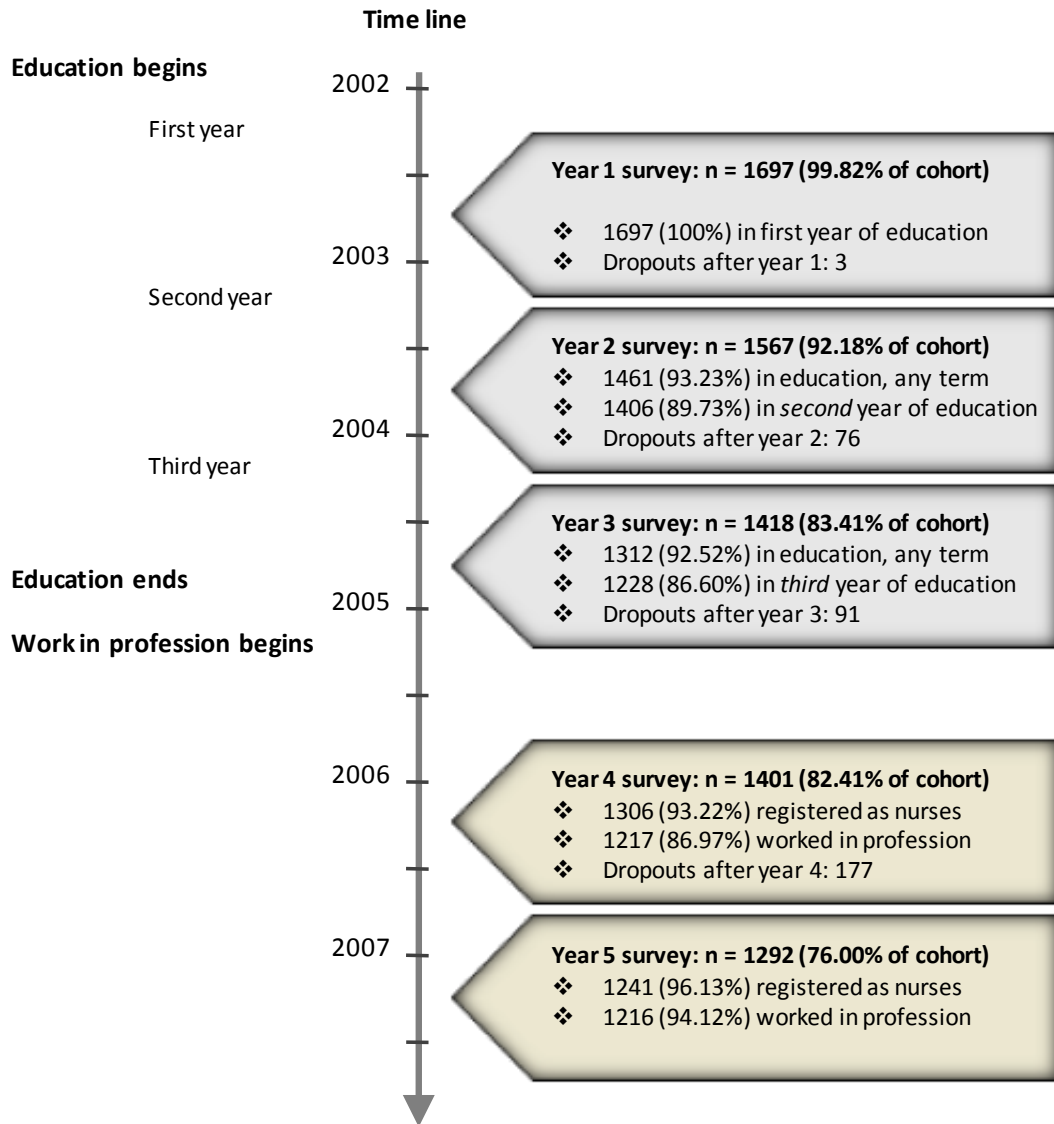
Figure 3.1. Description of inclusion in study I



3.2.3.1 Statistical analyses

We analysed depressive symptoms over time in a linear mixed model procedure that allowed for correlation between the repeated measures over time. We chose not to impose any structure on change and calculated a level of depressive symptoms for each time point. Because the number of repeated measures was limited, we used an unstructured covariance matrix to estimate variances and correlations over time¹⁸⁰. The respondents were clustered within colleges, and to investigate variance induced at this level we first entered college as a random effect, using a variance components matrix, in the analyses. As variation at the college level was small compared with variation at the individual level (0.08 compared with 23.24 – 28.1 in a multivariable model containing all included factors) we chose to enter college as a fixed factor in the final analyses to investigate differences between colleges instead.

Figure 3.2. Time line for five data collections in LANE*



**Number of respondents, their trajectory through education and professional establishment, and number of cohort members with last response in the respective data collections.*

We began by fitting a series of bivariable models containing the main effect of a factor plus time, after which we included the interaction between that factor and time. We then adjusted the bivariable models for the main effect of 1) age, 2) gender, 3) family status, 4) prior nurse assistant and 5) college to investigate their effect on the crude models. In a final step, to test that the pattern of change in depressive symptoms over time remained after controlling for the effect of other included factors, we fitted multivariable models: a) a model containing the main effects of all factors plus time, b) a series of models containing the main effects of all factors plus time and the interaction of a single factor and time and c) a model containing the main effects of all factors plus time and the interactions between all factors and time.

We found an interaction between college and time and tried to identify the source by recategorising the 26 colleges into groups of larger versus smaller class size (< 70 or > 70 students), type of college (education programs located within universities versus university colleges) and college location (large city or small/rural city, where large refers to the three largest cities in Sweden). In addition we stratified the analyses to investigate whether the difference in change between colleges occurred during education (year one to three), or after graduation (years three to five) to separate time in education from the transition to work and work establishment.

Because the response variable was positively skewed, we reran all analyses after log transformation of depressive symptoms, but as this did not affect the results to any substantial degree, we chose to display all results on the original scale.

3.2.4 Design of study III

In study III the aims were to investigate: a) risk for work-home conflict over time in education and work establishment, b) associations between work-home conflict and selected student characteristics and c) the association between work-home conflict and depressive symptoms over the period. As in study II we used data from the first five data collections in LANE to cover time in education, and an expected time of two years post graduation and work entry (see Figure 3.2.). We included all 1,700 cohort members from all 26 colleges but, as in study II, performed the analyses also on the subset of responders still in study year four, who had graduated according to the expected time plan (n=1,306).

We investigated two directions of conflict: work → home and home → work conflict (see section 3.2.1.2, and Table 3.3.) and compared respondents who reported conflict often/always with those who reported conflict seldom – sometimes. In the analyses we included information on age, gender, family status, former training as nurse assistant at high school level, prior experience of higher education, work experience before nurse education and salaried work during education to investigate their effect on risk for conflict, and attended college to control for effects at this level (see Table 3.5.). We performed separate analyses for work → home and home → work conflict to distinguish between the two directions of conflict.

In a second step we examined the association between work-home conflict and depressive symptoms over time. Because our main interest was differences in the association over time rather than risk for depression we, as in study II, employed a continuous measure of levels of symptoms using the summated score of the Major Depression Inventory. To assess the effect of work-home conflict on level of depressive symptoms we created a combined exposure variable with four levels: no conflict, presence of work → home conflict, presence of home → work conflict and presence of both directions of work-home conflict. We included information on age, gender and family status in the analyses to adjust for confounding due to their effect on the association between work-home conflict and depressive symptoms.

Table 3.5. Description of covariates, study I-III

Study	Variables	Collected from	Classification in study I – III
Demographic information			
I – III	Age	Personal identification number	Age at baseline: 20- 24/ 25-29/ 30-34/ 35+
I – III	Gender	Personal identification number	Male/female
I – III	Family status	Questionnaires I – V	Study I and II: <i>Live w parents/Single/Married-cohabiting/Single parent/Married-cohabiting parent</i> Study III: <i>Single/Married-cohabiting/Single parent/Married-cohabiting parent</i>
I	Country of birth	Questionnaire I	<i>Swedish born/ Born in Europe/Born outside of Europe</i>
Prior experiences from before nursing education			
I – III	Prior work experience	Questionnaire I	Study I: <i>Yes/No</i> Study II and III: <i>From health care and other/From health care only/From other than health care only/No</i>
I – III	Prior training as nurse assistant	Questionnaire I	<i>Yes/No</i>
I – III	Prior higher education	Questionnaire I	Study I: <i>Yes/No</i> Study II and III: <i>More than a year/A year or less/No</i>
Financial support during education			
I	Student grant/loan	Questionnaire I	<i>None/Partial loan or grant only/ Full loan</i>
I, III	Salaried work during term time in education	Questionnaire I – III	Study I: <i>Yes/No</i> Study III: <i>Regularly/Occasionally/No</i>
Experiences in nursing education			
I	Time spent on studies	Questionnaire I	<i>More than full time/Full time/Less than full time</i>
I	Evaluated quality of the education program	Questionnaire I	<i>Good/Poor</i>
I, III	Work home conflict	Questionnaires I – V	See Table 3.2.
I	Self efficacy as student	Questionnaire I	See Table 3.4.
Education details			
II, III	Attended nursing college	Colleges' student registers	Identification of any of 26 colleges and classification into <i>large/small class size</i> , location in <i>major versus smaller city or university/university college</i>
II, III	Graduation year	Questionnaires IV – V	Graduation from nursing education year 4, year 5, or not graduated at last follow up
II, III	Work in the profession	Questionnaires IV – V	Have or have not worked in the profession after graduation

3.2.4.1 *Statistical analyses of risk for work-home conflict*

We calculated risks and relative risks for work-home conflict over time, and the associations with the selected factors, in log binomial models^{181 182} estimated by generalised estimating equations that allow for correlation between the repeated measures. We used an unstructured working correlation matrix for the variances and correlations between the repeated measures over time¹⁸⁰.

We performed separate models to calculate risks for: 1) work → home conflict and 2) home → work conflict. For both directions of conflict we fitted a series of bivariable models containing the main effect of a covariate and time. Secondly, we added the interaction between the covariate and time (except for the effects of family*time and prior work experience*time on home → work conflict that could not be estimated). Thirdly, the bivariable models were adjusted for the effect of: 1) age, 2) age and gender and 3) age and family. Finally we fitted multivariable models of all included covariates: 1) a model of the main effects of all included covariates and time, 2) a series of models of the main effects of all covariates and time plus the interaction of a specific covariate and time and c) a model of the main effects of all covariates and time, and the interactions between all covariates and time.

As there was a difference in risk for work-home conflict for universities we tried to identify the source by re-categorizing into colleges with larger versus smaller class size (< or > 70 students), type of college (university or university college) or college setting (large city or small/rural city).

3.2.4.2 *Statistical analyses of the association between work-home conflict and depressive symptoms*

We fitted a bivariable model containing the main effect of work-home conflict and time and a model of work-home conflict and time plus the interaction between work-home conflict and time. Secondly we adjusted the bivariable models for 1) age, 2) gender and 3) family and after that the interaction between these factors and work-home conflict. Finally we fitted multivariable models: a) a model containing the main effects of work-home conflict, age, gender, family and time, plus the interaction of work-home conflict and time and b) to the prior model we added the interaction terms between work-home conflict and other factors.

Table 3.6. Self-efficacy, original items and constructed indices*.

Subscale	Item	Item mean (SD)	Index mean (SD)	Cronbach's alpha
Belief in ability to focus on study tasks	1. Can you manage to focus on study tasks when there are other, more fun things to do?	8.22 (2.18)	8.17 (1.95)	0.8
	2. Can you keep working on study tasks even when you're bored?	8.13 (2.09)		
Belief in social ability and capacity to communicate educational needs	1. Can you manage to get assistance from teachers/supervisors when needed?	8.3 (2.4)	9.19 (1.44)	0.76
	2. Can you manage to get assistance from fellow students when needed?	9.42 (1.88)		
	3. Can you manage to help fellow students who need assistance with study tasks?	9.8 (1.61)		
	4. Can you contribute to a good social climate in class?	9.31 (1.64)		
Belief in ability to stand up for own needs and views in class	1. Can you stand up for own views in class even when opposed by others?	9.04 (2.03)	8.89 (1.94)	0.75
	2. Can you stand up for yourself when you feel you've been treated unjustly?	8.74 (2.28)		

**All items were answered on 11-point Likert scales anchored by the statements "No, I can't manage that" (1) and "Yes, I'm sure I can manage that" (11).*

4 RESULTS

4.1 The EX2002 cohort

At baseline 2331 students distributed over 26 education programs at 46 different education sites were invited of which 1700, or 73%, responded and were included in the cohort. The number of invited students ranged from 49 to 212 over the 24 colleges for which we had access to student registers, and the participation rates between 46 and 86%. From the two remaining colleges, with an expected total student count of 100 (according to admission rates from the second and final selection of students, collected from the Swedish Agency for Higher Education Services), we included 45 students. More women than men chose to participate (74% versus 64%) but the age distribution was similar in participants compared with non-participants with a mean age of 28.42 (standard deviation, SD, 7.23) among responders and 28.37 (SD 7.24) in non-responders.

4.1.1 The cohort at baseline

The age range among responders at baseline was 20-52 years of age with a median of 26. More than a third was 30 years of age or older (see Table 4.1.). The gender distribution was 11% men and 89% women. Nine percent were born outside Sweden. Many had trained as nurse assistants at upper secondary school and more than half had worked within health care for a period of at least six months before entering nursing education. An additional 28% had prior experiences of work from sectors outside of health care, leaving 12% who came to education with no or less than six months experience of work. A quarter had some prior experience of tertiary education, but few had studied for more than year or attained any degree. Almost 60% were married or cohabited with a partner, and 33% of them were also parents. More than half of the students reported that they occasionally worked for pay during term time, but few did so on a regular basis.

4.1.2 Participation and dropout over time

The response rate year five was 76% compared with baseline. Thirty seven respondents were lost from the cohort over time because they were no longer traceable in the national population register, and 144 because they actively chose to decline further participation. Thus the number of cohort members who were sent questionnaires declined from 1,700 to 1,588 in the last year (see Figure 4.1.). A proportion of 67% all participants contributed data to all five data collections (see Graph 4.1.).

Dropouts before year five were younger (with a baseline age of 27.55 versus 28.69, $p < 0.01$) and more often men compared to completers but this did not affect either the age or gender distribution over time greatly (see Table 4.1.). Cohort members born outside of Sweden dropped out more often than Swedish born, and only half of those born outside of Europe completed five years of follow-up.

Table 4.1. Description of the cohort in the first and final year of education, and the second professional year

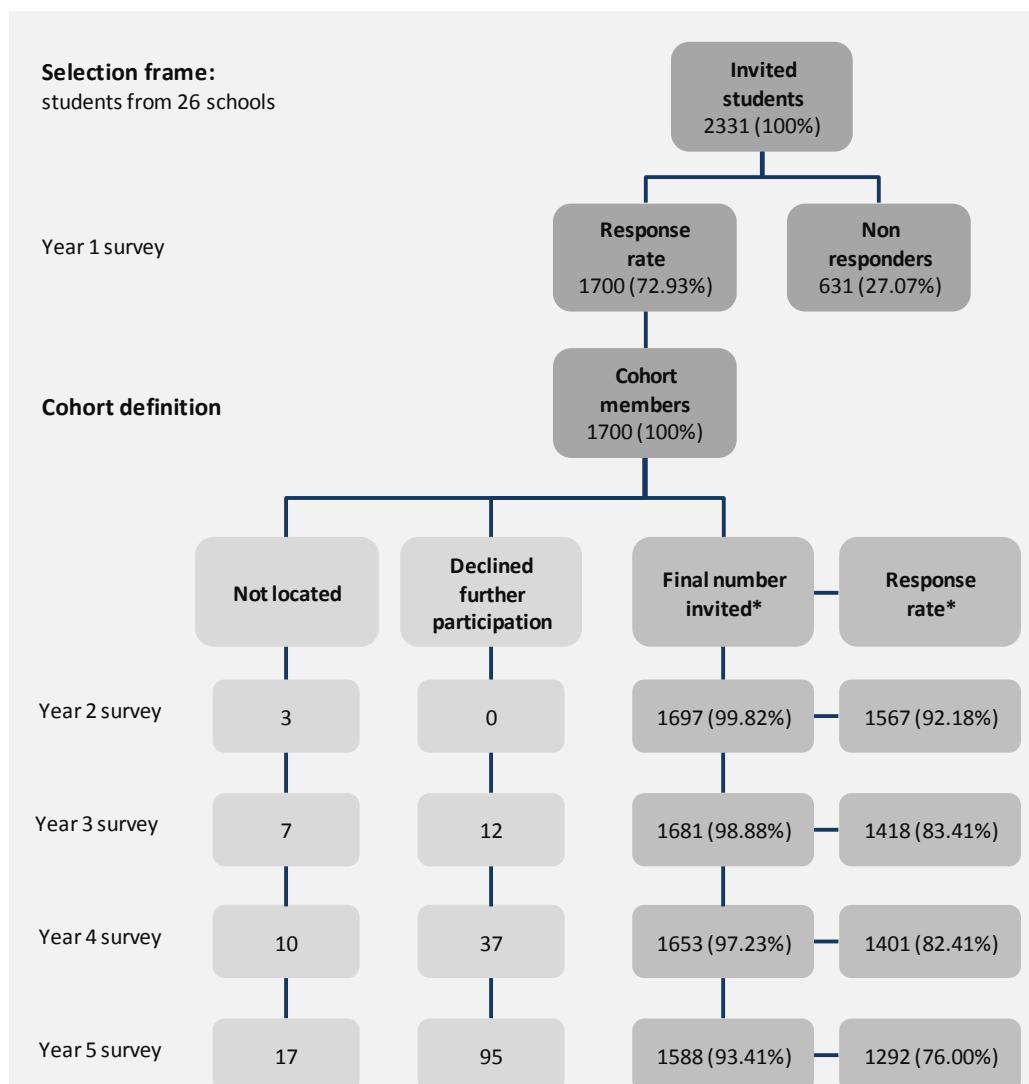
Time invariant factors	Year 1	Year 3	Year 5	Retention*
	<i>N and (%)</i>	<i>N and (%)</i>	<i>N and (%)</i>	<i>(%) of cohort</i>
Total	1697	1418	1292	(76.00)
Gender				
Male	184 (10.84)	152 (10.72)	136 (10.53)	(73.91)
Female	1513 (89.18)	1266 (89.28)	1156 (89.47)	(76.40)
Age at baseline				
20-24	711 (41.90)	580 (40.90)	519 (40.17)	(73.00)
25-29	351 (20.68)	293 (20.66)	263 (20.36)	(74.93)
30-34	263 (15.50)	229 (16.15)	211 (16.33)	(80.23)
35+	372 (21.92)	316 (22.28)	299 (23.14)	(80.38)
Prior work experience before nursing college				
Both within and outside health care	433 (25.52)	347 (24.47)	327 (25.31)	(75.52)
Health care only	582 (34.30)	492 (34.70)	458 (35.45)	(78.69)
Outside health care only	482 (28.40)	409 (28.84)	354 (27.40)	(73.44)
No prior work experience	196 (11.55)	166 (11.71)	147 (11.38)	(75.00)
Missing	4 (0.24)	4 (0.28)	6 (0.46)	
Country of birth				
Sweden	1540 (90.75)	1306 (92.10)	1199 (92.80)	(77.86)
Europe, except for Sweden	61 (3.59)	46 (3.24)	40 (3.10)	(65.57)
Outside of Europe	88 (5.19)	58 (4.09)	45 (3.48)	(51.14)
Missing	8 (0.47)	8 (0.56)	8 (0.62)	
Prior training as nurse assistant				
Yes	766 (45.14)	647 (45.63)	582 (45.05)	(75.98)
No	923 (54.39)	763 (53.81)	701 (54.26)	(75.95)
Missing	8 (0.47)	8 (0.56)	9 (0.70)	
Prior experience of higher education				
No prior experience	1260 (74.25)	1045 (73.69)	954 (73.84)	(75.71)
A year or less	301 (17.74)	258 (18.19)	230 (17.80)	(76.41)
More than a year	124 (7.31)	104 (7.33)	96 (7.43)	(77.42)
Missing	12 (0.71)	11 (0.78)	12 (0.93)	
School				
University	750 (44.20)	625 (44.08)	590 (45.67)	(78.67)
College	947 (55.80)	793 (55.92)	702 (54.33)	(74.13)
Time variant factors				
	<i>N and (%)</i>	<i>N and (%)</i>	<i>N and (%)</i>	
Family status				
Single	520 (30.63)	389 (27.43)	224 (17.34)	
Partner/married	457 (26.93)	414 (29.20)	356 (27.55)	
Single parent	98 (5.77)	86 (6.06)	74 (5.73)	
Partner/married and parent	561 (33.01)	512 (36.11)	635 (49.15)	
Missing	61 (3.59)	17 (1.20)	3 (0.23)	
Financial support, student grant and loan				
Full grant	1269 (74.78)	972 (68.55)	-	
Part of grant and loan	321 (18.92)	273 (19.25)	-	
No support	96 (5.66)	90 (6.35)	-	
Missing	11 (0.65)	83 (5.85)	-	
Salaried work during education				
Regularly	113 (6.66)	106 (7.47)	-	
Occasionally	890 (52.44)	585 (41.25)	-	
No	689 (40.60)	643 (45.35)	-	
Missing	5 (0.29)	84 (5.92)	-	

*Proportion completers in the group still in study year 5, compared with year 1

4.1.2.1 Dropout associated with colleges

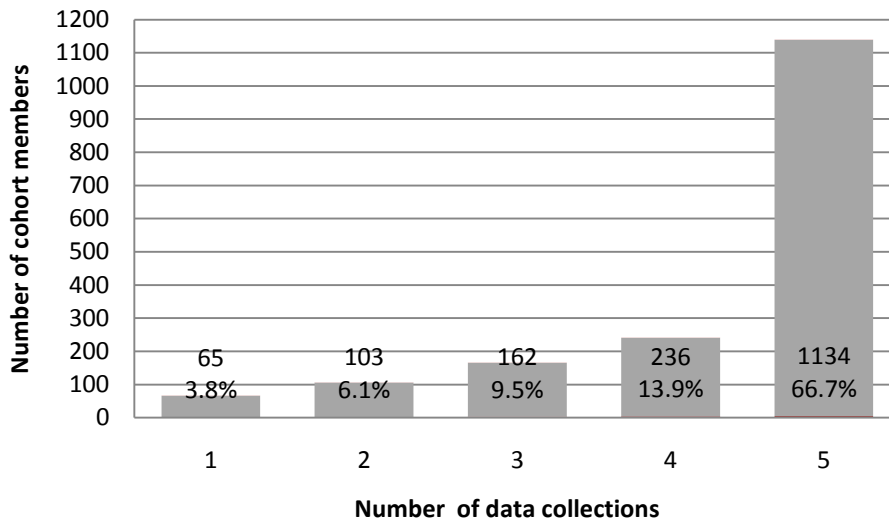
The retention rates from baseline to year five varied from 65.0 to 84.7% between the 26 colleges (see Graph 4.2.). When we classified colleges into categories of those located in larger cities versus smaller, within universities versus university colleges and education programs with a class size of >70 versus <70 students, respondents trained in colleges located in larger cities and in education programs located in universities versus colleges were somewhat less likely to drop out over time(see Graph 4.3.).

Figure 4.1. Description of study base, cohort definition and participation rates year 1 – 5



*All proportions given beneath are proportions of the defined cohort (n = 1700)

Graph 4.1. Number of data collections cohort members contributed to (n = 1700)



4.1.2.2 Dropout associated with depression and work-home conflict

Dropouts before year five had a higher mean baseline level of depressive symptoms compared with completers (8.25 versus 7.56, $p = 0.02$). The proportion respondents reporting work → home conflict at baseline was similar among dropouts and completers ($n = 65/404$, 16.1% versus $197/1285$, 15.33%, $p = 0.71$) but more dropouts reported home → work conflict than completers ($n = 42/402$, 10.4% versus $86/1285$, 6.7%, $p = 0.01$).

4.1.3 Completion of education

In year five 96.1% of 1292 remaining respondents had graduated and registered as nurses (see Figure 3.2.). A small proportion had graduated later than expected (before year five rather than before year four; $n = 95/1292$, 7.3%), or not graduated within the time frame of the study ($n = 51/1292$, 3.9%).

4.2 Results from papers I - III

4.2.1 Study I

Overall, 10.2% of the first year students reported depression according to the DSM-IV based algorithm applied.

4.2.1.1 Depression and demographic factors

Younger students, especially those under 30, reported depression more often than older (11.9 and 12.1% in the age groups 20-24 and 25-29 compared with 8.3 and 6.7% in age groups 30-34 and 35 and older). A higher proportion of women than men were depressed (10.7 versus 5.7%). Students who were single, single with children or still living in their parental home had a higher risk of depression compared with those who were married or cohabited with a partner, but results from the adjusted regression models showed that this, to some extent, depended on age and gender differences

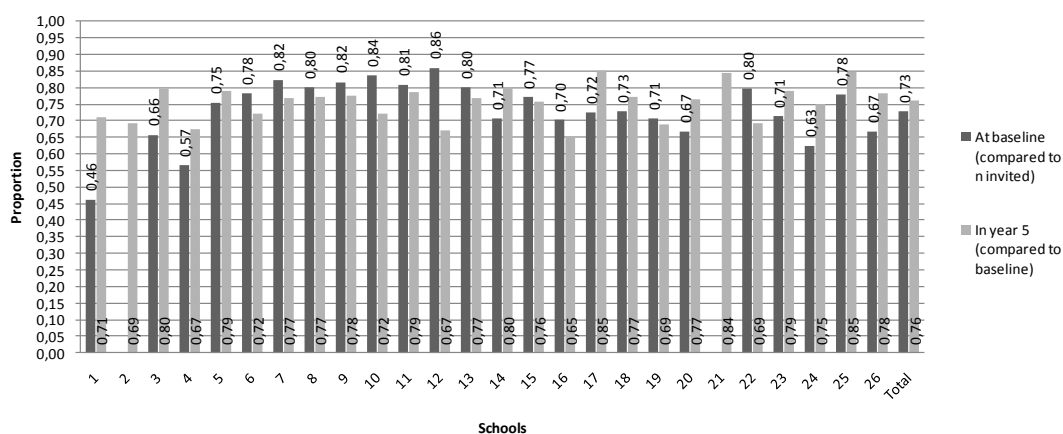
between groups. Of students born outside of Europe, 22.1% reported depression compared with 9.8% in Swedish born, and 5.7% in those born in other European countries. Students who came to education with prior work experience, and those who undertook salaried work during term time reported less depression compared with those who did not.

4.2.1.2 Depression and education related factors

Students who reported they spent more than 40 hours a week on their studies had a higher risk for depression compared with those who spent less (odds ratio – OR, 2.77, with a 95% confidence interval – CI, of 1.9-4.21). Those who regarded the quality of the education program as poor had a higher risk compared with those who reported good quality (OR 2.59, CI 1.66-4.03). Students who reported frequent education → home conflict had an odds ratio of 4.49 (CI 3.13-6.46), and those who reported home → education conflict 5.9 (3.83-9.1) compared with those who reported infrequent or no conflict. When we stratified the analyses for age, students older than 30 reported conflict almost twice as often as those of younger age (20.2 versus 13.5% for education → home conflict and 10.9 versus 5.6% for home → education conflict). Stratification for family status showed that students who were parents, both married/cohabiting and single parents, reported conflict more often, and that the risk for depression was high in all groups.

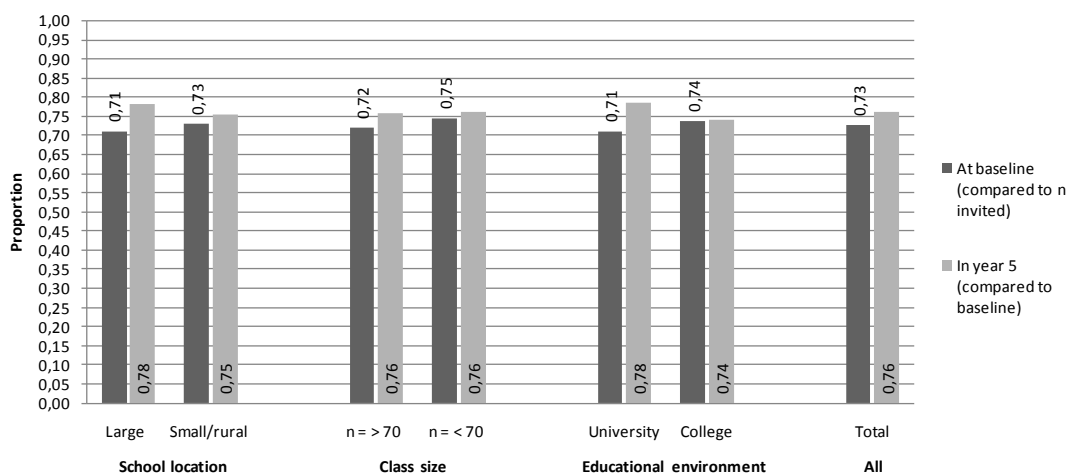
Regarding the measures for self efficacy, the quartile of students with the lowest ratings on the scale for “belief in ability to focus in study tasks” and “belief in social ability and capacity to communicate educational needs” reported more depression than other groups, but the association between depression and “belief in ability to stand up for own needs” was weaker.

Graph 4.2. Response rates by school*



*Response rates at baseline (proportion respondents compared with the selection frame in 24 schools) and over time (proportion respondents year five, compared with baseline response in 26 schools)

Graph 4.3. Response rates by some school characteristics*



*Response rates at baseline (proportion respondents compared with the selection frame in 24 schools) and over time (proportion respondents year five, compared with baseline response in 26 schools). Location refers to urban area.

4.2.2 Study II

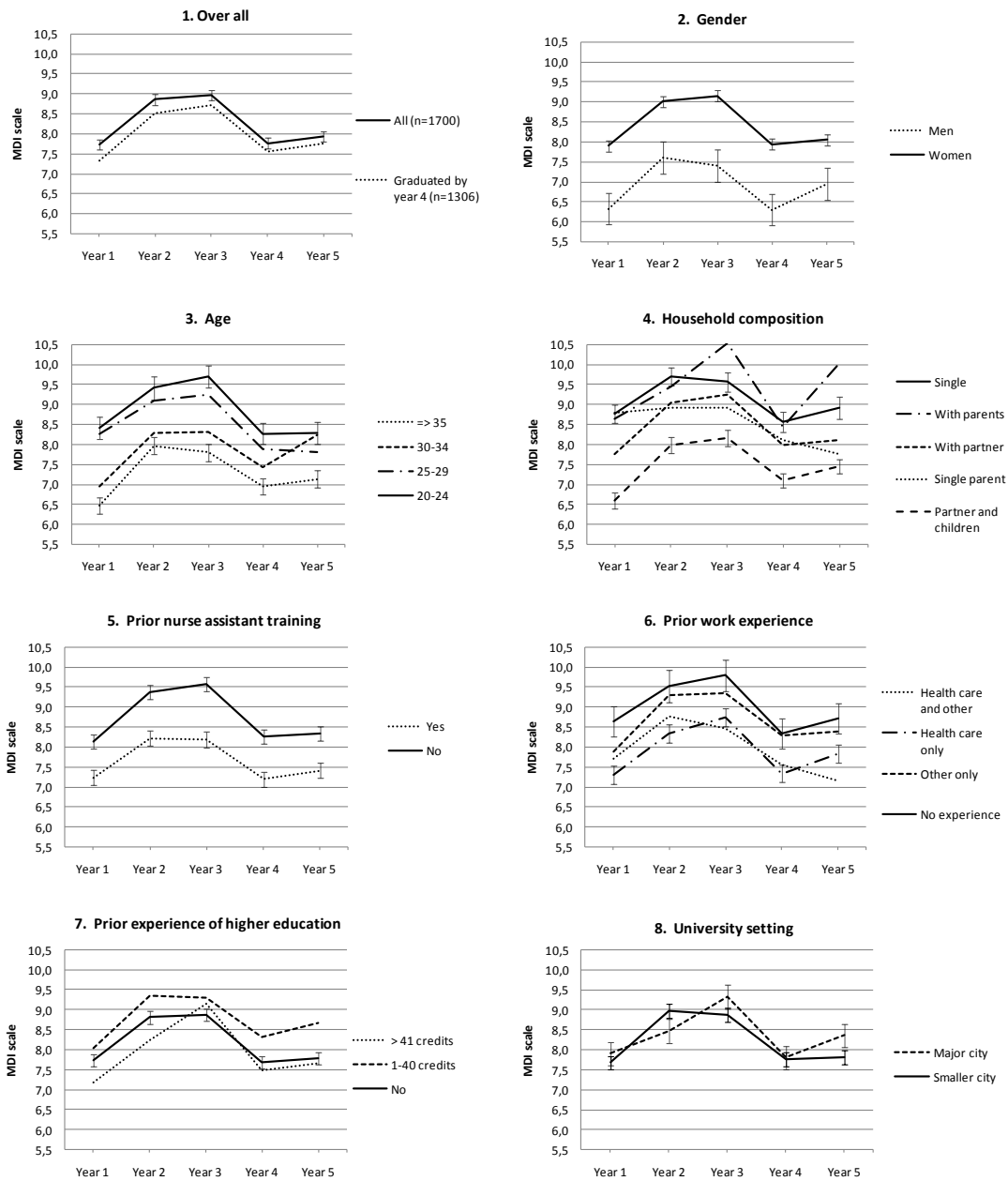
The overall mean levels of depressive symptoms increased over time in education (7.73, SD 5.29 year 1; 8.85, SD 5.39 year 2; 8.96, SD 5.18 year 3), but appeared to decrease to levels similar to baseline after graduation and a year in the profession (7.77, SD 4.97 year 4 and 7.94, SD 4.92 year 5) (see Figure 4.2.). The change in levels over time was significant ($p < 0.01$).

The symptom levels differed across subgroups of age, gender, prior training as nurse assistant and prior work experience but there was no significant difference in change over time except for age. When we adjusted the model for family status, the difference in change over time between groups of age was no longer significant. There was no significant difference in level of symptoms between colleges, but there was for change over time. Stratification for time in education (year one to three) versus time during work establishment (year three to five) showed this occurred during education. When we classified the 26 colleges in groups of larger versus smaller class size, colleges located in larger versus smaller cities and universities versus university colleges we found a difference in change between year two and three for colleges located in larger versus smaller cities.

When we added the main effect of all included factors in the same model, the difference in levels of symptoms for subgroups of age and prior work experience was no longer significant. Further multivariable modelling (inclusion of the interaction between time and an individual factor to the main effects model, and a multivariable model of the main effects of all factors plus their interactions with time) did not change the already obtained results.

The correlation between the repeated measures over time on the individual level varied between 0.49-0.60 for adjacent years and was 0.44 for the longest time lag from year one to year five.

Figure 4.2. Graphs of predicted means of depressive symptoms over education (year 1-3) and establishment in the profession (year 4-5) *



***Graph 1:** Estimates and error bars (of +/- 1 standard error) from two models of change in depressive symptoms over time in a) all 1700 cohort members and b) the subset of 1306 responders who graduated according to the expected time schedule before year 4. **Graphs 2-8:** Estimates and error bars (of +/-1 standard error) from bivariable models of depressive symptoms containing the main effect of a factor plus time, and the interaction between that factor and time

4.2.3 Study III

4.2.3.1 *Work-home conflict*

The proportion of respondents who reported frequent work-home conflict, either work → home or home → work, increased from 18.30-24.89% over time in education, but was lower both one and two years after graduation and work entry (8.05 and 13.02%). More respondents reported work → home conflict than home → work conflict.

Work → home conflict

The estimated overall proportions for reporting work → home conflict often/always were 0.15 (with a 95% CI of 0.14-0.17) year one, 0.17 (0.16-0.19) year two, 0.22 (0.20-0.25) year three, 0.08 (0.06-0.09) year four and 0.12 (0.10-0.14) year five and the change in risk over time significant ($p < 0.001$) (see Figure 4.3., Graph 1). The pattern of change over time remained similar in all models.

Older students and parents, especially single parents, had higher risk for conflict. Adjustment for family reduced the relative risks among older students compared with younger, but the effect estimates for parents remained across all models. Men and students with prior experience of higher education had less risk for conflict but these results were not significant. There was a difference between colleges in risk for conflict: after recategorization we found an increased risk for conflict in students attending full universities compared with university colleges. There were no significant differences in change over time across subgroups, except for age and after adjustment for family status the difference in change between age groups was no longer significant.

Home → work conflict

The estimated overall proportions for reporting home → work conflict were 0.08 (95% CI: 0.06-0.09) year one, 0.08 (0.07-0.10) year two, 0.09 (0.08-0.11) year three, 0.01 (0.01-0.02) year four and 0.03 (0.02-0.04) year five and the change in risk over time significant ($p < 0.001$) (see Figure 4.3, Graph 2). The pattern of change remained in the adjusted models, but adjustment for family status reduced the relative risk for conflict in later years of education compared with baseline somewhat.

The associations between home → work conflict and the included factors were similar to those for work → home conflict, but the relative difference in risks between subgroups of age and family status compared with the reference categories more evident. In addition, there was a difference in risk due to prior work experience. There were no significant differences in change over time across subgroups of the covariates we were able to investigate (all except family and prior work experience).

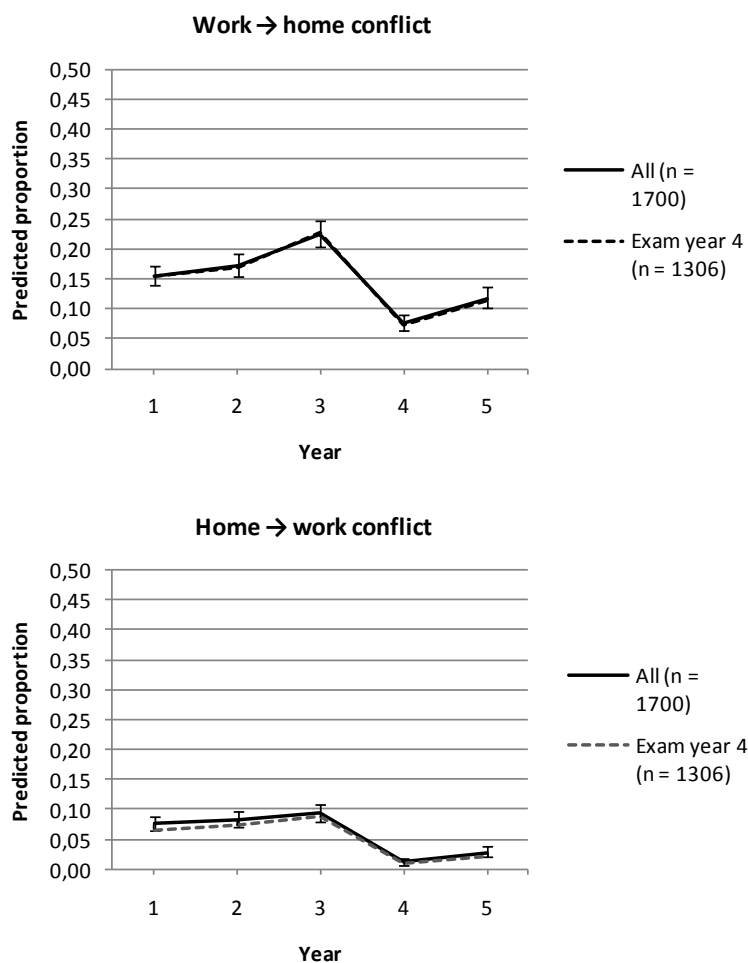
4.2.3.2 *Work-home conflict and depressive symptoms*

Respondents who reported work-home conflict had higher levels of depressive symptoms regardless of type of conflict. The difference in level between the three categories of conflict was slight compared with those who reported no conflict.

There was a significant difference in change over time between groups: After graduation when few reported conflict, the association between with depressive symptoms and work → home and home → work conflict seemed stronger than during

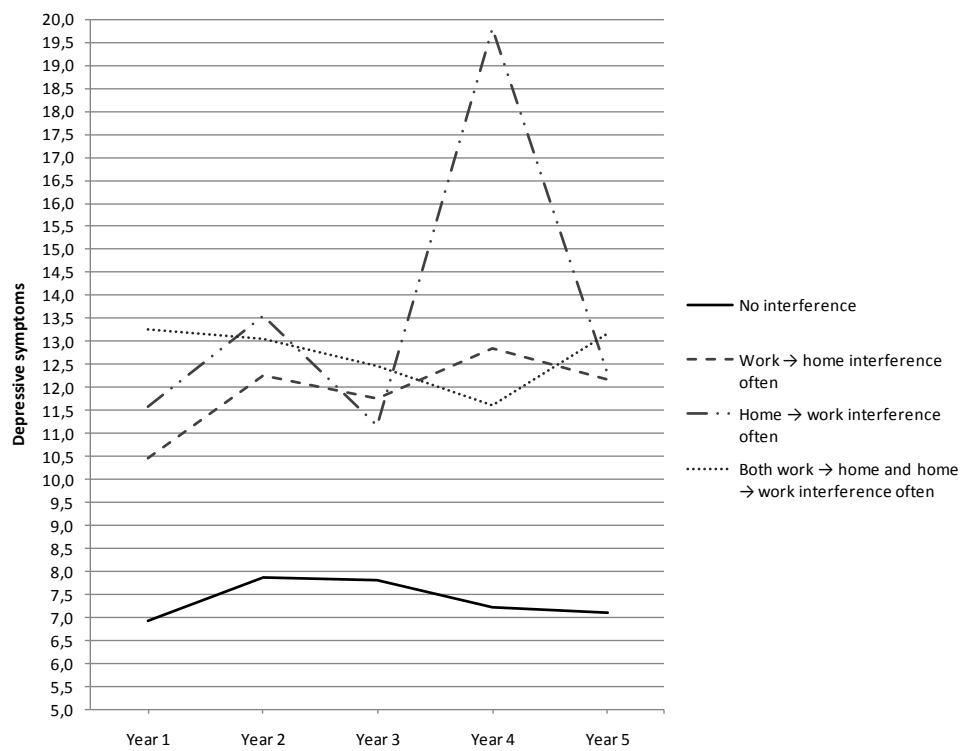
education. The same pattern did not hold true for those reporting both types of conflict however. Adjustment for age, gender and family or their interactions with work-home conflict did not change the crude models. A descriptive graph (see Graph 4.4.) shows comparatively similar associations between groups of work-home conflict and depressive symptoms over time, except for year four, when the five respondents who reported home → work conflict show elevated levels of symptoms.

Figure 4.3. Graphs of predicted proportions of work home conflict over education (year 1-3) and establishment in the profession (year 4-5).*



**Estimates of change in work → home conflict (Graph 1) and home → work conflict (Graph 2) over time from two models: a) all 1700 cohort members and b) the subset of 1306 cohort members who graduated according to the expected time schedule before year 4. The error bars show 95% confidence intervals from the models containing all 1700 respondents*

Graph 4.4. Descriptive data of levels of depressive symptoms by work home conflict over time in education (year 1-3) and establishment in the profession (year 4-5).



5 DISCUSSION

5.1 Summary of findings

An overall proportion of 10.2% (5.7% of the men and 10.7% of the women) of the investigated nursing students reported depression in their first year of education, according to the measurements employed. Younger age and being born outside of Europe was associated with higher risk of depression, whereas prior work experience, less need for financial support and salaried work during term time was associated with lower risk. In the educational setting, respondents who reported they spent more time on their studies, evaluated the quality of the education program as poor, or perceived frequent conflict between the demands of education and private life had higher risks of depression.

Depressive symptoms, measured as the summated degree of reported symptoms, increased over three years in education, but had decreased to a level similar to baseline after graduation when a majority of the former students had worked in the profession for at least a year. Age, gender, family status and prior training as nurse assistant affected the level of symptoms, but the pattern of change over time was similar across all groups indicating an independent effect of time in education and work establishment on distress. The correlation among the repeated measures, representing within individual correlation over time, varied between 0.44-0.60, suggesting individual differences in level of symptoms persisted to a considerable extent.

The proportion of students who reported frequent conflict between educational- and private demands increased over time in education (from 18 to 25%), but fewer respondents reported frequent conflict between work- and private demands one and two years after graduation and work entry (8 and 13%). More respondents reported work → home conflict than home → work conflict. The only factor that affected risk for work-home conflict consistently, regardless of direction, was to be a parent. Single parents reported higher relative risks than married/cohabiting parents, but both groups differed significantly from single respondents. The pattern of change in risk over time was similar for both directions of conflict, and across groups, indicating an independent effect of time in higher education and work establishment on work-home conflict. Respondents who reported frequent work-home conflict also reported higher mean levels of depressive symptoms compared with those with infrequent or no conflict. Even if we found a statistically significant interaction between work-home conflict and depressive symptoms over time, our overall impression is that of a strong and consistent association between work-home conflict and depressive symptoms over the entire period of investigation.

5.2 Methodological considerations

We performed studies based on data from a target population of a complete uptake of nursing students in Sweden who entered education at a specific point in time, but when

we discuss the implications of our findings we attempted generalisations to broader categories of students: a) nursing students undergoing education in Sweden or elsewhere at an unspecified point in time, and b) students undergoing higher education in Sweden or elsewhere at an unspecified point in time. The confidence with which we can generalise our results to groups other than the one we studied, rely on our underlying assumptions.

In LANE we invited a target population of all nursing students in Sweden in a specific term of education at a specific point in time. The invited students may be viewed as a sample from an underlying population of Swedish nursing students. The confidence we can have in inferences from the studied sample to the underlying population can be tested using statistical methods, provided the assumptions behind the inferential statistics are fulfilled. Inferences to groups outside the underlying population cannot be tested statistically, which does not exclude attempts, but they will be based on other information which affects the trust we can have in them. Perhaps the level of confidence in ventured inferences to other groups is best described as educated guesses. Still, to refrain from speculating about broader generalisations, using information from studies performed in other groups, leads to unfortunate limitations if they, as we argue may be the case with regard to change in distress over education and work establishment in other groups of students, reveal similar patterns that suggest a common denominator.

For inference from the targeted sample of invited students to the population of Swedish nursing students, that we tested statistically, the following issues affect the degree of confidence and the validity of our results.

5.2.1 Selection

Inferential statistics relies on the assumption that the targeted sample is a random sample of the population we wish to make statements about, and entails both the initial representativeness of this sample and that attrition from it is a random process. This is hardly ever the case entirely, but how it affects results depends on whether selection processes are associated with the factors under study. In our case, if an association exists between the outcomes of interest (depression, depressive symptoms or work-home conflict) and non-response, either at baseline or over time, our results could suffer from bias, an error that inflated or deflated the associations we present in a systematic manner. If respondents with depression or higher levels of depressive symptoms were less likely to participate, the remaining participants are a selection of respondents with less depression, and our results biased in a direction of a smaller proportion of depression/lower mean levels of depressive symptoms than was true of the population of nursing students. If, on the other hand, students with no depression were less likely to respond, results would be biased in the opposite direction. We can neither prove nor disprove an existence of selection bias, but we can make inference from the data available to us and in addition try to reduce unknown sources of selection effects in the analyses.

When we checked for associations between non-response and depression at baseline, we found a negative correlation between response rates and depression at the university level ($r = -0.13$, $p < 0.001$). For attrition over time we compared response at baseline with later responses, and found that cohort members who did not complete five years of follow-up had a higher mean level of depressive symptoms, and that a greater proportion of them reported home → work conflict at baseline compared with completers (see section 4.1.2.2.). We also know that while 95.3% of the remaining respondents reported they had graduated and qualified as nurses in year five, only 83% of all students who entered nursing training the same year as those who took part in LANE graduated within five years according to statistics from the National Agency for Higher Education. Taken together these findings imply:

- Rates of depression or levels of depressive symptoms at the university level may be associated with response rates at the same level.
- The pattern of change in levels of depressive symptoms and work-home conflict (specifically home → work conflict) may be biased towards lower levels symptoms and less conflict by time.
- The cohort may be subject to a “healthy worker effect” in that respondents who completed five years of follow-up in LANE are a selection of respondents who also completed their education more often than dropouts.

Clearly we cannot assume data either at baseline or over time to be missing due merely to random processes. As the information available for non-response at baseline versus attrition after baseline differ, we used different strategies to reduce the risk for unknown sources of selection bias in study I versus studies II and III.

5.2.1.1 Attempts to control selection effects in study I

In study I we included students from the 24 colleges for which we had followed the intended invitational procedure, but excluded those from two colleges with a modified procedure (see section 3.1.1.). Our arguments were: a) attrition from the target sample of all second-term students may have differed due to the altered invitational procedure and, b) as we did not have access to student registers, we had less information both on overall attrition rates and age or gender differences between responders and non-responders at the two colleges. If response to LANE was associated with depression, and responders from the two colleges a selection of students that differed from other colleges with regard to depression, including them in the study might have introduced bias.

5.2.1.2 Attempts to control selection effects in study II and III

In study II and III, which were longitudinal, we followed responses from the same subjects over time using a repeated measures design. In contrast to study I we included respondents from all 26 colleges in the argument that change associated with time in education and work establishment should be similar across all colleges, despite potential differences in response at baseline. Further, we included all respondents in the analyses regardless of whether they contributed data to all repeated measures over time,

dropped out during follow-up or graduated at a later time point than expected, reasoning:

- For respondents who dropped out from LANE before year four we did not have information on whether they completed the education program, or within which time frame they graduated, but for the data collections they participated in, they contributed information on experiences of depression or conflict in association with education/work establishment and time in education/work establishment.
- For a small group of respondents we had information about divergences from the expected time plan: those who remained in study and reported that they had graduated later than expected, but we assumed that their intention, as they entered education, was to qualify in three years as expected.
- If we chose to exclude these groups we would have been left with a selection of students who a) completed five data collections in LANE and b) completed their education within a stipulated time plan. If any of the outcomes were associated with drop out or graduation from the nursing education this would have introduced a bias with regard to levels of depressive symptoms or risk for work-home conflict at the different time points.

To investigate the effects of attrition and postponed graduation on change over time on the outcomes, and to check the stability of the results, we reran all analyses on the subset of respondents for whom we had information that they had followed the expected time plan. There is an issue with the chosen inclusion strategy we could have dealt with differently: We could have kept the responses from the group of respondents who graduated late up until their trajectory diverged from the expected time plan, but excluded later responses, in the argument their responses stopped contributing information on the specific association of time in education/work establishment on the outcomes at this point. As is, reanalyses on the subset of responders perhaps can be considered a conservative test of the pattern of change over time, but not of the obtained levels of symptoms.

5.2.2 Confounding

Whereas selection effects may have biased overall measures of the outcomes, they probably mattered less for associations between the investigated factors of interest and depression, or work-home conflict, when comparing subgroups of respondents. But for these associations other sources of bias have to be taken into account. In study I, family status (or household composition) was associated with depression, and students who were single had a higher risk, with an odds ratio of 1.89, of depression compared with students in established families of their own (married/cohabiting parents), but when we adjusted the analyses for the effect of age and gender the odds ratio decreased to 1.40, and in addition the p-value – or the probability of rejecting the null hypothesis of no difference in the population – no longer was less than 0.05 as before adjustment. It appears that the difference in risk between the groups in part was an effect of age and gender on risk of depression. To act as a confounder a factor must: a) be associated

with, but not affected by, exposure, and b) be a risk factor, or a proxy for a risk factor, for the outcome in itself¹⁸³. In the case described, age more than gender affected the estimate, with younger age associated both with single status and a higher risk of depression. But if the source of confounding is unknown, or information on potential confounders lacking, analyses cannot be controlled for their effect. In reality, this is always the case to some extent in observational research, and we take the measures available to us to reduce the risk for bias.

In study I we adjusted the analyses of the association between the selected explanatory factors and depression in two steps; first for age and gender and secondly for age, gender and other demographic factors to control for their effect on the crude estimates. Because of selection issues, we chose not to investigate differences in risk for depression between nursing colleges, but we did control the associations between other factors and depression for the effect of attended nursing college. As it did not affect the results to any substantial degree, this was not presented in the final tables.

The task in study II was to test our interpretation, that the overall trajectory of change in levels of depressive symptoms over time was an effect of time in education and work establishment rather than other factors. To be a confounder of this association a factor would have to be associated with time in education/work establishment and affect the trajectory of depressive symptoms over the period. Thus we adjusted the analyses for the main effects and interactions with time of factors that might influence time of entry into education, and the pattern of change over the period – mainly age and factors related to age and experience. In addition, we stratified the analyses and compared trajectories of change across subgroups of the included factors.

In study III, the associations between: a) the investigated demographic and experience related factors, and risk for work-home conflict over education and work establishment can be confounded by other factors that were associated with a specific factor of interest and affected risk for work-home conflict and b) the pattern of change in risk for work-home conflict over the period can be confounded by factors that were associated with time in education/work establishment and affected the pattern of change in risk for work-home conflict over time. In the analyses we adjusted the crude models for the main effects and interactions with time of other included factors in a hierarchical chain of steps. The association between work-home conflict and depressive symptoms over the period was tested by adjusting for age, gender and family status.

5.2.3 Statistical considerations

5.2.3.1 Study I, logistic regression

In study I we performed logistic regression on a binary outcome and estimated the odds ratio as a relative measure of differences in risk of depression between subgroups of a factor of interest. We chose to include only subjects with complete data on all factors of interest to ensure that all analyses were performed on the same set of respondents (see Figure 3.1.). Another way of dealing with missing values would have been imputation,

which we refrained from, as the number of respondents with incomplete data was not substantial.

When the outcome is rare the odds ratio approximates the relative risk (the ratio of proportions), which was the effect measure of real interest. This is an approximation with an in-built bias, however: as the proportion with the outcome increases, the odds overestimate the risk which influences also the ratio of the odds¹⁸⁴. The overall risk of depression in the first year students was 10.2%, but the risk in certain subgroups was considerably higher, which affects the interpretation of odds ratios obtained from comparisons between these and other groups as relative risks.

5.2.3.2 Study II and III, longitudinal data

Because of the longitudinal design we were able to follow change in the investigated subjects as they progressed through education and work establishment directly, and also to assess the extent of within-individual change over time. But as repeated measures are not independent of each other, which violate the assumptions underlying inferential statistics, and attrition from the cohort may have been associated with the outcomes of interest, these were issues we had to take into account in the analyses.

Clustered data

Data from LANE were clustered in two levels: the responses over the five repeated measures were clustered within individuals, and individuals were clustered within schools. In study II we investigated change in level of depressive symptoms in a linear mixed model procedure that allowed us to include and adjust for random effects of a) correlation between the repeated measures over time and b) variation induced at the level of nursing colleges. In study III we investigated binary outcomes of risk for work-home conflict in generalised estimating equations adjusted for the correlation between the repeated measures, but not variation induced at the school level, as this was not possible to analyse simultaneously. In study II, however, the variation induced at the school level in depressive symptoms was slight compared with variation at the individual level.

Assumptions of missing responses over time

The linear mixed models and generalised estimating equations both allow inclusion of data from cases with missing responses over time. They are robust to missing, provided the data is missing completely at random (MCAR) or missing at random (MAR). By MCAR we expect missing and dropout over time to be a process completely due to chance; the missing responses will not bias results as they contain no additional information about the outcome and analyses on all data available or on a subset of responders both yield equally valid results. But an MCAR assumption is rarely appropriate, since the probability of missing often depends on covariates, and what we often hope instead is that missingness depends only on known covariates, or MAR. A third type of missing mechanism is not missing at random (NMAR), by which the probability of missing depends on both the responses obtained and non-response, and an association between them.

In LANE we found an association between depressive symptoms and home → work conflict and later non-response, with a higher level of symptoms and risk for conflict in later non-responders compared with completers that indicates non-randomness. In contrast to MCAR, MAR provided us with a less restrictive and more realistic scenario as it let us assume missing responses to depend on (be conditional on) the known responses, but not on the missing responses¹⁸⁰. That is, we allowed for an association between the already observed levels of depression or work-home conflict and later dropout, but we assumed that missing responses did not depend on the levels of depressive symptoms or work-home conflict we would have observed at a later date, given non-respondents' prior measurements of depression or conflict.

Because the missing responses, given MAR or NMAR, contain information about the outcome they induce bias with regard to inference to the underlying population. For the same reason, given MAR or NMAR, preferably all available data ought to be used in analysis as data from responders with incomplete measurements contain additional information about the outcome compared with the subset of responders with complete data. Further, at least NMAR necessitates the construction of a model to account for the effect of non-response. If the data are missing at the level of MAR, results from substrata of respondents with similar values on the outcome will be unbiased, but not overall values as missing is dependent on prior values¹⁸⁰. Thus, also given the assumption of MAR, our results could have gained in validity from inclusion of non-response weights that used the available information from drop-outs to weight later mean levels of symptoms according to their expected, but not obtained, responses.

5.2.4 Measures and measurement of the outcomes

We used the Major Depression Inventory (MDI) to measure depression and depressive symptoms. It is a rating scale for self-report, developed to follow the criteria both of the DSM-IV and the ICD-10 classification systems for psychiatric conditions. The intention behind the MDI was to construct a scale useful both to screen for depression and to measure severity. The initial validation performed in small clinical sample in Denmark showed high sensitivity (0.90) and specificity (0.82) using a DSM-IV based algorithm to classify depression¹⁷⁴, but a later validation performed in a population-based Swedish community sample showed reduced sensitivity and specificity¹⁷⁷ which indicates that the validity of the instrument to some extent depends on the sample of respondents investigated and perhaps the method of administration.

The inventory distributed in LANE was modified and we cannot readily compare figures of prevalence with other studies as the changes made may have affected classification of disease. The same modifications were employed in two other studies performed in Sweden, a population-based survey in Västergötland and a sample of medical students at Karolinska Institutet^{96 176}, but in neither the psychometric properties of the modified scale was tested. We think the modifications affect mainly validity and comparability of the results of prevalence we present in study I, but, as all students included responded to an identical instrument, they matter less for internal comparisons of risk for depression between subgroups of students. Perhaps the best interpretation of the prevalence is that it indicates a level of significant distress related

to depression, and that it shows a figure for a proportion of students who may be in need of, or helped by, medical attention. Regarding the use of the summated score of depressive symptoms we calculated in study II and III, the modifications affected the sum score, but probably matter little for the pattern of change over time that we were interested in.

Regarding work-home conflict, there are no clear criteria or standards for what constitutes conflict, and researchers differ in how they define and operationalise it. This affects the precision of the concept and comparisons across studies, but not necessarily internal comparisons within a study, as long as the same definition and instrument are employed. In LANE two single items which asked for 1) negative impact of educational/work demands on home/family life and 2) negative impact from home/family demands on education/work were included, and we used a cut off on the response scales to separate respondents who reported frequent conflict from those who reported no or some conflict. The measures were not constant over time however. The phrasing of the items changed after expected graduation, as they had to be relevant for a working population rather than students, but more problematic is the change in response scales over time. Two different scales were used: to respond in year one, three and four respondents were asked to state the frequency of perceived conflict, but in year two and five to state the degree of conflict. Another issue is the change in number of response options which were reduced from five to four in year four. We cannot test how respondents interpreted the different scales and if they affected the level of their responses. What we can say is that the increase in risk for conflict over education occurred over a change in scales from frequency to degree and back, and that the decreased risk after education compared with risk over education was consistent over another scale change. Regarding the reduced scale with four response options year four, the response option missing was the middle alternative of “sometimes” on the frequency scale, which actually gave respondents less chance to be classified with infrequent conflict than on the five option scale used all other years. We give these arguments for why we think our interpretations of the results of an increase in risk for conflict over education and a decrease after graduation hold, but we have little control over and no means to test the effect of the changes.

5.3 Discussion of findings

The overall aims of the thesis were to investigate depression prevalence and to follow change in depressive symptoms over education and the first years in the profession. We also investigated associations between demographic and some education related factors and depression, and followed risk of work-home conflict and the association with depressive symptoms over the period.

5.3.1 Depression in first year students

The 10.2% risk of depression in first year students is modest compared with studies that show prevalence estimates of between 13 and 50%^{106 135 139 142 185-187}. Many of the cited studies used instruments and cut offs to detect mild or moderate depression, however. In contrast, Eisenberg, who used a clinically validated self-report instrument, based on

the DMS-IV criteria, in a random sample of students at different stages of higher education found estimates more similar to ours with 13.8% of undergraduates and 11.3% of graduates and professional students reporting depression. With even more strict criteria, only 5.5 of the undergraduates and 4.1% of graduates/professional students fulfilled the criteria for major depression.

Younger students had a higher risk of depression compared with older: while 11.9% of respondents in their early twenties reported depression, only 6.7% of those older than 35 did so. This reflects results from epidemiologic research in population-based samples, with a higher risk of depressive illness in young adulthood than in adults of a more mature age^{32 34}. Associations between age and depression or distress are seldom investigated or reported in students, probably because many of the student groups explored consisted of individuals of the same age, but Eisenberg, who was able to study a sample large and varied enough in age, also found a decrease in risk by age with an odds ratio of 0.46 for depression in students above 31 compared with those aged 18 to 22⁹⁷. There are several reports of no gender difference in depression among higher education students, and it has been suggested that female students may be a selection of healthier women than those not in education¹⁸⁸, but in LANE we found a difference similar to what is expected in the general population with 10.7% of the women reporting depression compared with 5.7% of the men.

Few respondents were born in other countries than Sweden, but those born outside Europe had more than doubled risks for depression compared with inborn Swedes and students from other European countries. Results from other countries are inconclusive, but in the Scandinavian setting, there are indications that non-European students experience discrimination and adjustment difficulties, and that they do so in a higher degree than immigrant students born in Europe¹⁸⁹. Perhaps the difference between students born outside Sweden but within Europe and those born in other parts of the world also reflects selection effects, as both the reasons for residing in Sweden and the choice of obtaining an education here may differ between the groups.

The majority of the first year students received financial support in the form of a full loan and grant, but the minority who did not had less risk of depression. And students who worked for pay during term time reported depression less often. Financial constraints are frequently reported as sources of stress in students^{96 112 140 190}, but our findings suggest that in the Swedish setting – where students are entitled to financial aid provided they uphold an adequate study record – to receive less or no financial aid may be a sign of financial independence, and that many of those who work for pay perhaps do so by choice rather than need.

5.3.1.1 Education related factors and depression

In LANE, 31% of the first year students reported that they spent more time on their studies than an expected normal work week of 40 hours, and those who did so had a more than doubled risk of depression compared with the 44% who reported that they spent 40 hours a week on studying. The 24% who said they spent less time studying had even less risk. This reflects results from others student settings where perceptions of high work load have been associated with distress^{102 111 112 114 140 141 191}.

Regarding the indices we constructed to measure self efficacy beliefs, the quartiles of respondents who reported least trust in their abilities to focus on study tasks (or self regulatory self efficacy) and social capacities in the educational setting had more than doubled risks of depression compared with the quartiles with the highest trust which is in line with prior investigations¹⁹²⁻¹⁹⁴.

5.3.2 Depressive symptoms over education and work establishment

The levels of depressive symptoms increased over time in education, but after graduation, and a year in the profession, they were similar to baseline again. We found only a limited number of studies on distress by time in education, confined to a few different professional programs, but taken together they seem to reveal a similar pattern despite differences in length and orientation: when students in medical-^{149 150}, dental-^{151 153}, law-¹⁵² and nursing education^{116 156 157} were followed, they all reported elevated levels of psychological distress or depression in their final year compared with the first. Some studies measured distress only at the beginning and at the end of education, but those that followed all years appear to agree in that they show a greater increase between the first and the second year, after which the levels of distress remain more or less stable until graduation^{150 152 153 157}.

After education, longitudinal studies which followed recently graduated medical doctors found them subject to high initial levels of distress that declined over the first years in the profession^{125 195}, and qualitative studies of newly qualified nurses consistently show high distress in new graduates, but also a gain in professional confidence over the first year at work^{99 128 160}. Our results indicated approximately stable levels of depressive symptoms the first two years in the profession, but as the first measurement at work took place at least a year after graduation we may have missed an initial peak in distress.

Thus, the overall pattern of change in depressive symptoms over the period seems to agree with prior research of stress and distress in new graduates, but, due to the extended follow-up, we were able to connect change over education with change after work entry and then found a transitional pattern of elevated distress in the latter part of education that decreased a year after graduation and work entry. In addition, despite differences in the level of depressive symptoms due to age, gender and family status, the trajectory of change was similar across groups, which supports an interpretation of the trajectory of change as an effect of time in education and work establishment.

5.3.2.1 Correlation between the repeated measures over time

The correlations between the repeated measures of 0.44 to 0.60 over time indicate that individual differences in symptoms levels between responders persisted. This is in line with longitudinal data from both general student samples, where students who reported distress at baseline had an increased risk of depression two years later¹⁵⁸ and samples of medical students, where high distress in first year students predicted psychological morbidity in late education¹⁴⁷.

5.3.3 Work-home conflict over education and work establishment

Many of the students in LANE entered education at a mature age, and qualitative studies show that older students may be subject to stress when their capacity to contribute income and help to their families, especially children, is compromised by a need to prioritise their studies^{196 197}. In our sample married and single parents had a relative risk increase of 48 and 78% respectively compared with single students, corresponding to absolute risks of 33 and 40% for reporting frequent work → home conflict in their third year of education. The risk for home → work conflict was doubled in married and tripled in single parents compared with singles, corresponding to predicted absolute risks of 20 and 31% in the same year. Also age affected work-home conflict, but adjustment for family status weakened the association and shows that family status more than age affected the risk for work-home conflict.

Even if the risks differed between student groups, all experienced an escalation in conflict as the education progressed. We are not aware of any other study that followed work-home conflict over education, but think that the pattern of change indicates an effect related to the increase in stress and distress found in nursing students as well as some other student groups^{116 149-151 153 156 157 198 199}. In contrast, the risks were reduced, and lower than at any time in education, a year after graduation and work entry. Probably there are qualitative differences between the demands of education and those of work that we cannot account for by the data from LANE, but the results suggest that there are demands specific to education difficult to combine with private life, and that they can also be associated with time in education. The levels of risk differed between schools which show that local factors affected students' experience of work-home conflict, but there were no detectable differences in the pattern of change over time supporting an interpretation of a general effect of time in education on the experience of work-home conflict.

Similar to investigations in working populations, more students reported work → home conflict than home → work conflict⁸⁰⁻⁸², and many reported both directions of conflict, which confirms findings of a high correlation between the two dimensions^{76 80}.

5.3.3.1 *The association between work-home conflict and depressive symptoms*

As for the association between work-home conflict and depressive symptoms over time we found a statistically significant interaction, and the year after graduation and expected work entry, respondents who reported home → work conflict had higher levels of depressive symptoms compared with other years. The group consisted of only five responders however, which makes it difficult to draw any conclusions. Instead we suggest that the association between work-home conflict and depressive symptoms appears fairly constant over the investigated time period, despite the change in risk of perceived work-home conflict, and that it seems to be the experience of conflict between education/work rather than the direction of conflict that affects levels of depressive symptoms.

5.3.4 Strengths and limitations of the data

To our knowledge LANE is the largest nationwide study of mental health in higher education for which all members of a defined student group were asked to participate. It is the only population-based study we are aware of through which it has been possible to link mental health development over education with that of the first occupational years.

The nationwide design enabled us to investigate differences in levels of distress and change over time between schools, and also to control our results for their effect on distress. Apart from differences at baseline between schools, we located a difference in the trajectory of change in depressive symptoms between colleges located in major versus smaller cities. For work-home conflict we found no statistically detectable difference in change in risk over time, but we did observe a difference in the level of risk of work-home conflict between schools. Because we had little information about the educational environment in individual schools we were not able to investigate these findings further. After inspecting descriptive graphs of development in individual schools, our impression is that the pattern of change both for depressive symptoms and work-home conflict held true over a majority of the schools however. Both findings support our interpretation of an effect of time in education and work establishment, independent of the local school environment. But the lack of more detailed information about the schools left us with little opportunity to investigate associations between environmental factors and depressive symptoms or perceptions of work-home conflict.

Even if we followed change over the entire period of education and the first years in the profession, the timing of the measurements probably affected our results. The baseline data collection took place in the second term of education and the first measurement at work a year after graduation. This means that the respondents had had ample time to adjust to the educational environment before they answered the baseline questionnaire of LANE, and to the professional setting before they answered the first post-graduation questionnaire. Perhaps the students would have reported higher levels of distress in their first term of education. We also may have missed an initial peak in distress when the newly qualified nurses entered the profession.

LANE was restricted to students in training for a single profession which limits inference to other students groups and newly qualified professionals. Studies performed in other student groups and in other groups of professionals indicate a similar development suggesting a common denominator however. Thus we believe our results may be relevant also for student groups outside nursing if certain qualitative differences are taken into account. Students in professional training follow an established curricula and share conditions and vocational development with their classmates, but students enrolled for general qualifications may have different educational goals with less defined outcomes in terms of a future career, which could affect distress both over education and after graduation differently. Between professional programs there are age and gender differences that probably influence the levels of distress on an aggregate level.

5.3.5 Significance of an effect of education on distress in individuals

Although we found a pattern of change that indicates an effect of higher education on perceptions of stress and distress in students we don't think that students experience more distress than their non-student peers. In fact, studies which investigated associations with depression or distress in broader categories of young adults do not show elevated risks in students^{34 95 146}. This does not contradict an effect of education on distress, only that people not in education experience distress in relation to other circumstances of life. We also think that for an individual, the effect of education probably is modest and that personal vulnerability and private stressors encountered over the period of education and work establishment often play more important roles for determining both levels of depressive symptoms and the trajectory over time⁶⁸. Our intention was not to predict risk of distress in single students however, but rather to investigate associations between education, the transition to work, and distress in groups of students and newly qualified professionals.

5.3.6 Implications of an effect of education on distress in students

A substantial part of the population attends higher education, and many individuals initiate their occupational life there, which makes the welfare of students a matter of concern for public health. The findings we present suggest that students may be subject to heightened distress over time in higher education, but also that it is transitional and probably abates as the former students establish themselves in their professions. Perhaps heightened distress in late education is an effect of anticipatory worry, as well as an immediate response to the educational environment, as the student prepares to meet the challenge of a not yet conquered profession. Nevertheless, within education, there are differences in the levels of depressive symptoms associated with demographic factors that can help identify student groups more vulnerable to distress. We cannot offer any solutions based on our results, but wish to point out some areas of interest for future research and preventive intervention in order to reduce distress and depression in students.

Traditionally, students consist of young persons in transition from adolescence to adulthood. In LANE, such students were more likely to report depression in their first year of education, and they continued to report higher levels of depressive symptoms over education and work establishment compared with students of more mature age. Young students face obstacles all individuals do on their way to adulthood¹, and the distress they perceive may be an effect of meeting the demands of education, and those of entering a new profession, in young adulthood, as well as an effect of the demands themselves. Thus the heightened levels of distress they show may be related to age as much as education, and attempts to alleviate distress in the group perhaps need to include efforts to support young students' path towards a beneficial and productive adult life as well as help with issues related to the educational setting.

Older students and students in established families reported less depression at baseline and lower mean levels of depressive symptoms over time compared with their younger, and for the most part single, counterparts^{199 200}. Other authors have come to similar

results as they show that students who are married or live with a partner are better supported and feel less distressed than their single and often younger counterparts¹⁹⁸²⁰¹. But older students have parental obligations more often, and in LANE, parents were more vulnerable to conflicts between educational and private demands which in their turn were associated with depression. Lifelong learning and the possibility for people to return to higher education further into adulthood is a promoted policy within the European Union, and as a result, the number of mature aged students has increased in many countries²⁰². In Sweden, measures which encourage young adults to enter higher education directly after secondary school have been discussed, but currently, approximately a third of all students registered for higher education are older than 30, and many are married/cohabiting and/or parents⁷⁻⁹. In LANE, a proportion of 38% of the students were older than 30, and 40% were parents, in their first year of education, which shows that conflicting demands generated in the interface between education and private life were stressors that affected a large number of students.

This heterogeneity of modern student groups raises questions of how best to meet the students' different needs. In Sweden all institutions for higher education are required to provide health services for education related issues, especially in the aim of promoting physical and mental health in students. They also have to provide career counselling to ease the transition from education to work. The aim and scope of the services vary from multi-disciplinary teams of medical doctors, nurses, social workers and physiotherapists at the largest universities to single counsellors at smaller colleges. We think the demographic variation of students affect the work of student counselling services as they have to cater to distress arising from areas uncommon in the traditional group of young adults, but there are no guidelines or policies in place to meet the demands of a changing student body with a high proportion of mature adults.

Within the educational setting, the differences in risk of work-home conflict between schools suggest that there are factors in the educational environment which can be manipulated to reduce the experience of conflicting demands. Perhaps more individualised education programs could be arranged to give room for flexible schedules without sacrificing quality for instance. We had very limited information about the environment at specific schools and were unable to investigate the matter further, but think more detailed examinations of factors in the educational environment that impact work-home conflict are of interest, as they can provide information for interventions aiming to reduce the experience of conflict, and thus distress.

We also wish to bring attention to the correlation we found between the repeated measures of depressive symptoms over time which suggests that students high in distress at one point in time have higher risk of distress also over time. This is neither surprising, nor a novel finding, as it reflects both knowledge about the recurrent nature of depressive illness and depressive states in the population³⁹ and findings from student settings where the most important risk factor for later depression was prior depression⁹². Still we think it worthwhile to point out, as, perhaps individual students high in distress may be helped by awareness of their heightened risk of continued distress over the period of education and the challenging transition to work.

5.4 Conclusions

The students investigated were a heterogeneous group consisting both of young adults who entered education directly after secondary level education and individuals with extensive experience of adult life. As a group, 10% reported depression at the end of their first year in education according to the measure applied, but the risk was affected by age and gender with a higher proportion depressed among younger and female students.

We found an increase in the level of depressive symptoms over time in education, but after graduation and a year in the profession the levels had decreased to levels similar to the first year of education. Even if the symptom levels differed due to age, gender and family situation the trajectory over time was similar across groups indicating an independent effect of time in education and work establishment on psychological distress. We think heightened distress over education is a transitional phenomenon that abates once the graduate has had time to accommodate to the profession. Nevertheless, within education, the differences in depressive symptoms associated with demographic factors can help to identify students groups more vulnerable to distress. Furthermore, as individual differences in distress seem to persist over time, perhaps students high in distress in the beginning of education can be helped by awareness among educators of the elevated levels of distress in late education.

Many students, especially those with parental obligations, had difficulties balancing the demands of education with those of private life, and those who reported frequent work-home conflict had higher mean levels of depressive symptoms compared with other students. The risk of work-home conflict increased over the course of education, but had decreased to lower levels than at any time in education a year after graduation and work entry, suggesting that specific demands attached to the student role and educational process affected the interface with private life. Respondents who reported frequent conflict also reported higher levels of depressive symptoms. The strong association with depressive symptoms suggests that measures to reduce work-home conflict, especially in education programs with many mature aged students, could help to alleviate distress in students. The level of risk differed between schools, indicating perhaps factors at this level could be influenced to reduce work-home conflict.

“My spontaneous thought is that I ended up so “right” in my choice of profession. To become a nurse has been at the back of my head for many years, until I late in life decided to go back to school. I feel joy every time I go to work.”

Nurse in her mid-forties, a year after qualification and work entry

6 SVENSK SAMMANFATTNING

Bakgrund och syfte: En ansenlig del av befolkningen genomgår högskoleutbildning, vilket innebär att studenters hälsa och välfärd har betydelse för folkhälsan på samhälls nivå. Det finns indikationer på hög psykisk stress bland studenter och även på att den kan ha ökat under senare år. Om psykisk stress i gruppen är en effekt av utbildningssituationen i sig, den demografiska sammansättningen med många unga vuxna, övergripande förändringar på samhällsnivå, eller en kombination av dessa faktorer är däremot osäkert. Syftet med denna avhandling var att undersöka förekomsten av självrapporterad depression och att följa utvecklingen av depressiva symtom hos studenter under utbildningen och de första yrkesåren. Specifika syften för det tre delarbeten som ingår var: 1) att undersöka förekomst av depression och kopplingar till demografiska och utbildningsrelaterade faktorer hos förstaårsstudenter (studie I), 2) att undersöka sambandet mellan tid i utbildning, tidigt yrkesliv och depressiva symtom, och att beskriva utvecklingskurvan över perioden (studie II), och 3) att undersöka risken för en upplevd konflikt mellan utbildningskrav/arbetskrav och krav från privatlivet (work-home conflict) under utbildningen och de första yrkesåren, och kopplingen till depressiva symtom (studie III).

Metod: Data för undersökningarna hämtade vi från LUST-projektet (en Longitudinell Undersökning av Sjuksköterskors Utbildning och Tillvaro – på engelska ”LANE”), en nationell kohortstudie av 1700 sjuksköterskestudenter som besvarade årliga enkäter mellan 2002 och 2007. Studie I var en tvärsnittstudie och för den använde vi data från första utbildningsåret. Vi mätte depressiva symtom med instrumentet Major Depression Inventory och beräknade förekomst av depression enligt en algoritm baserad på det amerikanska systemet för klassifikation av psykisk sjukdom – DSM-IV. Vi undersökte även kopplingar mellan demografiska och utbildningsrelaterade faktorer och depression. Studie II och III hade båda en longitudinell design och för dessa använde vi data från fem år: tre i utbildning samt två efter examen. I studie II mätte vi nivån av depressiva symtom genom att summera antal och grad av besvär angivna i Major Depression Inventory. Vi analyserade därefter förändring av nivåerna av symtom över undersökningstiden. I studie III undersökte vi två dimensioner av konflikt mellan arbete och privatliv: 1) krav från utbildningen/arbetet som inverkat negativt på privatlivet samt 2) krav från privatlivet som inverkat negativt på studierna/arbetet. Depressiva symtom mättes som i studie II. Vi analyserade därefter förändring i risk för konflikt, och kopplingen mellan upplevd konflikt och depressiva symtom över undersökningstiden.

Resultat: Studie I visade en förekomst av depression om 10,2% (5,7% hos män och 10,7% hos kvinnor) hos studenter första året i utbildningen. Lägre ålder (<30), immigration från utomeuropeiskt land, upplevd hög arbetsbörda, missnöje med utbildningens kvalitet, lägre tilltro till den egna förmågan och konflikt mellan studiekraV/arbetskrav och privatlivets krav var förenat med högre risk för depression. Tidigare arbetslivserfarenhet före utbildningen, mindre behov av finansiellt stöd i form av studielån och lönearbete under terminstid var kopplat till lägre risk för depression. I studie II fann vi ökande nivåer av depressiva symtom över tid i utbildningen, men en

återgång till nivåer motsvarande baslinjen (första utbildningsåret) ett år efter examen. Nivåerna av symtom skilde sig mellan grupper av studenter beroende på ålder, familjeförhållanden samt tidigare undersköterskeutbildning, men utvecklingen över tid var gemensam för alla grupper. Studie III visade att upplevelse av konflikt mellan studiekraV och privatlivets kraV ökade över tid i utbildningen, men att upplevelsen av konflikt mellan arbetskraV och privatlivets kraV var lägre ett år efter examen än någon gång under utbildningen. Deltagare med barn upplevde konflikt oftare än andra deltagare. Kopplingen mellan upplevd konflikt och depressiva symtom var stark och förändrades inte över undersökningstiden.

Slutsatser: De undersökta sjuksköterskestudenterna var en demografiskt heterogen grupp som bestod av både unga vuxna och äldre studenter. Sammantaget rapporterade 10,2% av studenterna depression första utbildningsåret, men risken påverkades både av ålder och kön. Vi tror att den utveckling av depressiva symtom vi fann, med en ökning under utbildningen och en sänkning ett år efter examen, är en effekt av ökad psykisk stress under utbildningstiden, men också att den är övergående och avtar när den nyutbildade hunnit anpassa sig till sitt yrke. Vi visar också att många studenter, speciellt de som hunnit bilda egen familj och har barn, upplever en konflikt mellan studiekraV och privatlivets kraV. Kopplingen till depressiva symtom antyder att försök att reducera upplevelsen av konflikt, speciellt i utbildningsprogram med många äldre studenter, skulle kunna bidra till att minska den psykiska stressen.

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