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Major depressive episode
in adolescents and young adults –
a nationwide epidemiological survey
among 15-24-year-olds

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**MAJOR DEPRESSIVE EPISODE IN ADOLESCENTS AND YOUNG
ADULTS – A NATIONWIDE EPIDEMIOLOGICAL SURVEY
AMONG 15-24-YEAR-OLDS**

Linnea Haarasilta

Academic dissertation

*To be publicly discussed, with the permission of the Medical Faculty of the University of
Helsinki, in the auditorium of the Department of Psychiatry,
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TIIVISTELMÄ

Terveysturvaturkimus on väestön terveyttä ja palvelujen käyttöä kartoittava valtakunnallinen tutkimus. V. 1996 mukana oli depressiota koskeva strukturoitu diagnostinen haastattelu (University of Michigan Composite International Diagnostic Interview Short Form, UM-CIDI SF). Tästä aineistosta tehtiin vakavan masennusjakson epidemiologiaa koskeva poikkileikkaustutkimus. Väestörekisteristä valittiin satunnaisotannalla indeksihenkilö, jonka kotitalouteen kuuluvat 15-75-vuotiaat henkilöt haastateltiin. Tutkimukseen osallistui 86% (N=3614) alkuperäiseen otokseen tulleista 4200 kotitaloudesta. Otos oli edustava iän, sukupuolen ja asuinalueen suhteen, ja tulokset ovat yleistettävissä suomalaisväestöön.

Tässä tutkimuksessa tarkastellaan 15-19-vuotiaiden nuorten (N=509) ja 20-24-vuotiaiden nuorten aikuisten (N=433) ryhmiä. Tutkimuksessa arvioidaan vakavan masennuksen esiintyvyyttä, depression liittyvää alkoholin ja tupakan käyttöä, somaattista sairastamista sekä terveyspalvelujen käyttöä. Suomalaisnuorista ei ole aiemmin julkaistu alle 18-vuotiaisiin ulottuvaa yleisväestöstä kerättyä tutkimustietoa ja kansainvälisestikin nuoruusikäisiin kohdennettu epidemiologinen tutkimus, jossa käytettäisiin strukturoitua diagnostista haastattelua on kohtalaisen uutta.

Tutkimuksessa todettiin, että edeltävän 12 kk aikana depression esiintyvyys 15-19 vuotiailla oli 5,3 % ja 20-24-vuotiailla 9,4 %. Työillä depression esiintyvyys oli hieman suurempi kuin pojilla (riskisuhde 1,34). Suurin osa (77,9 %) koki, että depressio vaikutti selvästi toimintakykyyn. Tutkimustulokset vahvistavat käsitystä siitä, että depressio on yleinen ja haittaa aiheuttava sairaus nuoruusikäisillä.

Pitkäaikaissairauksien (esim. astma ja allergiat) ja depression todettiin esiintyvän yhdessä. Depressiosta kärsivät nuoret raportoivat enemmän koulupoissaoloja somaattisten sairauksien vuoksi ja kokivat terveydentilansa useammin alentuneeksi kuin ei-masentuneet nuoret. Nuorten depression ja riskialttiin terveyskäyttäytymisen välillä todettiin selvä yhteys. Tupakointi, viikoittainen humalaan asti juominen sekä vähäinen liikunnan harrastaminen olivat yleisempiä masentuneilla kuin ei-masentuneilla nuorilla.

Terveyspalvelujen käyttöä koskevassa osatyössä todettiin, että nuoret käyttävät palveluja erilaisten fyysisten oireiden vuoksi varsin paljon (46,7 %), mutta mielenterveyspalvelujen käyttö on hyvin vähäistä (1,5 %). Masennusdiagnoosin saaneista nuorista vain pieni osa (20,6 %) oli ollut yhteydessä terveyspalveluihin depression vuoksi. Depressiolääkitystä ilmoitti käyttäneensä 14,3 % palveluihin hakeutuneista nuorista. Aikuisiän terveyttä ajatellen mielenterveyshäiriöiden varhainen tunnistaminen ja hoito olisi oleellista. Erityisesti matalan kynnyksen tutkimus- ja hoitopaikkojen (esim. kouluterveydenhuolto) osuus varhaistunnistamisessa on merkittävä.

ABBREVIATIONS

AACAP	American Academy of Child and Adolescent Psychiatry
ADHD	Attention deficit-hyperactivity disorder
APA	American Psychiatric Association
CAPA	Childhood and Adolescent Psychiatric Assessment
CAPI	Computer Assisted Personal Interview
CI	Confidence Interval
CIDI	Composite International Diagnostic Interview
DICA	Diagnostic Interview Schedule for Children and Adolescents
DIS	Diagnostic Interview Schedule
DISC	Diagnostic Interview Schedule for Children
DSM	Diagnostic and Statistical Manual of Mental Disorders
DSM-III	Diagnostic and Statistical Manual of Mental Disorders, third edition
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders, third edition, revised
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, fourth edition
ECA	Epidemiological Catchment Area Study
ECT	Electric convulsive therapy
FINHCS	Finnish Health Care Survey
FINHCS '96	Finnish Health Care Survey 1996
ICD	International Classification of Diseases
ICD-10	International Classification of Diseases, tenth edition
KELA	Kansaneläkelaitos (Social Insurance Institution)
K-SADS	Schedule for Affective Disorders and Schizophrenia for School-Age Children
KTL	Kansanterveyslaitos (National Public Health Institute)
MDD	Major depressive disorder
MDE	Major depressive episode
MRI	Magnetic resonance imaging
NCS	National Comorbidity Survey
NHMRC	National Health and Medical Research Council
OADP	Oregon Adolescent Depression Project
OR	Odds Ratio

RDC	Research Diagnostic Criteria
SCAN	Schedules for Clinical Assessment of Neuropsychiatry
SSRI	Serotonin-selective reuptake inhibitor
STAKES	Sosiaali- ja terveystieteiden tutkimus- ja kehittämiskeskus (National Research and Development Centre for Welfare and Health)
TCA	Tricyclic antidepressant
UM-CIDI SF	University of Michigan Composite International Diagnostic Interview Short Form
WHO	World Health Organization

1. ABSTRACT

The Finnish Health Care Survey (FINHCS) is a population-based nationwide study designed to monitor the health of the general population and evaluate the use of and need for services. In 1996, a structured diagnostic interview for major depressive episode (MDE) was included in the survey (University of Michigan Composite International Diagnostic Interview Short Form, UM-CIDI SF). The design was a one-stage cluster-sampling in which households formed the clusters. The household participation rate of completed interviews was 86% (3614 of 4200 households). All 15-75-year-old household members were interviewed.

The present study focuses on adolescents (15-19 years; N=509) and young adults (20-24 years; N=433). The aims of the study were to estimate the 12-month prevalence of MDE, to investigate associations between MDE and substance use as well as MDE and chronic illness and to analyze patterns of service use related to MDE. Prior research in the Finnish general population has not covered persons younger than 18 years and internationally research in adolescent psychiatry using structured diagnostic interviews has been scarce until recent years.

The 12-month prevalence of MDE was 5.3% for adolescents and 9.4% for young adults. Female to male ratio was 1.34. Most respondents with MDE (77.9%) perceived at least moderate impairment due to depression. The results underline the view that depression is a common and impairing disease among young people.

The study showed that chronic illness (e.g. asthma and respiratory allergies) and depression co-occur more often than expected by chance in young people. Adolescents suffering from depression report more sick-days due to physical illness and lower self-perceived health than their non-depressed peers. There was an association between MDE and risky health behavior: cigarette smoking, frequent drunkenness and low frequency of physical exercise were associated with MDE.

Any service use for physical illness was common (46.7%) while use of psychiatric services was rare (1.5%). Of those with MDE 20.6% reported a contact with health care because of depression. Use of antidepressant medication was reported by 14.3% of those with treatment

contact. Early recognition of adolescent mental health disorders and development of treatment facilities with easy access would be important.

2. LIST OF ORIGINAL PUBLICATIONS

The thesis is based on the following original publications, which are referred to in the text by Roman numerals I–IV.

- I Haarasilta L, Marttunen M, Kaprio J, Aro H. The 12-month prevalence and characteristics of major depressive episode in a representative nationwide sample of adolescents and young adults. *Psychological Medicine* 2001; 31: 1169-1179.
- II Haarasilta L, Marttunen M, Kaprio J, Aro H. Correlates of depression in a representative nationwide sample of adolescents (15-19 years) and young adults (20-24 years). *European Journal of Public Health*. In press.
- III Haarasilta L, Marttunen M, Kaprio J, Aro H. Major depressive episode and physical health in adolescents and young adults – results from a population-based interview survey. Submitted.
- IV Haarasilta L, Marttunen M, Kaprio J, Aro H. Major depressive episode and health care use in adolescents and young adults. *Social Psychiatry and Psychiatric Epidemiology* 2003; 38: 366-372.

3. INTRODUCTION

Epidemiology is relatively young as a science. An operationalized body of methods and research principles began to form after the Second World War (Rothman and Greenland, 1998a). Early epidemiological designs were targeted to study infectious epidemics, and infectious agents were viewed as single sufficient causes of disease (Zubrick et al., 2000). However, a multifactorial understanding of diseases soon began to evolve among researchers, and along with this paradigm shift came the development of statistical methods for multivariable modelling. It is currently recognized that many diseases represent outcomes of multiple interacting factors psychiatric disorders being a good example of such heterogeneity and causal complexity (Zubrick, 2000).

Perhaps the first large-scale epidemiological surveys designed to study child and adolescent development was the Isle of Wight Study (Rutter et al., 1976a; Rutter, 1989). This was a set of longitudinal surveys introducing novel methods and new data that raised issues, some still of importance in research (Kessler, 2001). One example is the application of diagnostic criteria based on behavior and free from assumptions of etiology or intrapsychic mechanisms - an idea familiar from current psychiatric diagnostic classification. Further, whereas it was earlier assumed, that children and adolescents could not be directly interviewed about psychopathology, the results of these studies supported the utility of direct interviews with young people. The idea of structured diagnostic interviews in child and adolescent psychiatry research was also pioneered by the Isle of Wight Study. Despite increasing interest in epidemiological research among younger age groups, studies using modern methods of diagnostic assessment are still relatively rare in comparison with the number of surveys on adult populations (Roberts, 1998).

Data on the prevalence of psychiatric disorders and related need of treatment are a necessary precondition when health care services are planned. It is known that many individuals suffering from mental health disorders do not contact services (Newman et al., 1996; Kessler et al., 1998a; Wittchen et al., 1998) and that those who do, differ in many respects from those who have not used services (Goodman et al., 1997). In contrast with clinical surveys, community-based surveys make it possible to study a wider range of pathology, including less

severe forms of a disease, without referral bias. For studies on risk and protective factors or etiology of a disease the general population design is essential. Results from epidemiological studies can also be applied to generate hypotheses for the purposes of further research.

The Finnish Health Care Survey (FINHCS) has been carried out in 1964, 1987, 1993, 1995 and 1996 in collaboration with the Social Insurance Institution (KELA), the National Research and Development Centre for Welfare and Health (STAKES), and the National Public Health Institute (KTL) (Arinen et al., 1998). It is a population-based study designed to monitor the health of the general population and evaluate the use of and need for services. In 1996, a diagnostic interview for major depressive episode was included in the survey, and as part of the FINHCS, a cross-sectional study on epidemiology of depression was conducted (Lindeman et al., 2000; Lindeman et al., 2001; Hämäläinen et al., 2001, Laukkala et al., 2001). The present thesis focuses on the epidemiology of depression among 15-24-year-olds.

4. REVIEW OF THE PREVIOUS LITERATURE

4.1 Adolescent development and changes in the concept of psychopathology

Transition from childhood to adolescence is marked by the emergence of puberty. The average age of onset for pubertal development is 11 years for females and 13 years for males, and individual variation within the same sex can also be large (Aalberg and Siimes, 1999). The end of adolescence is more vaguely defined than its beginning: adolescence ends when self-support is achieved. Usually, young adulthood is considered to begin at around 20 to 22 years (Aalberg & Siimes, 1999).

Adolescence is divided into three periods: early adolescence (around 12-14 years), adolescence proper (around 15-17 years) and late adolescence (around 18-21 years) (Aalberg and Siimes, 1999). These periods are suggested to be characterised by certain developmental phases. Early adolescence consists of the rapid biological changes and adjustment to them. Separation from the parents begins. Normally, turmoil is greatest during this phase. In adolescence proper, sexual development proceeds, the cognitive skills of a young person become enhanced and the capacity to integrate one's experiences and emotions gets better. Late adolescence is characterized by increased interest in future goals and many choices

concerning adult life are made. Separation from parents progresses and the youth begins to consider what he/she wants in life and what are his/her own ideals. These timetables are somewhat elastic, however, and it may well be that the identity development continues far beyond the adolescent years (Steinberg & Morris, 2001).

Empirical research on adolescent development has gained more interest in the past two or three decades providing important data on pathways to psychopathology. However, research on normal adolescent development and factors of resilience is still scarce and “no attempt to develop a general theory of normative adolescent development has met with widespread acceptance” (Steinberg & Morris, 2001). Epidemiological studies have revealed that, in contrast with earlier thinking, most young people pass through adolescence without extensive turmoil (Offer & Schonert-Reichl, 1992). Experimenting with new things and trying out boundaries appears to be inherent in adolescents’ lives but persistent disequilibrium is not a rule, and normal development should be distinguished from psychopathology (Rutter et al., 1976b; Offer & Schonert-Reichl, 1992).

Adolescent depression as a clinically significant disorder was long considered not to exist. On one hand, depressive symptoms were considered to be normative and mostly self-limited in adolescence and on the other hand “masked” or entirely different from the symptoms of depression identified in adults (Glaser, 1967; Welner, 1978). Evidence now suggests, however, that while there are age specific characteristics in the clinical picture of depression, existing diagnostic criteria can be used when classifying juvenile depressive disorders (Carlson & Cantwell, 1980; Roberts et al., 1995). Accumulating data further indicate that depression is a common disorder in adolescents often impairing and chronic in its course with long-term adverse effects especially if untreated (Birmaher et al., 1996). Moreover, detecting depression and other psychiatric disorders in young people is increasingly important, as it seems that many mental health problems first arise during adolescent years (Burke et al., 1990; Giaconia et al., 1994). Approximately half of the adolescent psychiatric disorders and related psychosocial problems continue into young adulthood (Newman et al., 1996; Hofstra et al., 2000). Early recognition and proper treatment of early-onset mental health problems is essential in efforts to support later development of mental health.

4.2 Definition of depression

Variations in mood can be seen as a continuum ranging from lowered to elevated mood. In casual language depression may indicate normal lowering of mood or depressive feelings as a response to loss or some unpleasant situation or event. Normal lowering of mood, commonly experienced by people during their lifetimes, is self-limited and does not significantly interfere with every-day functioning. Depression can also be viewed as depressive symptoms referring to an individual symptom or a few symptoms, which, although possibly persistent, are quantitatively or qualitatively different from a diagnosable mood disorder (NHMRC, 1997). In diagnostic classification, mood disorder is defined as an illness characterised by a distinct constellation of several co-occurring symptoms for a defined period of time contributing to significant psychosocial impairment (APA 1987; APA 1994; WHO, 1992). Mood disorders comprise unipolar depression, bipolar mood disorders and dysthymia. In this thesis, unless otherwise stated, depression refers to unipolar major depression.

The classifications currently in use are Diagnostic and Statistical Manual of Mental Disorders (DSM) (APA, 1987; APA, 1994) and International Statistical Classification of Diseases and Related Health Problems (ICD) (WHO, 1992). Research programs are more likely to apply the DSM classification rather than ICD as it provides more detailed instructions for case definition. The diagnosis of major depression requires persistent and intensive depressed mood or loss of interest or lack of initiative for at least two weeks accompanied by other symptoms such as exhaustion, sleep disturbance, changes in appetite and weight, psychomotor retardation or agitation, concentration problems, low self-esteem and guilt, hopelessness and thoughts of death (APA, 1987; APA, 1994; WHO, 1992). These symptoms must not be related solely to substance use, bereavement or medical illness. In contrast with DSM-III-R (APA, 1987), DSM-IV and ICD also require that symptoms must produce significant impairment in psychosocial functioning (APA, 1994; WHO, 1992). The diagnostic criteria are virtually the same in all age groups (APA 1987; APA 1994; WHO, 1992). Regarding MDE, the only exception between adult and adolescent criteria is that in adolescents irritable mood can replace depressed mood or anhedonia as a diagnostic symptom (APA 1987; APA 1994), but the basis for this change have not been systematically studied.

4.3 Epidemiology of depression in adolescents and young adults

4.3.1 Methodological issues

4.3.1.1 *Diagnostic measures*

Starting from the Feighner criteria (Feighner et al., 1972) and the Research Diagnostic Criteria (Spitzer et al., 1978) a great efforts have been devoted to developing common, standardized diagnostic criteria to reliably assess psychopathology in the general population. Accumulating research evidence helps to develop and clarify syndrome classification, but the many discrepancies between methods still produce variation in results and hamper the comparability between studies (Roberts, 1998). Moreover, true cultural variation in the distribution of psychiatric disorders may also exist (Weissman et al., 1996).

Self-reported psychological symptoms are more frequent than psychiatric disorders and it is probable that transient, unspecific every-day symptoms are overly reported when self-report scales are used. A shift from symptom scales to diagnostic interviews in assessing psychopathology has gradually taken place in psychiatric epidemiology. Modern epidemiology applies mainly two interview approaches. Semi-structured interviews are closer to traditional clinical decision making, as they provide only guidelines for items to be asked while the choice of words is open and there is also freedom to make additional, clarifying questions. Experience in clinical work is required. The Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS) (Kaufman et al., 1997) and the Childhood and Adolescent Psychiatric Assessment (CAPA) (Angold et al., 1995) are examples of such instruments applied in child and adolescent studies. Highly structured interviews on the other hand, are designed for lay interviewers and both the order and wording of the questions are predetermined. They are less time-consuming and economically more feasible in large-scale surveys than semi-structured interviews. The Composite International Diagnostic Interview (CIDI) (WHO, 1990), the Diagnostic Interview Schedule (DIS) (Robins et al., 1981), and the Diagnostic Interview Schedule for Children and Adolescents (DISC) (Shaffer et al., 1996) are commonly applied structured interviews. Some of the instruments have been specifically designed for and validated in adolescent populations (Angold et al.,

1995; Shaffer et al., 1996; Kaufman et al., 1997), but data on the highly structured interviews in younger age groups are more sparse (Wittchen et al., 1998; Aalto-Setälä et al., 2002a).

Structured interviews tend to yield higher prevalence estimates than semi-structured or clinical interviews, which has been suggested to be partially due to different interpretation of near-threshold symptoms (Helzer et al., 1985; Farmer et al., 1987; Brugha et al., 1999). As the structured interviews are often conducted by lay interviewers, it may be difficult to operationalize clinical significance of individual symptoms or impairment (Frances, 1998), even though the interrater or test-retest reliability may be very good due to high degree of structuring. Different methods of defining the cut point for a disorder and even small changes in wording (Regier et al., 1998; Brugha et al., 1999), influence selection of individuals to be studied, identification of different correlates and, finally, the conclusions made (Kazdin, 1989).

4.3.1.2 Study populations and sources of information

Epidemiological studies on adolescent psychopathology vary greatly in representativeness. The size of the study population in adolescent or young adult surveys applying standardized diagnostic instruments ranges from 150 (Kashani et al., 1987a, b) to 3010 (Wittchen et al., 1998) (Table 1 and Table 2). A few studies have used random sampling, while most have employed stratified sampling (Table 1 and Table 2). Differences in representativeness may also exist between one- and two-stage designs (Fleming & Offord, 1990). Moreover, response rate is not always clearly reported and varies between studies (Fleming & Offord, 1990; Roberts et al., 1998). Study drop-outs reportedly have an increased prevalence of psychosocial problems (Levy and Deykin, 1989; Oldehinkel et al., 1999), which is an important source of bias e.g. in school-based surveys including only those attending school (Whitaker et al., 1990; Lewinsohn et al., 1993a; Olsson & von Knorring, 1999). Examples of representative studies include surveys performed in the U.S. (Regier et al., 1993; Kessler & Walters, 1998) and in Germany (Wittchen et al., 1998; Oldehinkel et al., 1999). Unique studies in their representativeness are those of the Dunedin (McGee et al., 1990; Newman et al., 1996) and Christchurch (Fergusson et al., 1993; Feehan et al., 1994) birth cohorts following unselected samples of children from birth to adulthood in New Zealand.

Age and sex distributions are significant especially in the studies of adolescent psychopathology, as the prevalence estimates and correlates of disorders often vary by age and gender (Cohen et al., 1993; Anderson & McGee, 1994). In particular, the estimates from mixed child/adolescent samples on depression are not directly comparable to pure adolescent samples, due to the steep rise in the rates of depression after puberty, particularly in females (Hankin et al., 1998). Likewise, results from mixed adolescent/young adult samples are more informative if presented separately, as there may be cohort effects or age differences in psychopathology during transition to adulthood (Newman et al., 1996).

The reliability of child as the informant is dependent on age and the nature of information to be collected. On one hand adults are often unaware of the difficulties of the child, while on the other hand symptoms causing distress in the environment are not necessarily perceived as problem behavior by the adolescents themselves. Further, different patterns of behavior may be observed in home and school. Consequently, remarkable discrepancy may exist between child, parent and teacher reports (Roberts et al., 1998; Puura et al., 1998; Wu et al., 1999). Regarding internalizing symptoms in general and symptoms of depression in specific they often go unrecognised by parents and teachers (Fleming & Offord, 1990; Wu et al., 1999). For this reason, adolescents are considered as valid informants of their own depressive symptoms when directly interviewed. One approach is to collect information from several sources, but there is no consensus on how to combine such data in epidemiological studies (Roberts, 1998).

4.3.2 Incidence and prevalence

Incidence indicates the rate of development of new cases or episodes of illness within a given time period (Rothman & Greenland, 1998b). Prevalence is defined as the proportion of the population having an episode of illness within a given time period (Rothman & Greenland, 1998b). The time frame applied (e.g. current, six months, 12 months, lifetime) is important to define as the figures may vary greatly depending on the time period and the natural course of the disorder in question.

4.3.2.1 The prevalence of psychiatric disorders

The current prevalence of any psychiatric disorder in the adolescent general population is estimated to be about 20-25% (Table 1 and Table 2). In adolescence and young adulthood, mood disorders comprise one of the most prevalent diagnostic categories (Lewinsohn et al., 1993a; Newman et al., 1996; Wittchen et al., 1998). Many psychiatric disorders first emerge in adolescence and the overall prevalence increases by approximately two-fold from childhood to adulthood (Newman et al., 1996). In the Isle of Wight Study the prevalence of any psychiatric disorder was 7% in 10-11 year-olds and 21% among 14-15-year-olds (Rutter, 1976a). In two New Zealand birth cohorts, the lifetime prevalences of any disorder were 18% in late childhood (Newman et al., 1996), 22% at the age of 15 (McGee et al., 1990, Fergusson et al., 1993), and 37% (Feehan et al., 1994) and 41% (Newman et al., 1996) in late adolescence and young adulthood.

4.3.2.2 Frequency of depression based on symptom scales

Depressive symptoms are rather common among young people. The frequency of current self-reported depressed mood is estimated to 20-30 % in the general population (e.g Kandel & Davies, 1986, Kashani et al., 1987a; Rushton et al., 2002). Estimates of clinically significant depression according to self-rated symptom scales fall around 10% (e.g Larsson & Melin, 1990; Rushton et al., 2002).

4.3.2.3 General population estimates of depressive disorder based on diagnostic interviews (Table 1)

Depressive disorders in childhood exist but they are rather rare with a prevalence of between 0.5 and 3.5% (Fleming & Offord, 1990; Hankin et al., 1998; Puura et al., 1998). Incidence rises sharply after the onset of puberty, around 13 to 14 years (Oldehinkel et al., 1999), reaching its peak between 15 and 18 (Burke et al., 1990, Hankin et al., 1998). The one-year incidence of major depression is estimated to be 3 to 5% (Lewinsohn et al., 1993a; Garrison et al., 1997). Oldehinkel and coworkers (1999) reported a 20-month incidence of 3.4% for MDD. Incidence declines in young adulthood, as a considerable proportion of adult prevalence comprises recurrent cases of juvenile onset (Burke et al., 1990; Hankin et al.,

1998). The underlying mechanisms for the rise in the incidence of depression after puberty are not well understood but e.g. hormonal changes, development of the cognitive style and stressful life events at puberty are suggested to contribute to the phenomenon (Cyranowski, 2000).

MDD and dysthymia are the most common depressive disorders in adolescents, comprising 85% and 10% of all mood disorders, respectively (Birmaher, 1996). The lifetime prevalence of major depression in the general population studies including adolescents or young adults reportedly varies between 8.5% and 18.5%, one-year estimates range from 3.4% to 16.8% and current rates from 0.7% to 4.7% (Table 1 and Table 2). Estimates of adolescent and young adult major depression correspond to those of adults (Regier et al., 1993; Blazer et al., 1994). Some evidence suggests that the prevalence of depressive disorders would be increasing (Klerman & Weissman, 1989; Wittchen et al., 1994a; Kessler et al., 1994) and that the age of onset would be decreasing (Lewinsohn et al., 1993b) in recent birth cohorts, while other studies have not found any significant cohort effect (Murphy et al., 2000). Explanations for the possible increase in juvenile-onset depressive disorders include changing family structures, social roles and patterns of urbanization (Klerman & Weissman, 1989; Wittchen et al. 1994; Kessler & Walters, 1998). The Finnish general population studies have found no evidence on increasing prevalence during the past two decades, but no data has previously been published on persons younger than 18 years old (Lehtinen et al., 1990; Isometsä et al., 1997; Lindeman et al., 2000; Aalto-Setälä et al., 2001; Pirkola et al., 2002).

4.3.3 Gender differences

The 1:1 female to male ratio seen in childhood depression changes after puberty: depressive disorders in adolescents and adults are reportedly twice as common in females than in males (Table 1 and Table 2). Female preponderance is especially well documented for major depression (Weissman et al., 1996). The emergence of gender difference takes place by age 14, but is more related to the onset of puberty and pubertal status than age per se (Hankin et al., 1998; Cyranowski et al., 2000; Wade et al., 2002). It has been suggested that pubertal maturation in interaction with genetic background (Silberg et al., 1999), life events and female coping and attachment style would contribute to the greater female vulnerability for major depression (Nolen-Hoeksema & Gurgis, 1994; Wichström, 1999; Cyranowski et al., 2000;

Hankin & Abramson, 2001). Some studies also suggest a greater female vulnerability to recurrence of depression in comparison with males (Lewinsohn et al., 2000a) while others have found no gender disparity (Hankin et al., 1998). Current evidence lends support both to the existence of true gender difference (e.g. Piccinelli & Wilkinson, 2000) and to the possibility that artefactual determinants contribute to the observed difference (e.g. Sliverstein, 2002). There are also contradictory data on whether gender difference in the prevalence of depression is decreasing (Kessler et al., 1994) or increasing (Murphy et al., 2000) in recent birth cohorts.

4.3.4 Risk factors

A risk factor is defined as a variable or characteristic, which increases the likelihood of an individual developing a disorder compared with someone else without the risk factor (Kazdin et al., 1997). To investigate risk factors a prospective longitudinal design is needed, while in cross-sectional designs correlates or associations can be investigated (Kazdin et al., 1997). Major depression is a multifactorial disorder, and accumulation of risk factors carries a cumulative effect on the outcome (Kendler et al., 2002). Risk factors for major depression vary in some respects by age of onset. Reportedly, juvenile onset depression is more often associated with family history of mood disorders and severe and prolonged psychosocial disadvantage, while the risk factor profile of subjects with adult-onset would be closer to those never depressed (Jaffee et al., 2002). A recent review on biological studies also shows that there are differences in the biological dimensions of depression by age of onset and by the degree of family loading for depression (Kaufman et al., 2001).

The single best predictor for future adolescent depression appears to be family history of mood disorders. According to Beardslee (1998), by the age of 20 a child with an affectively ill parent has a 40% chance of experiencing an episode of major depression. Children of depressed parents are more likely to have early onset of affective illness and exhibit more severe episodes and lower levels of psychosocial functioning than those without a family history of mood disorders (Weissman et al., 1987; Lieb et al., 2002). Regarding the genetic risk, some diagnostic specificity exists (Rice et al., 2002). However, a wider spectrum of disorders, including anxiety, substance use and disruptive disorders, can also emerge as outcomes, and parental psychopathology other than depression also increases the risk for

depression in children (Kendler et al., 1997; Biederman et al. 2001; Lieb et al., 2002). Further, various behavioral measures such as poor communication or family conflict, marital discord and divorce and maladaptive parenting reportedly associate with depression (Fleming and Offord, 1990; Goodyer et al., 1997a; Sadowski et al., 1999). These patterns of behaviour are more prevalent in families with parental psychopathology, but also have an effect on the childhood development, which is independent of the parental illness status (Johnson et al., 2001). As the expression of genes varies by environment and genetic background may influence the sensitivity for environmental risk (Silberg et al., 1999), it is most likely that a complex combination of genetic and environmental factors mediates the relation between parental illness and child affective disorder.

Vulnerability for depression also arises from stressful life events (Lewinsohn et al., 1999; Goodyer et al., 2000a). Loss of a parent as well as neglect and abuse (Brown et al., 1999; Kendler et al., 2002) are predisposing factors for juvenile depression. Characteristics of both the adolescent and his or her environment moderate the impact of the life event. The capacity of an individual to cope with various stressors appear to be in fundamental role. This capacity is an outcome of multiple interacting factors including e.g. genetic background, functioning of the stress regulating and other neurophysiological circuits, attachment with primary caregivers, and character-related, and environmental factors (Essex et al., 2002; Newport et al., 2002; Sund & Wichström, 2002). The triggering effect of life events is suggested to be more significant in the first episode than in the recurring episodes of major depression (Lewinsohn et al., 1999). Neurophysiological sensitization or “kindling” (Post et al., 1992) resulting from repeated episodes may predispose to a more spontaneous onset of future episodes which is more independent of life events (Lewinsohn et al., 1999; Kendler et al., 2000).

Previous depression (Lewinsohn et al., 1993a; Goodyer et al., 2000b) or other early onset psychopathology (Rohde et al., 1991) can contribute to the risk of future depressive disorder in young people. Early physical illness (Lewinsohn et al., 1995; Reinherz et al., 1999) and conditions interfering with educational functioning may render a child vulnerable to depression (Lewinsohn et al., 1995). In addition, various character-related factors, e.g. low self-esteem (Palosaari & Aro, 1995; Reinherz et al., 1993), helplessness and excessive emotional reliance (Lewinsohn et al., 1994; Lewinsohn et al., 2000a), are suggested to increase the likelihood of depression.

4.4 Characteristics and consequences of depression

4.4.1 Symptom presentation

Studies investigating the symptom presentation of depression in young people are scarce. A clinical study by Carlson & Strober (1979) comparing the presenting symptoms between adolescents and adults from two different data bases found no major differences in the presentation of symptoms by age. Further, many symptoms considered typical of juvenile depression were also found in adults (Carlson & Strober, 1979). Mitchell et al. (1988) reported more frequent feelings of guilt, suicide attempts, somatic complaints, low self-esteem, and hallucinations in children and adolescents of their clinical sample compared to adults from another study group. This broadly concurred with a review by Carlson & Kashani (1988). Adolescents seem to have higher rates of suicidal behavior and possibly anhedonia, hopelessness and hypersomnia (Ryan et al., 1987; Mitchell et al., 1988; Cooper & Goodyer, 1993) when compared with prepubertal children. Children, on the other hand, report more symptoms of anxiety, somatic complaints (Ryan et al., 1987) and hallucinations (Mitchell et al., 1988) than adolescents.

Data on symptom presentation in the general population are extremely scarce but they accord with evidence from earlier clinical studies (Cooper & Goodyer, 1993; Roberts et al., 1995). Reportedly, the most prevalent symptoms in adolescent depression are depressed mood, anhedonia, concentration difficulties and sleep disturbance (Carlson & Strober, 1979; Inadmar et al., 1979; Strober et al., 1981; Ryan et al., 1987; Mitchell et al., 1988; Cooper & Goodyer, 1993; Roberts et al., 1995). In comparison with clinically referred youths, suicidality is less prevalent in the general population (Roberts et al., 1995). To our knowledge, there are no studies comparing different age groups outside clinical settings within the same study population.

Interpretations from these above-mentioned studies should be made with great caution as the number of studies is limited. There is considerable variation between different studies even within the same age group raising questions about the methods applied as well as generalizability of the results as data are mostly derived from clinical populations. Further,

symptom concordance between different episodes may also be low (Roberts et al., 1995). However, an important conclusion shared by previous research is, that the core diagnostic symptoms are present and identifiable in all age groups. Some of the symptoms earlier referred to as “depressive equivalent” symptoms are likely to be manifestations of other psychiatric disorders often co-existing with depression (e.g. behavioral problems, anxiety symptoms) (Welner, 1978; Ryan et al., 1987; Mitchell et al., 1988). There may be variation in the clinical picture by age but earlier research suggests that the variation only modifies the symptom frequency and the context in which symptoms emerge, not the existence of any particular symptom.

4.4.2 Impairment

Prevalence data from the general population surveys are facing credibility problems as the very lifetime estimates (up to 50%) of any psychiatric disorder difficult to interpret in terms of true morbidity or treatment need (Leeman et al., 1998). It has been suggested that this reflects problems of categorical diagnostic assessment in the general population surveys, and additional dimensional criteria increasing recognition of clinically meaningful entities have been called for (Bird et al., 1996; Harrington & Clark, 1998; Regier et al., 1998; Ezpeleta et al., 2001) although such dimensional data appears to be difficult to operationalize (Frances, 1998; Roberts et al., 1998). One way to approach the significance of symptoms and syndromes is to evaluate the extent of psychosocial impairment related to the illness. Comparisons between studies are difficult as the assessment of impairment and the presentation of the results are performed in a variety of ways (Roberts et al., 1998). The methods used vary, comprising measures of self-evaluated impairment and observer-rated impairment. Moreover, either overall impairment due to the psychiatric disorder or specific impairment in different domains (e.g. school, peers, family) may be estimated. The assessment of impairment is usually either included in the rating of diagnostic criteria or is determined by separate questions.

Epidemiological studies consistently report that the prevalence estimates are affected by the inclusion of the impairment criteria and most researchers report that the additional impairment criteria change the prevalence estimates markedly (e.g. Shaffer et al., 1996; Simonoff et al., 1997; Verhulst et al., 1997; Aalto-Setälä et al., 2001). Regarding depression, it has been

suggested that a proportion of community youths with an MDD diagnosis function relatively well (Shaffer et al., 1996; Verhulst et al., 1997), although several studies also report that most of them have significant levels of impairment (Bird et al., 1988; Lewinsohn et al., 1993a; Newman et al., 1996; Essau et al., 2000). Within the spectrum of psychiatric disorders, major depression reportedly belongs to the most impairing conditions (Newman et al., 1998; Wittchen et al., 1998; Bijl & Ravelli, 2000; Ezpeleta et al., 2001), and the burden of disease has been forecast to increase (Murray & Lopez, 1997).

Impairment and psychological symptoms have an independent and additive effect on functioning. Reportedly, impairment predicts treatment seeking as well as general outcome in follow-up studies regardless the psychiatric illness status, and psychiatric disorders accompanied with disability have poorer outcome than disorders without perceived impairment (Costello et al., 1996; Angold et al., 1999a; Oldehinkel et al., 1999). Moreover, the outcome of subthreshold symptoms is affected by degree of disability (Oldehinkel et al., 1999). It has been suggested that those impaired but undiagnosed represent a group of “false negatives” in terms of identified treatment need and that the assessment of impairment should also be included in diagnostic and clinical assessment (Angold et al., 1999a).

4.4.3 Course and outcome

Episode duration is an important measure of natural course and burden of disease but, so far, little is known about the length of the depressive episodes in the community regarding younger age groups. Reported estimates vary greatly from short (Cooper & Goodyer, 1993; Essau et al., 2000) to long episodes (Olsson & von Knorring, 1999; Oldehinkel et al., 1999). Earlier reviews conclude that the mean episode duration is between seven to nine months (Birmaher, 1996; Kovacs, 1996), but there is also evidence that in the general population shorter episodes of some weeks or a few months prevail (Lewinsohn et al., 1994; Kaminski & Garber, 2002). Recent research in the adult general population suggests that most major depressive episodes remit within six months, but that there is a considerable proportion of individuals (approximately 20%) whose depression is chronic lasting over 12 months (Spijker et al., 2002). Identifying factors which contribute to persistence or recovery could benefit the development of interventions. It has been suggested that early age of onset (Lewinsohn et al., 1994), older age at the time of the episode (Oldehinkel et al., 1999), severity of depression

(Lewinsohn et al, 1994; Oldehinkel et al., 1999; Spijker et al., 2002), comorbidity (Keller et al., 1988; Spijker et al. 2002), suicidal behavior and treatment seeking (Lewinsohn et al., 1994) are associated with longer episode duration.

Depression often runs a recurring course. Most adolescents with a depressive episode recover, but approximately half of them experience a new episode by young adulthood (Kovacs, 1996; Newman et al., 1996; Lewinsohn et al., 1999; Weissman et al., 1999). The risk of recurrence increases along with the number of episodes, and recurrence is associated with more severe episodes and poorer outcome than a single episode (Lewinsohn et al., 2000a). A significant minority of 5-10% develops chronic depression of several years (Birmaher, 1996). It has been suggested that half of adult depressions would have adolescent or childhood onset (Newman et al., 1998). The turnover rate to bipolar disorder is suggested to be in the range of 20-40% among clinically referred adolescents initially presenting with MDE (Kovacs et al., 1996), while much lower rates have been reported from community samples (Lewinsohn et al., 2000b).

Major depression in adolescence is also associated with anxiety disorders (Pine et al., 1998), suicidal behaviour (Weissman et al., 1999; Pelkonen & Marttunen, 2003), physical illness (Bardone et al., 1998), early pregnancy and problems in psychosocial and academic functioning (Reinherz et al., 1999; Rohde et al., 1994; Fergusson & Woodward, 2002), both later in adolescence and adulthood. Studies on depressed mood or symptoms of depression falling below the diagnostic threshold suggest that in a considerable proportion of young people depressed mood remains rather stable and that such persistent symptoms are associated with low psychosocial functioning and interpersonal difficulties (Gotlib et al., 1995; Garrison et al., 1989), poor somatic health (Rushton et al., 2002; Kandel & Davies, 1986), and future major depression, suicidality, anxiety and substance use disorders (Gotlib et al., 1995; Pine et al., 1999; Lewinsohn et al., 2000a; Aalto-Setälä et al., 2002b). Further, adolescence and young adulthood are characterised by various choices concerning e.g. education and family, and these choices may be affected by mood disorder.

4.5 Comorbidity

Comorbidity is defined as the co-occurrence of two or more distinct disorders in a person in a defined period of time (Klerman, 1990). It is established that disadvantage and psychosocial problems tend to accumulate and covary, and comorbidity has been criticised for being an artefact produced by the categorical diagnostic classification systems (Klerman, 1990; Caron & Rutter, 1991). Clarity of the concept has suffered from changing boundaries of diagnostic categories between different classification systems, e.g. ICD comprises a single category for “conduct disorder with depressed mood”, while DSM classifies “conduct disorder” and “depressive disorder” as two separate diagnoses. Further, different time periods (from current to lifetime) are applied. Strictly thinking, comorbidity refers to co-occurrence of clearly specified and distinct disease categories (Wittchen, 1996). Dimensionally thinking, however, comorbidity can also be seen as a way to define and systematically study pathways via which wider range disadvantage or psychosocial problems and psychiatric symptoms accumulate. This may have significance for nosology, hypotheses on etiology and choice of treatment interventions as observation and follow-up of co-occurring symptom patterns and disorders may help to redefine and clarify disorder entities (Caron & Rutter, 1991; Angold et al., 1999b). Therefore, when assessing comorbidity, dimensional data on symptom patterns and subthreshold conditions may also prove informative.

Attention to comorbidity in the field of adolescent psychiatry has increased steadily since the late 1980's, and there is evidence that the co-occurrence of several disorders in the same person happens more often than expected by chance (Caron & Rutter, 1991; Angold et al., 1999b). Comorbid depression is more of a rule than an exception: 40-80% of the young people with MDD also have at least one comorbid psychiatric disorder and 20-50% of these individuals have more than one comorbid disorders (Birmaher, 1996). The most common comorbid disorders are anxiety disorders (30-80%), disruptive disorders (30-80%) and substance use disorders (20-30%) (Anderson & McGee, 1994; Birmaher, 1996).

In comparison with “pure” depression, depression with comorbid disorders is more likely to persist (Goodyer et al., 1997b) and to be associated with suicidal behaviour (Marttunen et al., 1991; Lewinsohn et al., 1995) and significant psychosocial impairment (Lewinsohn et al., 1995; Newman et al., 1996; Wittchen et al., 1998). Young people with comorbid depression

seek treatment more often than those with “pure” depression (Fergusson et al., 1993; Lewinsohn et al., 1995; Aalto-Setälä et al., 2002c), but their psychosocial functioning often remains compromised (Pelkonen et al., 1997). Most comorbid disorders begin prior to depressive episode with the exception of substance use disorders, which are as likely to occur after the initial depressive episode as before it (Kessler et al., 1996; Rohde et al., 1996; Merikangas et al., 1998; Kandel et al., 1999; Rao et al., 2000).

4.6 Depression and substance use

The current or one-year prevalence of any alcohol or drug use disorder is estimated to be 2-6% in adolescents (Lewinsohn et al., 1993a; Cohen et al., 1993; Fergusson et al., 1993; Verhulst et al., 1997; Kandel et al., 1999) and 6-15% in young adults (Cohen et al., 1993; Regier et al., 1993; Perkonig et al., 1998). General population studies have reported frequent co-occurrence of psychiatric disorders and substance use both in young adults (e.g. Regier et al., 1993; Kessler et al., 1996) and adolescents (Boyle & Offord, 1991; Lewinsohn et al., 1993a; Feehan et al., 1994; Newman et al., 1996; Rohde et al., 1996; Wittchen et al., 1998; Chong et al., 1999; Costello et al., 1999; Kandel et al., 1999).

The suggested mechanisms underlying comorbidity between major depression and substance use comprise three main arguments (Brook et al., 2000): 1) There is a common vulnerability to both depression and substance use, suggesting that both conditions result from a common physiological and/or psychosocial etiological basis. 2) Substance use leads to depression, e.g. via its interference with physiological and emotional functioning. 3) Depression leads to substance use and increases vulnerability to substance use disorders drug use, e.g. being a way to cope with emotional distress. Co-occurrence does not imply causality and the described associations could be either direct effects of one factor to another or mediated by confounding or intervening factors. Pathways to use and abuse as well as the patterns and mechanisms of psychiatric comorbidity differ by substance used and by comorbid disorder.

4.6.1 Problems in measuring substance use in adolescents and young adults

The diagnostic criteria for substance abuse and dependence are designed for and derived from studies on adults. The diagnostic criteria comprise items on pathological use of the substance, indicators of social or occupational impairment and symptoms of tolerance or withdrawal (APA 1994, WHO, 1992). The persistent pattern of problem use is also required. There is evidence that current diagnostic criteria miss out a group of young people with impairing and deviant pattern of substance use (Harrison et al., 1998; Pollock & Martin, 1999). Little is known about the suitable measures to operationalize substance misuse in younger age groups in which experimenting is a rule and the time period for the diagnostic criteria of substance use disorder to have fully developed is relatively short.

Evidence suggests that patterns of substance use can be seen as a continuum, with levels below the diagnostic threshold also carrying a significant risk, especially in younger age groups (Rohde et al., 1996; Colder & Chassin, 1999; Pollock & Martin, 1999; Rohde et al., 2001). Lewinsohn and coworkers (1996a) reported that having just one symptom of abuse or dependence was extremely strongly associated with problem drinking among 14-17-year-old high school students. Different levels of substance use may have different predisposing factors. It appears that while peer and social factors have an effect on substance experimentation, a spectrum of individual and family level psychological and biological determinants influence the risk of abuse or dependence (Newcomb & Bentler, 1989; Colder & Chassin, 1999). Studies on comorbidity provide evidence on the existence of a meaningful continuum as the magnitude of comorbidity and related impairment appears to increase as the severity of substance use increases (Rohde et al., 1996; Kessler et al., 1996; Merikangas et al., 1998; Windle & Davies, 1999; Brook et al., 2000).

4.6.2 Cigarette smoking

According to Finnish school surveys approximately 80% of adolescents have tried cigarettes by the age of 18 (Ahlström et al., 1997; Rimpelä et al., 1999). Figures for regular smoking are around 12% for 14-year-olds (Rimpelä et al., 1999), 25% for 16-year-olds (Ahlström et al., 1997; Rimpelä et al., 1999) and 30% for 18-year-olds (Rimpelä et al., 1999), and an increase in adolescent female smoking has been noted (Rimpelä et al., 2002). In a general population health survey, a slightly lower smoking rate (approximately 20%) and a declining trend among the 15-24 year-old males in Finland has been reported (Helakorpi et al., 1999). According to a review by Bauman & Phongsavan (1999), these estimates correspond to the reports from other countries.

General population studies have reported significant associations between smoking and major depression among adolescents and young adults, and the prevalence of smoking is estimated to be twice or three times higher among depressed individuals than their non-depressed peers (Brown et al., 1996; Fergusson et al., 1996; Breslau et al., 1998; Nelson & Wittchen, 1998a). There seems to be an especially strong association between early onset of regular smoking, progression to nicotine dependence and juvenile-onset major depression (Fergusson et al., 1996; Breslau et al., 1998). The hypothesis of common vulnerability has gained some support (Kendler et al., 1993; Fergusson et al., 1996). It has also been suggested that depression makes an individual more vulnerable to nicotine dependence as nicotine may have enhanced addictive potential in depressed individuals via dopamine pathway (Balfour & Ridley, 2000; Moolchan et al., 2000). There is recent evidence contradicting both common vulnerability (Dierker et al., 2002) and direct causality (Ferguson et al., 2002), which points more towards the significance of confounding or intervening factors in the pathway.

4.6.3 Alcohol use

Most young people experiment with alcohol. Reportedly, the frequency of lifetime abstinence among adolescents is around 15% in 16-year-olds and 10% in 18-year-olds in Finland (Rimpelä et al., 1999). Youths with psychiatric disorders are more likely to proceed from experimenting to a deviant drinking pattern and to report a higher level of alcohol consumption and alcohol-related problems compared to their peers (Rohde et al., 1996; Rao et

al., 2000). Studies using diagnostic measures have concluded that 15-35% of adolescents with major depression have a co-occurring alcohol use disorder and that among those with a diagnosed alcohol use disorder 30-50% suffer from major depression (Lewinsohn et al., 1993a, Feehan et al., 1994; Newman et al., 1996; Rohde et al., 1996; Costello et al., 1999; Kandel et al., 1999). In a series of studies on adults (Merikangas et al., 1998) an average of 26% of those with alcohol dependence were diagnosed as having a lifetime history of any mood disorder. The NCS data concluded that 40% of those with a lifetime history of MDE had a history of a substance use disorder (Kessler et al., 1996). Although males reportedly drink more often and more alcohol by occasion (Lewinsohn et al., 1996a; Holly & Wittchen, 1998), the rates for comorbid depression and problem drinking are suggested to be rather similar for females and males (Rohde et al., 1996; Merikangas et al., 1998; Costello et al., 1999; Windle & Davies, 1999). The inconsistency of reports on the temporal sequence between depression and alcohol use disorders indicate that different mechanisms may act in different sequelae of comorbidity (Deykin et al., 1992; Rohde et al., 1996; Brook et al., 1998; Cohen et al., 1999).

4.6.4 Illicit drug use

The prevalence estimates of drug use vary greatly by country, but cannabis tends to be the most common drug used. Prevalence estimates generally vary between 1% to 20% and reaching 40% in the US followed by stimulants, hypnotics and sedatives and opiates around 1-10% each (Perkonig et al., 1998; Boyle & Offord, 1991; Gilvarry, 2000; Bauman & Phongsavan, 1999). Illicit drug use in Finland has escalated during the past few years but is still at low level internationally (Stakes, 2003). The association between experimenting with illicit drugs as well as regular drug use and depression is evident, while drug use is even more strongly related to alcohol use and conduct disorders, antisocial personality and comorbidity of multiple disorders than depression alone (Cohen et al., 1993; Lewinsohn et al., 1993a; Brook et al., 1998; Merikangas et al., 1998; Boyle & Offord, 1991). The pharmacological effects of drugs as predisposing factors for depression may be significant, as both regular drug use and drug dependence are more likely to precede mood disorder in young people than follow it (Merikangas et al., 1998; Brook et al., 2002).

4.7 Depression and physical health

4.7.1 Chronic illness

The point prevalence of any chronic medical condition in adolescence is estimated to vary between 5 and 20% depending on the definition applied (Rutter et al., 1970; Cadman et al., 1987; Berntsson & Kohler, 2001). The most common chronic diseases in young people are asthma and various allergies. Chronic medical conditions may produce symptoms resembling the symptoms of depression (e.g. loss of energy and changes in sleep and appetite), while unspecific or medically unexplained somatic complaints are common in adolescents suffering from depression (McCauley et al., 1991; Egger et al., 1999). Therefore, diagnostic interview is often needed for accurate classification (NHMRC, 1997). Identification of depressive disorder among patients with chronic illness has clinical implications, as studies from adult samples suggest that accompanying depression has maladaptive effects (Katon et al., 1990).

Data on the associations between physical and mental health have mainly been derived from adult populations. Most studies on the associations between physical illness and psychiatric disorders in adolescence have used symptom scales, and have been conducted in clinical populations among individuals with rare and severe conditions, e.g. cystic fibrosis, cardiopulmonary defects, cerebral palsy, cancer (Breslau, 1985; Lavinge & Faier-Routman, 1992; Bennet, 1994). These studies have varied in methods, and results regarding the prevalence of psychiatric disorders among those with chronic illness are inconsistent. There is more consistent evidence on social adjustment problems, lower self-esteem and body image concerns being more common among youths with disabling chronic illness than in their healthy peers (e.g. Breslau, 1985; Howe et al., 1993; Huurre et al., 2002). On the other hand, many young people with a physical illness do well especially in case of non-limiting diseases (Huurre et al., 2002). It has also been suggested that those with chronic conditions have lower rates of psychological symptoms than their physically healthy counterparts (Breslau et al., 1985).

General population studies on young people have seldom included both structured psychiatric interview and assessment of physical health in the same survey (Lewinsohn et al., 1996b), and

varying definitions of physical illness have been applied. Few studies have investigated associations between specific illness categories (e.g. migraine, atopic illness) and MDD (Cohen et al., 1998; Pine et al., 1996; Egger et al., 1998; Breslau et al., 1993). The Isle of Wight Study reported a prevalence of psychiatric disorders to be 17% among those with chronic medical condition vs. 7% among physically healthy children (Rutter et al., 1970). Lewinsohn and coworkers (1996b) estimated the point prevalence of MDD to be 8.5% among the physically healthy adolescents and 11.2% among those with any chronic physical illness and 22.2% in case of functionally impairing chronic illness.

It seems that specific characteristics of certain illnesses as well features common to various medical conditions contribute to the risk of depression, but it is not well known how different mechanisms interact (Burke & Elliott, 1999). Associations with psychiatric disorders have been suggested to vary by disorder (Lavinge & Faier-Routman, 1992; Bennett, 1994) and to be especially strong between neurological disorders or “diseases involving the brain”(Rutter et al., 1970; Breslau, 1985; Howe et al., 1993). Diseases causing functional disability reportedly increase the risk specifically for adolescent depression (Lewinsohn et al., 1996b), possibly via their effects on pubertal and psychosocial development, sense of continuity, body image, self-efficacy and self-esteem in young people (Bennett, 1994), but the direction and nature of causal relations remain to be further studied. Further, illnesses related to dysregulation of inflammatory response or the immune or neurotransmitter systems (e.g. migraine, allergies, asthma) have been linked with MDD (Breslau et al., 1993; Pine et al., 1996; Cohen et al., 1998) or with symptoms of depression (Bell et al., 1991; Hurwitz & Morgenstern, 1999). It could be hypothesized that one of the underlying common factors could be dysregulation of the stress moderating systems including sympathetic-adrenal-medullary system and hypothalamic-pituitary-adrenal axis (Marshall, 1993; Cohen & Rodriguez, 1995), but more research is needed to reveal the mechanisms of the comorbidity.

4.7.2 Disability, sick-days, and self-rated health

Chronic physical illness accompanied with disability relates more strongly to psychiatric disorders (Cadman et al., 1987; Lewinsohn et al., 1996b) as well as to various social problems such as isolation, peer and academic problems and low competence than chronic illness alone (Cadman et al., 1987; Howe et al., 1993). Where depression and chronic illness co-occur they

have independent and additive effects on disability (Klerman , 1989; Ormel et al., 1994; Armenian et al., 1998; Druss et al., 2000a), and there is a dose-response relationship between severity of mental illness and functional disability when controlled for physical illness (Ormel et al., 1994). Rates of health care use are higher among those with disabling chronic illness, and the use of services is most frequent in case of comorbid disabling physical illness and psychiatric disorder (Cadman et al, 1987; Klerman , 1989). Depression is among the most disabling diseases, contributing to a high number of sick days and disability pensions (Bijl & Ravelli, 2000; Klerman, 1989; Isometsä et al., 2000) in working age adults. Such analyses in adolescent epidemiological surveys are more scarce. Existing data on adolescents suggests that frequent absenteeism or sick-days may signal e.g. poor coping with chronic illness, depression, substance use or family dysfunction (Weitzman et al., 1982) and that major depression especially is related to a higher number of sick days (Glier & Pine, 2002) the association being stronger if a physical illness accompanies depression (Egger et al., 1998).

It has been evidenced in adult populations that one of the best predictors various health outcome measures (e.g. health care use, mortality) is the respondent's own perception of overall health (e.g. Fylkesnes, 1993; Idler & Benyamini 1997). Perception of health is related to symptoms of both mental and physical illness, but it is also significantly attributable to other factors such as overall well-being and sense of functioning, self-esteem, school achievement, and socioeconomic status (Vinglis et al., 1998). Although less studied in the context of adolescent psychiatric epidemiology, associations between internalizing disorders and perception of health have been reported (Kandel & Davies, 1986; Feehan et al., 1994; Lewinsohn et al., 1996b). Among those with chronic illness, perception of disease severity reportedly relates to depression and low self esteem (Leung et al., 1997).

4.8 Depression and health care use

4.8.1 Problems in defining treatment need

As the prevalence estimates for psychiatric disorders vary greatly between studies it is difficult to estimate what the “true” prevalence might be (Regier et al., 1998). Estimating the proportion of individuals in need for treatment in the community is even more difficult, as operationalization of treatment need in the general population studies remains an unresolved

issue (Frances, 1998; Spitzer, 1998; Regier, 2000; Wakefield & Spitzer, 2002). There is ample evidence that not all individuals meeting the diagnostic criteria for a psychiatric disorder seek help or are in need for treatment (e.g. Goodman et al., 1997; Kessler & Walters, 1998; Regier et al., 1998). Researchers from the two large US surveys, namely the Epidemiologic Catchment Area (ECA) and the National Comorbidity Survey (NCS), have recently re-evaluated their prevalence estimates by including the criteria for treatment need. This re-evaluation led to the lowering of the estimates by the average of 30% in the NCS using the CIDI interview, and by 17% in the ECA applying the DIS interview (Narrow et al., 2002). Moreover, many people with symptoms falling below the diagnostic threshold are impaired and refer themselves to treatment (Bird et al., 1996; Leaf et al., 1996; Angold et al., 1999a). Thus, diagnostic criteria, perceived need and actual service use are not always closely related. In young people this issue is further complicated, as children and younger adolescents seldom make the decision to seek treatment themselves because adults often make the decision for them. In light of existing epidemiological data there is no uniform, widely accepted way to identify treatment need in the general population.

4.8.2 Help-seeking

Various cultural factors and attitudes influence the process of help-seeking (Rogler & Cortez, 1993; Angermeyer et al., 1999). It is likely that characteristics of the person offering help as well as many characteristics of adolescent and his or her family affect adolescent service use more than severity of psychopathology. Most adolescents prefer friends or family if they are to confide to someone about their emotional problems (Offer et al., 1991; Gould et al., 2002). However, health care professionals, social workers as well as school personnel are considered helpful by a great majority of youths (Dubow et al., 1990; Offer et al., 1991), while many young people may be unaware of the official helping agencies (Dubow et al., 1990). For many younger adolescents school services represent the only contact to health care (Burns et al., 1995; Leaf et al., 1996; Wu et al., 1999), and the use of school services is suggested to be less influenced by demographic or parental factors and to be an easier access to adolescents than many other helping agencies (Wu et al., 1999; Angold et al., 2002). Confidentiality and low threshold for treatment are highly appreciated by adolescents (Dubow et al., 1990). Disturbed youths, in contrast with their non-disturbed peers, turn more often to their friends for help than to their parents or other adults (Offer et al., 1991; Gould et al., 2002), but those

confining to their parents are more likely to obtain professional help than those who only talk to their peers (Saunders et al., 1994). Females are more likely to seek treatment in adolescence and in adulthood, while boys are equally or even more prevalent in child psychiatric settings (McGee et al., 1990; Laitinen-Krispijn et al., 1999).

Earlier studies show that disturbed children and adolescents report a greater number of physical health problems and use general practice services more often than their peers (Saunders et al., 1994; Gasquet et al., 1997). However, it seems that the youths themselves do not necessarily discuss their mental health problems with the physician, and the underlying psychosocial problems and symptoms of psychiatric disorders may often go unrecognized (Druss & Pincus, 2000; Cohen et al., 1991). Reportedly, even in case of suicide attempt contacts with psychiatric care are rare (Marttunen et al., 1992; Lewinsohn et al., 1998).

So far, information on adolescents' help-seeking behavior is largely gained from studies using self-reports in defining depression, or from studies not specifically assessing the role depression in help-seeking but assessing a wider range of psychosocial problems. The pathways to service use vary somewhat by diagnosis (Whitaker et al., 1990; Cohen et al., 1991; Newman et al., 1996; Kessler et al., 1998a; Wittchen et al., 1998). Although depression leads to service use more often than many other juvenile disorders (Newman et al., 1998; Wittchen et al., 1998), it appears that many youths suffering from major depression do not receive help (e.g. Aalto-Setälä et al., 2001; Whitaker et al., 1990; Newman et al., 1996; Kessler & Walters, 1998; Wittchen et al., 1998; Flament et al., 2001). Underrecognition and undertreatment of depression also exists in adult populations (Lehtinen & Joukamaa, 1994; Hirschfeld et al., 1997). The earlier the onset of a disorder the longer is the delay in treatment referral (Kessler et al., 1998a). Longer episode or illness duration (Lewinsohn et al., 1994; Newman et al., 1996; Logan & King, 2002) as well as recurrence (Wittchen et al., 1998) and severity of depressive episode (Wu et al., 2001) and comorbidity (Lewinsohn et al., 1998; Wittchen et al., 1998; Wu et al., 1999; Aalto-Setälä et al., 2001) increase the likelihood of treatment use. Impairment in various domains of functioning is related to perceived need and use of health services (Wu et al., 1999).

In younger age groups, identification of need for psychiatric care and actual service use is influenced by many parental and family factors. Parental identification of the depressive symptoms as well as perceived family burden are major determinants of adolescent service

use (Angold et al., 1998; Wu et al., 1999; Logan & King, 2002). Adults are more likely to perceive treatment need in children and adolescents with disruptive disorders than with depression (Feehan et al., 1994; Wu et al., 1999), and many symptoms of depression go unrecognized by adults (Rutter et al., 1976a; Fleming & Offord, 1990; Feehan et al., 1994). Parents may also be unaware of suicidal ideation or suicidal attempts of their children (Marttunen et al., 1992). Treatment need is recognized more easily if comorbid externalizing disorder co-occurs with depression (Goodman et al., 1997; Logan & King, 2002), while comorbid disorders may also hamper recognition of depression itself. Adolescents themselves identify service need more easily if they have depression in comparison with externalizing symptoms (Wu et al., 1999). Furthermore, adult's own depressive illness increases the recognition of child's depressive symptoms, although this does not necessarily lead to actual service use (Logan & King, 2002).

4.8.3 Use of antidepressant medication

Research shows that the frequency of antidepressant use for adolescent depression was very low by the end of 1990's but has been rising in past few years (Zito & Safer, 2001; Olfson et al., 2002; Sourander et al., 2002). Less than one third of community adolescents with major depression have reportedly used antidepressant medication (Newman et al., 1996; Lewinsohn et al., 1998; Druss et al., 2000c; Wu et al., 2001). Characteristics related to antidepressant use are severity of depression or suicidality, comorbidity and psychotic symptoms (Wu et al., 2001).

4.9 Treatment

Although there is accumulating evidence that adolescent depression is treatable, treatments available have been studied surprisingly little so far. Treatment appears to shorten the depressive episode, improve psychosocial functioning, and possibly reduce the risk of recurrence (Birmaher, 1996; AACAP, 1998; Lewinsohn et al., 1998). Studies assessing the prevalence of adolescent health care use have seldom addressed the characteristics of treatment actually received. Lewinsohn et al. (1998b) reported that most young service users have a very low numbers of treatment session. High rates of drop out (Pelkonen et al., 2000)

as well as low estimates of guideline-concordant treatments (Strober et al., 1998; Wang et al., 2000) have been reported.

Most evidence regarding psychotherapy of depression in young people relates to cognitive or interpersonal psychotherapy. Cognitive therapy has been shown to be effective in mild to moderate depressive disorder, but there is less evidence on its efficacy as the sole treatment of severe depressive disorder (Brent et al., 1997; Brent et al., 1998; Harrington et al., 1998). Interpersonal therapy is likewise effective in the treatment of depression (Mufson & Fairbanks, 1996). Less research has been conducted on the efficacy of family therapy or psychodynamic therapy in adolescents, although they are widely applied in treatment settings (Curry, 2001; Cotrell & Boston, 2002). No specific intervention has been described as effective to treat depression in the physically ill adolescents, but cognitive approach and interventions improving family coping have been recommended (NMHRC, 1997). As depressive disorders are often characterised by difficulties in school work and interpersonal relationships, psychoeducation and psychosocial support (e.g. arrangements both at school and at home) is included in the treatment of depression, despite the scarcity of empirical research on the efficacy of such supportive measures (AACAP, 1998; NMHRC, 1997).

Antidepressant medication is recommended in psychotic or otherwise severe depression, and if depression is recurrent or does not respond to other treatment (AACAP, 1998; NMHRC, 1997). Pharmacotherapy should always be conducted in adjunction with other treatment. Serotonin-selective reuptake inhibitor (SSRI) medication is considered the first line treatment in adolescent depression (Ryan, 2002), although randomized, controlled antidepressant trials among adolescents have been infrequent (Emslie et al., 1997; Emslie et al., 2002; Keller et al., 2001). Data on the efficacy of TCAs in adolescents are lacking and their side effects profile appears to be unfavourable in comparison with SSRIs (Hazell et al., 1995). Novel antidepressants, such as venlafaxine and mirtazapine, remain to be studied but are already used in clinical practice (Ryan, 2002). ECT may be beneficial in psychotic depression (NMHRC, 1997).

4.10 Prevention

Prevention is commonly divided into three levels of preventive activities (Harrington & Clark, 1998): 1) primary prevention or activities aimed at the whole population to reduce the incidence of the disease, 2) secondary prevention or recognition and treatment of those already ill, and 3) tertiary prevention or maintenance treatments provided to minimize the risk of recurrence and additional morbidity. According to current data base there are no specific enough risk factors suitable for primary prevention at the general population level. Unspecific measures targeted against social disadvantage and measures supporting parenting and child development can be considered as preventive methods for adolescent depression as well as other psychosocial problems. Educating citizens to recognize the symptoms of depression and to reduce the stigma related to mental disorders in general may enhance early treatment seeking. To avoid doing harm, such education should be conducted on a rather general level, omitting detailed data on suicidal behavior (Harrington & Clark, 1998).

There is accumulating evidence that prevention targeted to high risk groups can reduce the risk of future major depressive episode. Three major prevention programs have been introduced: 1) individual (Clarke et al., 1995) and group (Clarke et al., 2001) cognitive intervention for adolescents with depressive symptoms below the diagnostic threshold, 2) school-based program assessing cognitive style and social skills (Jaycox et al., 1994), and 3) family-based cognitively oriented program focusing on the children of depressed parents (Beardslee et al., 1998).

Clinicians should be trained to recognize and treat depression in young people, and more research is needed to develop all phases of care from acute to continuation treatment. On an individual level, vigorous treatment of depression may reduce the risk of suicidal behavior (Pelkonen & Marttunen, 2003). Sufficient follow-up for 6 to 12 months after recovery is recommended to prevent recurrence, and educating patients as well as their families may improve early recognition of recurring symptoms and subsequent help-seeking (AACAP, 1998; NHMRC, 1997). Treatment may also avert the development of comorbid disorders emerging as complications of depression, and treatment of other disorders may reduce the risk of subsequent depression (Harrington & Clark 1998; Kessler et al., 1996).

4.11 Summary of the reviewed literature

Epidemiological research in adolescent psychiatry has developed fast during the past two decades, generating valuable data about psychiatric disorders during adolescence and young adulthood. The development of research paradigm towards common diagnostic criteria and definitions of psychiatric disorders in youths has contributed to the better comparability of the studies. Basic information on the prevalence and characteristics of depression is slowly accumulating, although there remains a great variance in the methods and, consequently, results and conclusions obtained from the general population surveys.

In the light of current evidence, depressive disorders in adolescents and young adults appear to be relatively common. Considering the rather high prevalence estimates, together with the reported long-term consequences, depression should be approached as a public health problem already in young people. Major issues not sufficiently studied so far are interrelations of major depression and other aspects of health and health behavior among those depressed early in life. Depression seems to accumulate with other severe problems in terms of both physical and mental health. While the importance of psychiatric comorbidity has already been acknowledged, the clustering of chronic illness and risky health habits among depressed youths has so far been neglected by most general population psychiatric surveys. Further, little is known about the ways to measure comorbidity in a dimensional way, which does more than merely investigates categorical diagnoses or measures of behavior.

Analyses on psychiatric service use for depression comprise an important field of epidemiological research given existing reports on the underrecognition and delayed treatment of depression. Few studies using diagnostic interviews have assessed service use among depressed youths, and even more scarce are research data on the quality of treatment received. Further, surprisingly little is known about “what works for whom”.

Table 1. Epidemiological studies on the prevalence of psychiatric disorders on adolescents (12-21- year-olds).

Reference	Study population	N	Age (years)	Interview method and source of information	Diagnostic criteria	The prevalence of any psychiatric disorder (%)	The prevalence of major depression (%)	Timeframe
Rutter et al. 1976a	Random sample The Isle of Wight	2303	14-15	Clinical interview Adolescent, parent	Rutter	21	-	Current
Kashani et al. 1987a, b	Random sample, School population	150	14-16	DICA, Adolescent, parent	DSM-III, impairment criteria	18,7; m 16,0; f 21,3	4,7	Current
Levy and Deykin 1989	Random sample	424	14-16	DIS, Adolescent	DSM-III	-	8,5; m 5,2; f 10,3	Lifetime
Velez et al. 1989	Random sample	456	15-20	DISC, Adolescent, parent	DSM-III-R, severity criteria	16,0	3,1	Current
McGee et al. 1990	Birth cohort v. 1972- 73	943	15	DISC, Adolescent parent	DSM-III-R, impairment criteria	22,0; m 18,2; f 25,9	1,2 1,9	Current 12 months
Garrison et al. 1992	Stratified sample School population	488	12-14	K-SADS, Adolescent, parent	DSM-III, impairment criteria	-	a: m 4.7; f 7.2 a and p: m 9.0; f 8.9	12 months
Fergusson et al. 1993	Birth cohort v. 1977	961	15	DISC, Adolescent, parent	DSM-III-R	a: 22,1 pP:13,0	a: 0,7 p: 0,5 a: 4,2 p: 2,2	Current 12 months
Reinherz et al. 1993	Stratified sample	386	mean 17.9	DIS, Adolescent	DSM-III-R	- - 49,1	2,9 6,0 9,4 ; m 5,1; f 13,7	1 month 6 months Lifetime
Lewinsohn et al. 1993a	Random sample School population	1710	14-18	K-SADS, Adolescent	DSM-III-R	9,6; m 7,8; f 11,2 37,1; m 31,6; f 42,1	2,6; m 1,7; f 3,4 18,5; m 11,6; f 24,8	Current Lifetime
Cohen et al. 1993	Stratified sample	I: 508 II: 446	I: 14-16 II: 17-20	DISC, Adolescent, parent	DSM-III-R	- -	I: 4,7; m 1,6; f 7,6 II:2,7; m 2,7; f 2,7	Current Current

Feehan et al. 1994	Birth cohort v. 1972-73	930	18	DIS, Adolescent	DSM-III-R, impairment criteria	36,6; m 31,1; f 42,3	16,7; m 12,0; f 21,8	12 months
Gomez-Benyeto et al. 1994	Stratified sample	107	15	K-SADS, Adolescent	DSM-III-R, impairment criteria	13,6; m 10,8; f 16,3	2,5	Current
Newman et al. 1996	Birth cohort v. 1972- 73	961	21	DIS, Adolescent	DSM-III-R	40,4; m 38,6; f 42,4	16,8; m 11,2; f 22,6	12 months
Verhulst et al. 1997	Stratified sample	780	13-18	DISC, Adolescent, parent	DSM-III-R, impairment criteria	a: 21,5 p: 21,8 a or p: 35,5 a and p : 4,0	a : 2,8 p: 1,3 a or p: 3,6 a and p : 0,4	6 months
Olsson & von Knorring , 1999	Stratified sample School population	251	16-17	DICA, Adolescent	DSM-III-R	- -	5,8; m 2,3; f 9,2 11,4; m 4,2; f 17,7	12 months Lifetime
Oldehinkel et al. 1999	Random sample	1228	14-17	M-CIDI, Adolescent	DSM-IV	- -	3,4; m 2,4; f 4,5 6,7; m 5,4; f 8,0	12 months Lifetime
Essau et al. 2000	Random sample School population	1035	12-17	M-CIDI Adolescent	DSM-IV	-	14,0; m10,7; f 16,3	Lifetime

f= females, m = males, a= adolescent's estimate, p= parent's estimate

Table 2. Epidemiological studies on the prevalence of psychiatric disorders on mixed child- adolescent and adolescent-young adult populations.

Reference	Study population	N	Age, years	Interview method and source of information	Diagnostic criteria	The prevalence of any psychiatric disorders (%)	The prevalence of major depression (%)	Timeframe
Bird et al. 1988	Stratified sample	386	4-16	DISC, clinical interview Adolescent, mother, teacher	DSM-III-R, impairment criteria	A and p,: 33,9	8,7	6 months
Jensen et al. 1995	Stratified sample (military)	104	6-17	DISC, Adolescent, parent	DSM-III-R, impairment criteria	A: 13,6 p: 24,4 A or p: 40,8	A: 2,8 p: 1,9 A or p: 4,3	6 months
Costello et al. 1996	Stratified sample	1015	9-13	CAPA, Adolescent, parent	DSM-III-R, impairment criteria	A or p: 20,3, m 24,8; f 15,5	A or p: 0,03	3 months
Shaffer et al. 1996	Random sample	1285	9-17	DISC, Adolescent, parent	DSM-III-R, impairment criteria	A: 26,3 p: 20,6 A or p: 39,4	A: 3,1 p: 4,8 A or p: 7,1	6 months
Steinhausen et al. 1998	Stratified sample	379	7-16	DISC, Adolescent, parent	DSM-III-R	A or/and p: 22,5	A and/or p: 0,66	6 months
Simonoff et al. 1999	Twin study	2762	8-16	CAPA, Adolescent, parent	DSM-III-R, impairment criteria	A or p: 14,2	A or p : 1,2	3 months
Canino et al. 1987	Stratified sample	295	18-24	DIS, Adolescent	DSM-III	10,2 18,5	2,6 3,6	6 months Lifetime
Regier et al. 1993	Random sample	2256	18-24	DIS, Adolescent	DSM-III	16,9	2,2	Current
Kessler & Walters 1998	Random sample	2000	15-24	UM-CIDI, Adolescent	DSM-III-R	-	6,1; m 4,3; f 8,2 15,7; m 11,0; f 20,8	Current Lifetime
Wittchen et al. 1998	Random sample	3021	14-24	M-CIDI, Adolescent	DSM-IV	- 39,0; m 34,0; f 33,0	5,3; m 3,3; f 7,2 11,8; m 9,1; f 14,5	12 months Lifetime
Aalto-Setälä et al. 2001	Stratified sample School population	245	20-24	SCAN Adolescent	DSM-IV	22.2; m 18.1; f 24.7	6.9; m 5.4; f 7.8	Current

f= females, m = males, a= adolescent's estimate, p= parent's estimate

5. AIMS OF THE STUDY

The general aim of this thesis was to analyze characteristics and selected general health correlates of depression in two developmentally different age groups, adolescents (15-19 years) and young adults (20-24 years).

The specific aims of the study were:

- I To estimate the 12- month and symptom prevalence of the major depressive episode (MDE), and to analyze its characteristics (impairment, severity, duration).
- II To analyze selected correlates for MDE in adolescents and young adults. Of special interest were associations between MDE and use of alcohol and cigarette smoking.
- III To investigate associations between MDE and chronic illness in young people.
- IV To analyze patterns of health care use related to MDE.

6. SUBJECTS AND METHODS

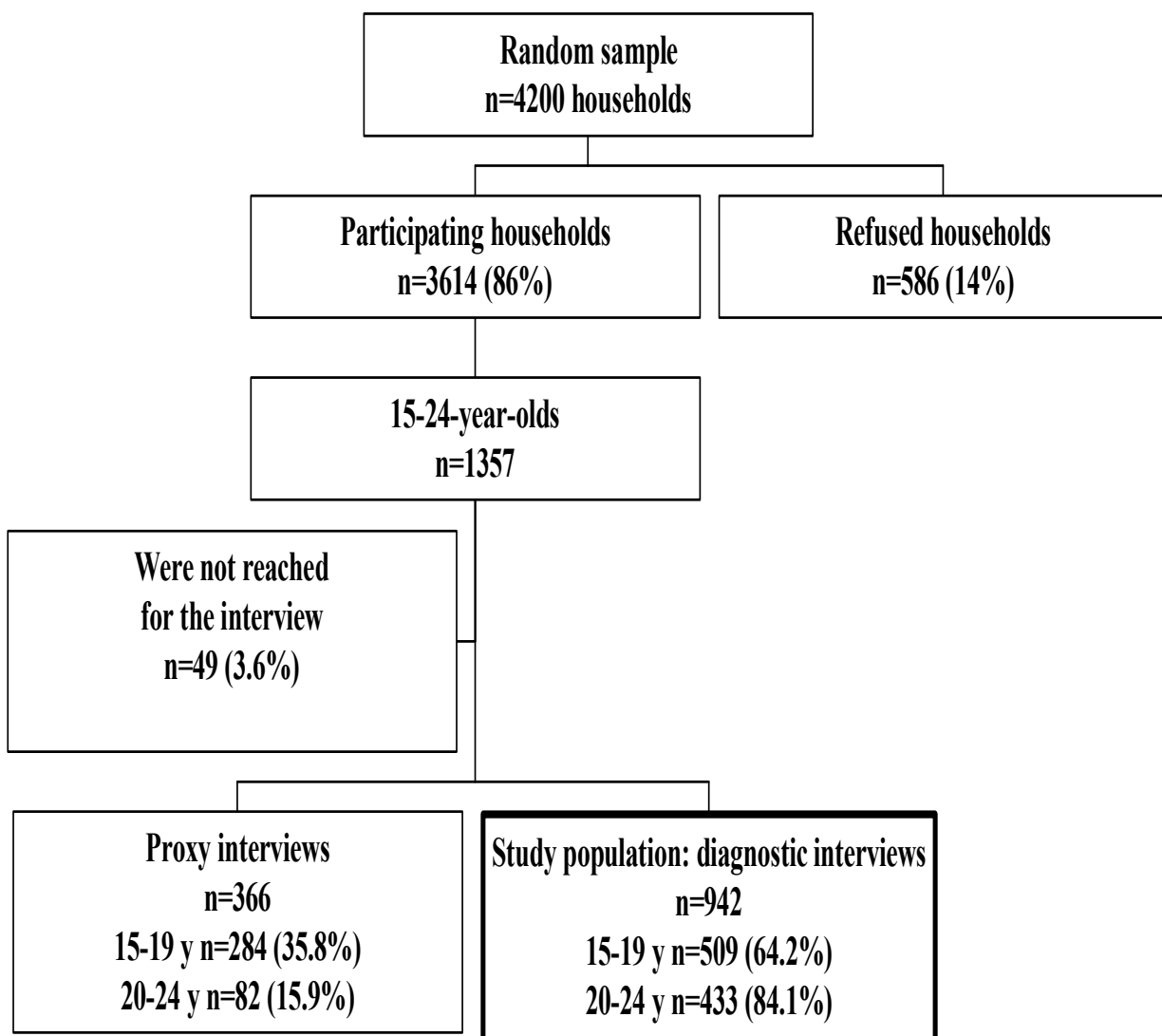
6.1 Subjects

This study forms part of the Finnish Health Care Survey (FINHCS) (Arinen et al., 1998; Lindeman et al., 2000; Lindeman et al., 2001; Hämäläinen et al., 2001; Laukkala et al., 2001). The design was a one-stage cluster-sampling in which households formed the clusters. Households were selected by first drawing a random sample of reference persons from the population register. A household was defined as married or cohabiting persons living permanently in the same dwelling: their parents and unmarried children were included if they, too, lived there and shared living costs. One-person households were also included, while institutionalized persons were excluded. The members of the household of each reference person were identified from the population register. The household participation rate of completed interviews was 86% (3614 of 4200 households) (Lindeman et al., 2000). The diagnostic interview on MDE, which was included in the FINHCS in 1996, was given to 5993 persons (82.2% of the original sample) aged 15-75 years. Data on absent household members were collected by proxy interviews, i.e. another member of the household answered on behalf of the identified participant himself. In this age group the usual proxy respondent was one of the parents. The diagnostic data on MDE could not be gathered by proxy method and was only assessed in personal interviews. All subjects were fully informed, and gave formal verbal consent in accordance with the Personal Data File Act.

The FINHCS '96 sample is closely comparable with the entire Finnish population (Lindeman et al., 2000). The present study is a cross-sectional survey focusing on depression in adolescents and young adults. Non-institutionalized 15-19- and 20-24- year-old inhabitants of Finland in 1996 formed the basic target population of the present study (Figure 1). The participating households included 1357 15-24-year-olds, of whom 29 (2.1%) refused to participate and 20 (1.5%) were not reached or otherwise could not be interviewed. Interview data, including both personal and proxy interviews, were collected on total of 792 adolescents (401 males, 391 females) and 515 young adults (272 males, 243 females). Subjects with proxy data were excluded from the present study and only subjects who had been personally interviewed and thus had diagnostic data on MDE were included. Proxy interviews were done for 283 adolescents (35.7%) and 83 young adults (16.1%) ($p < 0.001$), more frequently among

males than females both among 15-19-year-olds (n= 173, 43.1% vs. n= 110, 28.1%, p<0.001) and 20-24-year-olds (n= 63, 23.2% vs. n=20, 7.8%, p<0.001) (Figure 1). There were no other statistically significant differences in sociodemographics. The prevalence of chronic illness (proxy interviews 23.4% vs. personal interviews 23.0%, p=0.889) and frequency of service use for physical illness (proxy interviews 46.2% vs. personal interviews 46.7%, p=0.857) were independent of the interview status. The final sample thus consisted of 509 adolescents (281 females, 228 males) and 433 (224 females, 209 males) young adults. The study sample was demographically representative of the corresponding age groups in the general population (I: Table 1).

Figure 1. Flow chart of The FINHCS '96 sample.



6.2 Diagnostic interview

Professional interviewers employed by Statistics Finland and trained in the survey conducted the interviews between April 5th and June 21st, 1996. The data were collected by the Computer Assisted Personal Interviewing (CAPI) technique. The University of Michigan Composite International Diagnostic Interview Short-Form (UM-CIDI SF) (Kessler et al., 1998b) was used to generate a probability diagnosis of DSM-III-R MDE during the preceding 12-month period. UM-CIDI is a modification of the Composite International Diagnostic Interview (CIDI) (WHO, 1990), a structured diagnostic interview designed for use in general population samples by trained interviewers who are not clinicians. In WHO field trials CIDI has had good interrater reliability, test-retest reliability and validity in most diagnostic categories, including affective disorders (Wittchen et al., 1994b). Studies of reliability and validity of UM-CIDI have been conducted (Kessler et al., 1998b), and calculating from the data provided by Blazer and coworkers (1994) the estimates were 0.7 for sensitivity and 0.8 for specificity for the MDE section.

To produce the UM-CIDI SF a subsample of respondents endorsing the CIDI diagnostic stem questions in the NCS has been studied, and the short form items for an optimal algorithm to predict reproduction of full CIDI diagnoses thereby selected (Kessler et al., 1998b). One stem question on the intensity of depressed mood was added to operationalize persistence of depressive symptoms (Kessler et al., 1998b). Psychomotor disturbance is not assessed, and the total number of diagnostic symptoms to be endorsed in UM-CIDI SF is eight, differing from the total of nine items in DSM-III-R. Duration of the depressive episode was assessed in the diagnostic interview. An item on psychosocial impairment (severe, moderate, mild, none) was included.

According to the diagnostic algorithm of UM-CIDI SF the diagnosis of MDE was determined by the presence of depressed mood or anhedonia for at least two weeks and most times of day, plus at least two additional symptoms of depression (unpublished memo by Kessler and Mroszack, 1998; Kessler et al., 1998b). With increasing number of symptoms required for the diagnosis the probability of caseness increases (Kessler et al., 1998b) but the price of this would most likely be the misclassification of the milder major depression cases commonly encountered in community. Existing data on SF scales suggest that diagnostic classification of

CIDI can be reproduced with moderate to excellent accuracy with the MDE Short-Form. Kessler et al. (1998b) report sensitivity of 89.6%, specificity of 93.9% and overall classification accuracy of 93.2% when cut-point of five symptoms is applied. An external study comparing the accuracy of the Finnish translation of UM-CIDI-SF to a semistructured clinical interview (Schedules for Clinical Assessment of Neuropsychiatry, SCAN) was also conducted in a sample of young adults and the results show satisfactory specificity (Aalto-Setälä et al., 2002a).

6.3 Classification of measures

6.3.1 Sociodemographic variables

Age was defined as age by the end of the study year. For the purpose of comparing the characteristics of MDE between two developmentally different age groups the study population was divided into two categories: adolescents (15-19 years) and young adults (20-24 years). Region of residence was defined according to the division of the 12 Finnish provinces at the time of the study and division to northern, eastern, southern and western Finland and Greater Helsinki Area was performed (Arinen et al., 1998). In data analyses, Greater Helsinki Area was combined with southern Finland, both regions being characterised by high degree of urbanisation and migration into the area, and was contrasted with the rest of the country. Communities were defined as 0= rural and 1= semi-urban or urban based on the population statistics provided by Statistics Finland.

The highest level of completed education was classified as follows: 1= ongoing basic education, 2 = basic education completed (9 years), 3= high school graduate (12 years), 4= vocational school graduate, and 5= other. Employment status and present schooling was noted and a variable differentiating those who are either full-time students or working from those who are neither studying nor working was formed (0=working or attending school, 1= not working, not in school). Marital status was defined as 0=married or cohabiting, 1= not married, nor cohabiting. The socioeconomic status was only assessed on the household level and as the composition of households varies enormously within these age groups without truly differentiating between socioeconomic categories, this variable was not included in the data analyses.

6.3.2 Substance use

Substance use was assessed by six questions concerning alcohol consumption and cigarette smoking. All the interviewees were asked how often (once a day / once a week, 2-3 times a month / once a month, never) they drank alcohol and how often (once a week / 2-3 times a month / once a month, never) they drank until drunkenness. The items on alcohol use were combined into a categorical variable “frequency of drunkenness” (0= never drinks alcohol, drinks alcohol but never to drunkenness, 1= drunkenness once a month or less, 2= drunkenness at least twice a month,).

Information on lifetime and current smoking and the number of cigarettes smoked daily was gathered. The variable for smoking was dichotomized: 1=currently smokes more than 10 cigarettes per day, 0= no or occasional smoking.

6.3.3 Chronic illness, disability and self-perceived health

The assessment of physical health was based on interview and preceded the diagnostic interview for MDE. All persons were asked to name any chronic or otherwise disabling medical condition lasting at least three months (“any chronic illness”). Further, it was asked whether these diagnoses were diagnosed by a physician and a dichotomized measure “diagnosed chronic illness” was formed (1= doctor-diagnosed chronic illness, 0= no defined diagnosis, no chronic illness). The degree of disability was assessed (a lot / somewhat / a little / not at all) and dichotomised (0= no disability, 1= any disability) and combined with data on chronic illness (“disabling chronic illness”: 1= chronic illness with disability, 0= no disability or no chronic illness). Distinct categories were formed for the most common medical conditions with a doctor-defined diagnosis (e.g. respiratory allergies including asthma and hayfever or allergic rhinitis, other allergies, neurological disorders, musculoskeletal illness, metabolic diseases, dermatological disorders).

Self-perceived health was rated and dichotomized (0= good, rather good, 1= moderate, rather poor, poor). Data on number of days absent from school or work due to physical illness in 1996 (“sick-days during the past six months”) were collected. The frequency of physical

exercise lasting at least 30 minutes was recorded (daily / two to five times a week / once a week / twice or three times a month / once a month or less / never) and a variable “frequency of exercise” was formed (0=daily, 1= twice a week to twice a month, 2=once a month or less often). Body mass index (BMI) was calculated from self-reported height (m to closest cm) and weight (kg) as wt/ht^2 .

6.3.4 Service use

All the respondents were asked about health care use for any physical illness as well as any mental health problem in 1996 until the time of the interview (“recent use of services for physical illness / for mental health problems”). Data on use of medication was also gathered (“recent use of medication”). Moreover, those with diagnosis of MDE (n=68) were asked about referrals to health care because of depression during the past 12 months. Service providers were classified as primary care (health care center, general practitioner), psychiatric care (psychologists, psychiatric outpatient clinic, private psychiatrist, psychiatric hospital), and other service. Perception of received help (sufficient / some / none) and need for help (definite/ possible / none) were noted regarding service use for any mental health problem and MDE.

6.4 Data analyses

To adjust for differential participation rates the subjects were post-stratified and then weighted by age, sex, and region of residence (Lindeman et al., 2000). The statistical analyses were computed by using Stata 6.0 software (Stata, 1999), which takes into account the cluster sampling method, i.e. the possibility that there are multiple respondents from the same household, and weighting procedure. Some preliminary analyses and descriptive statistics were computed by SPSS 9.0 (SPSS, 1999) without taking weighting into account (study I). Of the descriptive statistics Chi square, Fisher’s exact test, two-tailed t-test and Mann-Whitney U were used. Logistic regression analyses were conducted in two steps: first age- and sex-adjusted analyses were applied to identify possibly significant dependent variables and then multivariable analyses were performed using a fixed model including the variables significant in age- and sex-adjusted analyses. In hypothesis testing p value <0.05 was considered

significant and p values between 0.05 and 0.1 are reported as trends. Odds ratios and their lower limit 95% confidence interval >1 were considered significant.

7. RESULTS

7.1 The 12-month prevalence and characteristics of MDE (Study I)

7.1.1 The 12-month prevalence

In all, 27 of the 15-19-year-olds (n=509) and 41 of the 20-24-year-olds (n=433) received a diagnosis of MDE, corresponding to a 12-month prevalence of 5.3% for adolescents and 9.4% for young adults (I: Table 2). Female to male ratio in adolescents (1.38) was the same as in young adults (1.36) (I: Table 2). With impairment criteria included, the 12-month prevalence estimates were lowered to 3.9% for adolescents and 7.6% for young adults the gender ratio remaining virtually unchanged (1.34).

7.1.2 Symptom frequencies

The frequency of depressed mood was higher among females (OR 1.55; 95% CI 1.02, 2.35) and young adults (OR 1.99, 95% CI 1.32, 2.98) than males and adolescents but these differences disappeared when additional requirements for persistence and frequency of dysphoria were taken into account (I: Table 3). The prevalence of anhedonia was similar in both genders and age groups. Most respondents (94.4%) endorsing the stem questions for persistent depressed mood or anhedonia lasting at least two weeks eventually received a diagnosis of MDE.

Depressed mood, anhedonia and impaired concentration were the most common symptoms of depression and present in over 80% of the 68 subjects with MDE (I: Table 4). Insomnia, fatigue and worthlessness were each reported by over 50% and frequent thoughts of death were reported by 45.6% of those with MDE. With the exception of females reporting more commonly decrease (OR 2.4; 95% CI 1.2, 4.8) of appetite, no gender differences emerged.

Minor age differences occurred only in the rank order of diagnostic symptoms but the prevalence estimates of individual symptoms were not affected by age (I: Table 4).

7.1.3 Severity of depression and episode duration

The number of symptoms of MDE was normally distributed (Shapiro-Wilk $p=0.26$) and ranged between 3 and 8 [mean 5.2 (S.D. 1.50)]. There were trends of female gender (5.4 vs. 4.7) ($p=0.060$), frequent drunkenness (5.9 vs. 5.0) ($p=0.093$), being without a stable relationship (6.1, vs. 5.0) ($p=0.068$) and allergic symptoms (5.9 vs. 5.0) ($p=0.071$) associating with a higher mean symptom score. No age difference was observed (5.1 for young adults vs. 5.3 for adolescents) ($p=0.667$).

All but one subject with MDE experienced psychosocial impairment related to the depressive episode: 27.9% ($n=19$) reported severe impairment, 50.0% ($n=34$) reported moderate impairment, and 20.6% ($n=14$) perceived that MDE had a small impact on their functioning. The mean number of depressive symptoms was higher in case of severe psychosocial impairment (5.9, S.D. 1.82) than mild or moderate (4.9, S.D. 1.27) impairment ($p=0.035$). Severe impairment was also associated with frequency of drunkenness: while 6.1% ($n=3$) of those with mild or moderate impairment reported drunkenness at least twice a month, 36.8% ($n=7$) of those with severe impairment reported drinking to drunkenness at this frequency ($p=0.004$).

Estimates of the duration of the major depressive episode ranged from 2 weeks to 12 months. The distribution was highly skewed towards shorter episodes. Mean total episode duration was 1.5 months (S.D. 2.54) and median one month in both genders and both age groups. Most subjects with MDE ($n=62$; 91.2%) reported that the episode had both started and ended during the 12-month period. No factors associating with median duration of MDE were found.

7.2. Substance use and MDE (Study II)

7.2.1 Sociodemographic correlates, substance use and MDE

In order to analyze, which health behavioral and sociodemographic variables associate with MDE, age- and sex adjusted logistic regression analyses were first performed for selected independent variables. A set of correlates significant in age- and sex- adjusted analyses (II: Table 1) was then entered into multivariable models separately for each gender and age group (II: Table 2). Among adolescents, current smoking (OR 5.54; 95% CI 1.44, 21.3) and having chronic medical conditions (OR 3.77; 95% CI 1.04, 13.7) appeared as correlates of MDE. In young adults, drunkenness once a month or less (OR 2.79; 95% CI 1.14, 6.83), drunkenness at least twice a month (OR 4.48; 95% CI 1.44, 14.0), not being married nor cohabiting (OR 3.50; 95% CI 1.35, 9.08) and lack of physical exercise (OR 4.01; 95% CI 1.18, 14.0) associated with MDE. MDE in females was associated with not being married nor cohabiting (OR 3.56; 95% CI 1.26, 10.1) and living in southern Finland (OR 2.30; 95% CI 1.06, 5.02). Drunkenness at least twice a month (OR 4.54; 95% CI 1.27, 16.3) was the sole correlate for MDE among males.

The interactions between cigarette smoking ($p=0.013$) as well as having chronic medical conditions ($p=0.003$) and age were significant, indicating that smoking and chronic illness were associated with MDE especially among adolescents. The two-way interactions between gender and other independent variables did not reach statistical significance.

7.2.3 Age differences in the associations between substance use and MDE

To further investigate possible age differences in how substance use associates with MDE, we performed analyses in which the respondents were divided into three developmentally different age groups: adolescents (15-17 years), older adolescents (18-21 years) and young adults (22-24 years). Sex- adjusted logistic regression analyses including cigarette smoking and frequency of drunkenness as independent variables were conducted in each of these age groups (II: Table 3). The association between smoking and MDE was strongest among 15-17-year-olds (OR 15.5; 95% CI 2.20, 109) supported by significant age interaction ($p=0.022$). Frequency of drinking to drunkenness peaked later, in 18-21-olds (OR 4.56; 95% CI

1.25,16.6), although the age interactions between frequent drunkenness and MDE were insignificant ($p=0.395$ and $p=0.801$).

7.3 Chronic illness, disability and MDE (Study III)

In all, 33.6% ($n=23$) of those with MDE in comparison with 22.3% ($n=194$) of youths without MDE reported a chronic illness diagnosed by a physician. The association between chronic illness and MDE was significant (OR 1.78; 95% CI 1.03, 3.05) after adjusting for age, sex, smoking and frequency of drunkenness. Chronic illness accompanied by disability was associated with MDE among adolescents (OR 3.09; 95% CI 1.12, 8.54; interaction with age $p=0.034$). The reported disability in chronic illness was not associated with psychosocial impairment in MDE ($p=0.96$). The prevalence of the individual disease categories was low in this age group and only respiratory allergies, other allergies, musculoskeletal illness and neurological disorders (including migraine) comprised sufficient numbers of observations for more detailed analyses. Respiratory allergies (OR 2.40; 95% CI 1.00, 5.75) and migraine in young adults (OR 6.18; 95% CI 1.24, 30.8) were related to depression.

The prevalence of individual depressive symptoms was compared between those with MDE only ($n=45$) and those with both chronic illness and a history of MDE during the past 12 months ($n=23$). Thoughts of death were more prevalent among individuals with both conditions (65.7%) than among those with MDE only (35.2%) ($p=0.02$). Frequencies of the other diagnostic symptoms of MDE did not significantly vary by chronic illness status.

Poor self-perceived health was associated with MDE (OR 2.26; 95% CI 1.01, 5.07). There was a trend of the association appearing stronger among adolescents (OR 3.82; 95% CI 1.19, 12.3) than young adults (OR 1.34; 95% CI 0.43, 4.40) (interaction with age $p=0.091$). The perception of general health was not related to severity of depression. No gender differences were observed.

Further, the median number of sick-days during the past six months was higher among individuals with MDE during the past 12 months than in those without depression (3.0 vs. 2.0; $p=0.001$). The number of sick-days was dichotomised using a median split of three days. In logistic regression analysis an association between MDE and the number of sick-days was

observed (OR 1.72; 95% CI 1.02, 2.92), especially among adolescents (8 days vs. 2 days; OR 2.80; 95% CI 1.14, 6.90; interaction with age $p=0.097$), after adjustment for age, sex, substance use and chronic physical illness (III: Tables 2 and 3). The mean number of depressive symptoms showed a trend of associating with the number of sick-days ($p=0.08$).

7.4 Health care use and MDE (Study IV)

7.4.1 Health care use for physical illness

Recent treatment use for physical causes was reported by 46.7% ($n=439$) and was more common among females and young adults than males and adolescents. Service use for physical causes was most frequently reported by the respondents with both MDE and chronic physical illness (IV: Table 1). In multivariable logistic regression analysis, female gender (OR 1.70; 95% CI 1.30, 2.23), age group of 20-24 years (OR 1.33; 95% CI 1.10, 1.75), disabling chronic illness (OR 2.58; 95% CI 1.51, 4.41), cigarette smoking (OR 1.78; 95% CI 1.13, 2.81), and poor self-rated health (OR 3.16; 95% CI 1.76, 5.68) were associated with health care use for physical illness (IV: Table 2). Interaction of disabling chronic illness and female gender was significant, indicating that females with a physical illness are more likely to use services than males ($p=0.023$). MDE comorbid with chronic illness, when contrasted with having neither condition or either illness alone, showed borderline association with health care use for physical causes (OR 2.47; 95% CI 0.99, 6.14).

7.4.2 Health care use for MDE

In total, 1.5% ($n=14$) of the respondents reported recent health care use for any mental health problem. Most subjects seeking treatment ($n=12$) contacted psychiatric services. In the multivariable logistic regression analyses, MDE (OR 5.58; 95% CI 1.43, 21.8) and low self-rated health (OR 15.4; 95% CI 4.61, 51.6) were related to health care use for any mental health problem (IV: Table 3). No significant age or sex interactions were observed.

Of those with MDE ($n=68$), 20.6% ($n=14$) had been in contact with health care because of depression during the past 12 months (IV Table 4). Ten subjects (71.4%) had contacted psychiatric services including six respondents (42.3%) also reporting primary care service use.

Of the treatment users, two subjects (14.3%) reported recent use of antidepressant medication. One fourth (25.9%, n=14) of those with MDE who had not used services, considered that they could benefit from professional help. Higher mean number of depressive symptoms (5.7 vs. 4.8, p=0.06), poor self-rated health (30.4%, n=4 vs. 7.1%, n=3; p=0.03), and feelings of worthlessness (n=11, 84.2% vs. n=19, 46.6%; p=0.02) were associated with perceived need for help.

While high psychosocial impairment (OR 3.77; 95% CI 0.97, 14.7) was associated with greater health care use, two thirds (63.2%, n=12) of those with high levels of impairment had not contacted services. Neither episode duration (OR 1.00; 95% CI 0.94, 1.06), number of depressive symptoms (OR 1.40; 95% CI 0.89, 2.19), nor thoughts of death (OR 1.68; 95% CI 0.43, 6.53) were significantly related to treatment use in this study group. Gender (OR 1.27; 95% CI 0.37, 4.33) and age (OR 1.78; 95% CI 0.49, 6.40) differences were insignificant (IV: Table 4).

8. DISCUSSION

8.1 Methods

8.1.1 Study population

Few studies on adolescent depression applying structured diagnostic interviews have been carried out on a highly representative, nationwide sample. With few exceptions (Kessler & Walters, 1998; Wittchen et al., 1998), prior cross-sectional studies have included a more narrow age distribution or included mixed adolescent and child samples, while studies comparing depression in adolescents and young adults within the same study population have been infrequent. However, actual developmental effects may be confounded by cohort effects in a cross-sectional design and an ideal way to study developmental differences would be a longitudinal study. Previous psychiatric epidemiological studies in Finland have included persons 18 years of age or older (Lehtinen et al., 1990; Isometsä et al., 1997; Aalto-Setälä et al., 2001; Pirkola et al., 2002). The sample size was satisfactory corresponding to the mean size of earlier general population studies (Table 1), but still small for some subgroup and interaction analyses of interest.

The response rate in the present study was high. However, the relatively large proportion of proxy interviews among 15-19-year-olds and males may have affected the prevalence of MDE in these subgroups. Presuming that study dropouts are more likely to have psychiatric disorders than subjects attending the study (Levy and Deykin, 1989; Blazer et al., 1994; Oldehinkel et al., 1999) the prevalence of MDE in the study population might be spuriously low. The proxy interviewed, however, do not necessarily represent typical dropouts as they may have been engaged in other activities at the time of the interview, and parents were more likely to serve as respondents, especially for younger adolescents. This could result in overestimates of MDE prevalence. We found no differences in the sociodemographic measures or physical health and service use between personal and proxy interviews, indicating that regarding these measures no significant differences could be identified.

8.1.2 Diagnostic interview

Structured diagnostic interviews have been used increasingly in epidemiological surveys, but there are limitations in their functioning which deserve discussion. The UM-CIDI SF is modified from the CIDI, which reportedly has both high reliability and validity in the general population (Wittchen et al., 1994b; Kessler et al., 1998b). However, the properties of the UM-CIDI SF have been studied less. It has been suggested that the SF would possibly have lower sensitivity in comparison with the full CIDI (Kessler et al., 1998b). In our study, the stem questions of the UM-CIDI SF appeared rather exclusive, as most respondents endorsing them also received a diagnosis of MDE and most of them also reported psychosocial impairment. Possible low sensitivity generally leads lower prevalence estimates and dilution of associations.

We have conducted an external study comparing the accuracy of UM-CIDI SF diagnosis of MDE to diagnoses of MDE and depressive syndrome (MDD, dysthymia, adjustment disorders, bipolar disorder) based on SCAN interview and consensus diagnoses. The results showed that the diagnostic specificity of SF was high for depressive syndrome (0.90) and lower for MDE in specific (0.82) while sensitivity was low (0.70) (Aalto-Setälä et al., 2002a). However, in this methodological study a lower cut-point for MDE was used in comparison with the FINHCS '96. The requirement for the intensity of depressed mood or anhedonia was

only “half of the day” instead of “most time of the day” (Aalto-Setälä et al., 2002a) possibly contributing to overrepresentation of milder depressions supported by the fact that most “false positives” had a mood disorder other than major depression (Aalto-Setälä et al., 2002c). Small changes in wording and criteria may lead to significant changes in classification (Regier et al., 1998). Further, the validity of the CIDI or its derivatives has been little studied in persons younger than 18 years but it has been suggested that the validity of the responses does not change by age within the age group of 14-24- year-olds (Wittchen et al., 1998). Although most interviews (n=623) were conducted in privacy, some (n=319) were performed with another family member present in the room during the interview which might have made these respondents reluctant to answer the questions openly.

The diagnostic interview only included data on MDE during the past 12 months, precluding further analyses of psychiatric comorbidity or prior mood disorders. This leaves some uncertainty for the interpretation of the results, as the adjustment for some other psychiatric disorders would have possibly changed the magnitude of the associations acknowledging the high rate of comorbidity related to depression and the likelihood of other psychiatric disorders also being related to compromised health behavior. A history of prior mood disorders or identification of bipolar disorders would have made it possible to include more specific data on the nature of the associations. The study was conducted in a cross-sectional design, which does not allow for causal inferences or analyses of sequences between MDE and related factors. Therefore, only hypotheses can be presented on the nature of the associations.

8.1.3 Measures for substance use and chronic illness

Not assessing diagnostic substance use disorders can be considered a limitation. However, current data on young people suggest that dimensional data identifying symptoms and symptom clusters is also needed, and that alcohol use and problems related to alcohol should be studied not only as a categorical phenomenon but as a continuum, especially in young people in the process of developing their drinking behavior (Rohde et al., 1996; Harrison et al., 1998; Pollock & Martin, 1999). That illicit drug use was not included is a limitation in view of the current situation of increasing drug use in adolescents and young adults.

Only a few studies have combined the assessment of psychiatric diagnoses and measures of physical health in adolescent general population (Breslau et al., 1993; Lewinsohn et al., 1996; Pine et al., 1996; Cohen et al., 1998; Egger et al., 1998). However, assessment of physical illness by self-report instead of objectively verified pathology is a limitation. It has been reported that in general population surveys items on “doctor-diagnosed” illnesses have good specificity, although the accuracy of self report may vary by disorder (Haapanen et al., 1997). Usually, the specificity is good for well-known medical conditions with clearly defined diagnostic boundaries, while illnesses with fluctuating course may be either over- or underreported (Kehoe et al., 1994; Haapanen et al., 1997).

8.2 Prevalence and characteristics of depression (study I)

8.2.1 The 12-month prevalence of MDE

Our estimate of the 12-month prevalence of MDE in both age groups fell into the range reported earlier in studies using diagnostic interviews and DSM criteria in adolescents and young adults (Tables 1 and 2). The prevalence of MDE was lower than in the NCS, which applied UM-CIDI in case ascertainment and reported the 12-month prevalence of MDD to be 12.4% among 15-24-year-olds (Kessler & Walters, 1998). Application of the additional criterion of “at least moderate impairment” in case definition lowered the rates by 20-25%, and was congruent with earlier findings of additional criteria significantly affecting classification and prevalence estimates (Shaffer et al., 1996; Simonoff et al., 1997; Verhulst et al., 1997; Oldehinkel et al., 1999; Aalto-Setälä et al., 2001). Studies including evaluation of impairment already in the diagnostic assessment process report that up to 90-100% of adolescents or young adults with depression diagnosis are significantly impaired (Bird et al., 1988, Newman et al., 1996; Wittchen et al., 1998; Essau et al., 2000). In our study population, all except one respondent reported at least some impairment, further underlining the disabling nature of depression.

One of the most consistent findings of epidemiological literature is that females are in higher risk for major depression and that the female to male ratio is approximately 2:1. In this study, females had a higher prevalence of MDE than males but the gender difference was smaller than expected. Although there is consensus on the existence of a true gender disparity, there is

also evidence that methodological determinants (e.g. threshold for caseness, interview instruments, study procedures) contribute to measurement of the difference (Piccinelli & Wilkinson, 2000). It is possible that Finnish adolescent males have an increased risk of MDE, which is indirectly supported by the high rates of suicide among them (Pelkonen & Marttunen, 2003), but it may also be that proxy interviews being more prevalent among boys than girls may have lead to underestimate of MDE among males and that the prevalence would be even higher than reported here. Within the whole FINHCS'96 sample the female to male ratio for MDE was 1.5 : 1 (Lindeman et al., 2000) and other Finnish epidemiological studies on adults or young adults have reported a female to male ratio to be approximately 1.7:1 (Lehtinen et al., 1990; Isometsä et al., 1997; Aalto-Setälä et al., 2001; Pirkola et al., 2002).

The finding that MDE was more prevalent among young adults than adolescents is congruent with a German study concluding that young adults present higher rates than adolescents (Wittchen et al., 1998), while in the NCS no age difference was observed (Kessler & Walters, 1998). Most studies including a wider age range have not reported the results separately by age group, but study populations comprising both adolescents and young adults tend to yield higher rates than pure adolescent samples (Newman et al., 1996; Oldehinkel et al., 1999). This phenomenon has been explained via young adults presenting with recurrent depression more often than adolescents, thus contributing to a higher total prevalence (Hankin et al., 1998). In the present study there is a possibility that attrition to proxy interviews more so in adolescents than young adults may have spuriously increased the age difference.

8.2.2 Symptom presentation and episode duration of MDE

Empirical data on the symptom presentation of adolescent depression in an unselected sample are important in establishing grounds for classification of adolescent depression. The symptom presentation observed in our sample is fairly consistent with the report from the Oregon Adolescent Depression Project (OADP) (Roberts et al., 1995) which included 14-17-year-old high school students, as well as with the study by Cooper & Goodyer (1993) involving 15-16-year-old females. Consistently, depressed mood and impaired concentration were among the three most prevalent symptoms (present in 70-100% of those with major

depression), but there was some variation in the frequency of other symptoms between the studies. The female preponderance of symptoms related to appetite is suggested by our study as well as the study by Cooper & Goodyer (1993). A contradicting comment is provided by Essau et al. (2002), who state that significant gender differences in the frequencies of presenting symptoms exist but they do not give specific figures in their report. In keeping with earlier studies, which have made comparisons between different data sets (Carlson & Kashani, 1988; Mitchell, 1988), we found no significant age difference in the symptom presentation between adolescents and young adults. In comparison with clinical populations in which suicidal ideation is present in more than half the depressed subjects (Carlson & Kashani, 1988), thoughts of death were less frequent in our study population, in accordance with prior general population studies (Roberts et al., 1995; Cooper & Goodyer, 1993). It is probable that if actual suicidality instead of thoughts of death would have been assessed the frequency would have been even lower.

Our estimate of the median duration fell at the lower end of the distribution reported previously in the general population, and is likely to be spuriously low as the interview technique does not take into account periods of altering severity or partial remission. Further, the time of the interview may also have a censoring effect on episode duration although the effect is likely to be small in the present study. Prior reports of the median episode duration range from 8 (Lewinsohn et al., 1994) to 16 weeks Keller et al., 1988). Some studies suggest that approximately 65% of the subjects with depression would have an episode lasting between 2 and 4 weeks (Cooper & Goodyer, 1993; Essau et al, 2000). Others report that clearly longer episodes of over 12 months prevail (Olsson & von Knorring, 1999), or that a significant proportion of depressed adolescents suffer from chronic symptoms of at least 20 months (Oldehinkel et al., 1999). As the likelihood of service use increases along with increasing episode length (Lewinsohn et al., 1994) longer episodes are more prevalent in clinical populations in comparison with non-clinical samples (Kovacs, 1996).

8.3 Correlates of MDE

8.3.1 Sociodemographic correlates (study II)

Besides gender and age, the associations between region of residence, educational and working status, marital status and MDE were investigated. Although most youths are still unmarried or not cohabiting by the age of 24 in the Finnish society, existence of a stable relationship appears to be even more rare among those young adults with MDE. Palosaari and Aro (1995) reported that having a stable intimate relationship is a protective factor against depressive symptoms in young adulthood in the presence of parental divorce and low self-esteem in adolescence. Lack of social support associates with MDD (Lewinsohn et al., 1994; Wade & Kendler, 2000; Kendler et al., 2002). Problems in interpersonal relationships both in adolescence (Kandel & Davies, 1986) and in adulthood (Zlotnick et al., 2000; Hammen & Brennan, 2002) reportedly associate with major depression. These interpersonal difficulties may reflect "scars" or long-term consequences of earlier depressive episode on psychosocial functioning (Rohde et al., 1994), but they may also be indirect indicators of other risk factors, e.g. low self-esteem (Hammen & Brennan, 2002).

No individual province was associated with a higher prevalence of depression, but southern Finland when contrasted with the rest of the country was significantly associated with MDE. The sample was geographically representative and this finding may indicate an uneven distribution of latent variables not measured in this survey. Southern Finland is characterised by rapid urbanization as well as migration from other parts of Finland to urban centers for opportunities to work and study. Evidence on the associations between urbanization and depression is inconsistent and it is likely that confounding factors associating with both urbanization and depression contribute to the association (e.g. Kessler et al., 1994; Lehtinen & Joukamaa, 1994; Ayuso-Mateos et al., 2001). For example, social support may be more difficult to obtain in such circumstances, and the environment for young people may include elements, which increase vulnerability to depression. Revealing the underlying reasons for this finding, however, are beyond the scope of this study.

Unemployment has been linked with juvenile depression (Kandel & Davies, 1986). In our study not attending to school or not working was associated with depression in age and sex-adjusted analysis but the association disappeared after adjusting for other dependent variables such as smoking and alcohol use. This may mean that the prevalence of depression is higher among youths, who are not engaged to studying or working, but that the association is more strongly mediated by other factors.

8.3.2 Substance use (study II)

In congruence with existing general population studies we also observed an association between MDE and cigarette smoking (Brown et al., 1996; Fergusson et al., 1996; Breslau et al., 1998; Nelson & Wittchen, 1998a). Depressed youths are reportedly more likely to start smoking earlier and to proceed into regular smoking and nicotine dependence more often than their non-depressed peers (Fergusson et al., 1996; Breslau et al., 1998). We also observed a significant interaction between cigarette smoking and age. The fact that young adult depression was not related to smoking in our sample may be explained by the strong association between drunkenness and MDE in young adults in multivariable analyses. In general, our findings suggest that there are age or developmental disparities in how different substances are related to MDE. Previously, time periods of special vulnerability regarding the development of comorbidity between depression and substance use have been suggested: early adolescence for cigarette smoking or nicotine dependence (Fergusson et al., 1996) and later adolescence for drinking problems (Rao et al., 2000). Substance use with early onset reportedly has a tendency to proceed to substance dependence (Nelson & Wittchen, 1998b), and to be comorbid with depression and other psychiatric disorders (Budyens-Branchy et al., 1989; Deykin et al., 1992; Giaconia et al., 1995; Rohde et al., 1996) more often than in case of later onset. Moreover, the availability of legal substance may modulate the effect since 18 years is the legal drinking age in Finland whereas cigarettes could be bought at the age of 16 in 1996.

Frequency of drunkenness was related to MDE in young adults and males. We observed that frequency of alcohol use was not significantly associated with MDE but frequency of drunkenness was related to MDE. It was also associated with higher levels of impairment among those depressed. It has been previously reported that the degree of problems related to alcohol use is associated with increased lifetime occurrence of depressive disorders,

suggesting that there is a meaningful continuum in drinking behavior (Rohde et al., 1996; Merikangas et al., 1998). Further, frequency of drunkenness has been suggested to serve as single best indicator of problem drinking among young adults (Bailey, 1997), and other proxy measures such as frequency of alcohol consumption or the quantity of alcohol consumed per occasion reportedly correlate well with alcohol misuse (Lewinsohn et al., 1996a; Holly & Wittchen, 1998; Saccone et al., 2000). Our results suggest that frequent drunkenness is an indicator of potentially harmful drinking relate to adolescent depression, and that the correlation strengthens as the frequency of intoxication increases.

Consistent data exist on gender differences in the prevalence estimates of MDE (female preponderance) and substance use disorders (male preponderance) separately, but reports on gender differences in the association of MDE and heavy drinking have been inconsistent (Rohde et al., 1996; Costello et al., 1999; Windle & Davies, 1999). The patterns of comorbidity may differ by gender, e.g. females reportedly have higher prevalence of co-occurring depression and anxiety disorders, while male depression would be more often comorbid with conduct disorders and substance use disorders (Rohde et al., 1991). As males tend to drink more often and consume more alcohol per occasion than females, our results may also reflect gender specific patterns of drinking behavior not measured here.

8.3.3 Chronic illness, disability, and self-perceived health (study III)

Earlier epidemiological research analyzing the association between physical health and structurally diagnosed MDE in youth is sparse, partly due to the low prevalence of physical illness in the adolescent general population. However, the interrelations of physical and mental illness are widely recognised, and as depression often first emerges in adolescence and many health habits are formed at the same time it would seem important to investigate these issues also in younger age groups, too. Our findings of chronic illness associating with MDE accords with the study by Lewinsohn and coworkers (1996b). Again in keeping with earlier research, we observed that the association was especially prominent if chronic illness was accompanied with disability (Cadman et al., 1987; Offord et al., 1989; Lewinsohn et al., 1996b). Disability representing discontinuity in life experience and activities may result in unfavourable self-appraisal especially in terms of self-esteem and body image, which would then increase vulnerability to depression (Mechanic, 1983; Williams et al., 2002). However,

the relationship appears to be reciprocal as studies from adult samples suggest that MDD predicts disability regardless the type of chronic illness (Ormel et al., 1994; Armenian et al., 1998). It may also be, that attributes of the individual rather than characteristics of chronic illness itself contribute to both the risk for depression and disability (Lewinsohn et al., 1996; Burke & Elliott, 1999).

The analyses of the relationship of MDE to specific medical conditions were limited by the low prevalence of individual illness categories. Earlier research has suggested that certain illness categories related to dysregulation of the stress-regulating systems would specifically be related to major depression via commonalities in pathophysiology (Marshall, 1993; Cohen & Rodriguez, 1995). In keeping with these hypotheses and prior epidemiological studies we observed that respiratory allergies (Cohen et al., 1998) and migraine (Breslau et al., 1993; Pine et al., 1996; Egger et al., 1998) were associated with MDE. Unequivocal evidence for the causal relations is lacking, and longitudinal studies are needed to investigate this issue.

Depressed adolescents perceived their general health lower and they also reported more sick-days for physical illness than their non-depressed peers. Our findings are consistent with the study by Lewinsohn et al. (1996b), who also reported an association between MDD and poor self-perceived health and suggested that perception of poor general health is also one of the long term outcomes of adolescent depression (Rohde et al., 1994). Cognitive style, along with physiological, emotional and behavioural dimensions of depression are all suggested to contribute to the perception of overall health in depressed individuals (Cohen & Rodriguez, 1995). If MDE and a chronic medical condition co-occur it seems that they have an additive effect on reduction in activities or sick-days (Lewinsohn et al., 1996; Egger et al., 1998). In keeping with these reports, we observed an association between the number of depressive symptoms and the number of sick-days due to physical illness, suggesting an association between severity of MDE and disability.

Another indicator of impairment and condition severity was that thoughts of death were more frequent among those respondents who had both MDE and a chronic medical condition, in contrast with those who had MDE only. Thoughts of death are more common among depressed adolescents than actual suicidality, but in the light of previous research this finding warrants attention. It has been suggested that adolescent general medical illness is associated

to actual suicidal thoughts (Suris et al., 1996; Druss & Pincus, 2000), and increased rates of suicidal behavior have been reported in case of comorbid MDD and chronic illness (Breslau & Davis, 1993; Druss & Pincus, 2000).

Many known risk factors for major causes of adult mortality are related to health behavior. Health habits are usually established by young adulthood and are often related to cultural and psychosocial factors (Mechanic, 1983; Williams, 2002). The role of psychiatric disorders as modifiers of health behavior appears to be important in adolescence, and it seems that various unfavorable or risky health behaviors accumulate, especially in youths with psychosocial problems and psychiatric disorders (Ramrakha et al., 2001; Bardone et al., 1998; Kandel & Davies, 1986; Shrier et al., 2001). Supported by previous research using symptom rating scales in young adult populations (Weyerer, 1992; Steptoe et al., 1997; Stephens, 1998) our findings of lower levels of physical exercise associating with MDE also suggests accumulation of health risks. Symptoms of depression such as low levels of energy, initiative and self-appraisal and anhedonia lead to withdrawal from physical exercise. Some of the symptoms of depression reported in self rating scales may also indicate poor physical shape and produce spurious correlations. Physical exercise has also been shown to have antidepressive effects in mild depression (Brosse et al., 2002). Moreover, as depression has been shown to independently increase the risk of adult physical morbidity and mortality, especially in cardiovascular disease (Wulsin et al., 1999), it would be important to identify the patterns of additional health risks related to depression in order to plan early intervention or prevention programmes. There is preliminary evidence that although health promotion generally has only a modest effect on health behavior, recognition of possible underlying depression improves the results of health promoting interventions in adolescents (Walker et al., 2002)

8.4 Health care use (study IV)

In accordance with prior research, health care use for physical causes was common and associated with disabling chronic illness (Cadman et al., 1987). In our study population, any service use was highest if chronic illness was accompanied with MDE, in accord with previous observations that comorbidity of mental and physical illness in adolescents increases the likelihood of identified treatment need and use of services (Wu et al., 1999). Our findings

are also consistent with prior evidence that respondents suffering from both physical illness and symptoms of depression are likely to refer to general practice for physical causes, while psychiatric services are seldom used (Cadman et al., 1987; Saunders et al., 1994; Suris et al., 1996, Verhulst et al., 1997).

Our estimate of approximately one fifth of those with MDE contacting health care is at the lower end of the estimates reported. It is likely that our results provide an underestimate of service use, as only official service providers were investigated and avenues of informal help-seeking were not included. Although most respondents seeking help for depression had contacted psychiatric care, the prevalence of psychiatric service use was lower than previous 12-month estimates ranging from 23.8% to 39% (Newman et al., 1996; Kessler & Walters, 1998; Wu et al., 1999; Aalto-Setälä et al., 2001). If treatment sought, perceived need for help, and at least moderate psychosocial impairment are considered as indicators of treatment need, at least half of the subjects (n=35) with a history of MDE during the past 12 months in our study population were in need for treatment. Less than half of those in probable need had sought help for depression. Notably, nearly 60% of those with a history MDE during the past 12 months had recently contacted health care for physical causes. Thus, the ability of the medical professional to recognize and treat adolescent mental health problems would be important.

The proportion of subjects with MDE receiving antidepressant medication fell within the 4.2% to 31% range of general population research estimates (Newman et al., 1996; Lewinsohn et al., 1998; Druss et al., 2000b; Wu et al. 2001) and accords with the estimates obtained from the whole FINHCS'96 sample (Laukkala et al., 2001). The absence of reported psychiatric hospitalization among our study subjects probably contributed to the low prevalence of antidepressant medication. Moreover, since the question of medication only covered "recent use" or the period of 1996 until the interview, adolescents receiving antidepressant medication earlier in the 12-month study period would be misclassified as not taking medication. However, as the recommended length of the psychopharmacological treatment is at least six months, most of the study period should have been covered. Considering both the handicap caused by major depression throughout life-span (Lewinsohn et al., 1994; Kessler & Walters, 1998; Wittchen et al., 1998) and the preliminary reports of effective preparations being available for treating adolescent depression (Emslie et al., 1997; Emslie et al., 2002; Keller et

al., 2001), evaluation of antidepressant treatment should be included in the assessment of depressed adolescents.

Young adults reported use of services consistently more often than adolescents, raising the concern that undertreatment of depression maybe even more of a problem among younger age groups. Depression often first emerges in adolescence, and early treatment and prevention of recurrence would be important in improving the outcome. Adolescents seldom seek help independently from adults, and therefore adults are in key position to recognize depressive symptoms in young people and be aware of the treatments available. The cognitive constellation of depression including negative self-appraisal, low level of initiative, guilt etc., may serve as specific inhibiting factors in service use. Moreover, it may be very difficult for a young person to recognise symptoms of depression to be signs of an illness and a natural reaction may be to wait for the low mood to go away by itself or to view depressive symptoms as part of personality. The negative stigma of psychiatric illness as well as adolescents' striving for autonomy may further delay help-seeking. Adolescent's own perception of general health appears to be strongly related to any service use. Significant female preponderance in mental health service use or treatment sought for MDD, as suggested by earlier research (Lewinsohn et al., 1999; Wu et al., 2001), was not found.

8.5 Clinical implications

Depression is relatively common among young people, the prevalence being higher among young adults and females than adolescents and males. Although shorter episodes of some months prevail in the general population, our findings underline the view that depression in young people is not a benign phenomenon but often accompanied with impairment. The presenting diagnostic symptoms can be identified in both adolescents and young adults, and the frequency of symptoms of MDE is mainly independent of age and gender.

Depression tends to accumulate with risky health behavior. As many habits and patterns of behavior are formed already in adolescence and young adulthood, depression may emerge as

an important mediator of health behavior. Unfavorable health behavior together with MDE may predispose young people with depression to many adversities in terms of later physical and mental health. This aspect should not be neglected among younger age groups, who are often considered to be in good physical health. The associations between depression and chronic illness deserve special attention. Although young people with chronic illness have depression more often than expected by chance, they seldom use psychiatric services. However, they do refer to general practice or primary care more often than those with chronic illness alone and they could possibly receive treatment for depression if detected. Further, assessment of adolescent mental health should be regularly performed in secondary care units treating adolescents and young adults with chronic diseases and psychiatric consultation asked for when needed. Sick-days or days absent from school should be carefully noted and the overall health of students with frequent sick-days should be evaluated.

The associations between depression and substance use are known but the measurement of problem drinking in young people is sometimes problematic. Our findings suggest that frequency of drunkenness could serve as an indicator of deviant drinking pattern, and attention should be paid to changes in the frequency of drunkenness or frequent drinking per se. The combination of MDE and frequent drunkenness was also related to higher levels of impairment, supporting the existence of a meaningful continuum in drinking behavior. Alcohol use and cigarette smoking appeared to show some age specific patterns in how they relate to depression: smoking is more prevalent among adolescents and alcohol use or drunkenness in young adults. While a third of the adolescents smoke by the age of 18, the prevalence of regular smoking was twice as high among those depressed. Drunkenness at least once a week was rather rare in the study population in general but relatively common among those with depression. These findings emphasize the importance of identifying both juvenile psychiatric and substance use disorders and keeping in mind the high prevalence of comorbidity.

The frequency of service use for depression was strikingly low, even after taking into account the possibility of overdiagnosing depression or including milder cases who would not be in need for treatment. Figures for antidepressant use were even more discouraging. This calls for increased activity in education of citizens about depression and access to care. On the other hand, treatments and services should be developed to be able to respond to the changing

needs. The development of school services or other treatment facilities with low threshold is especially urgent. As adolescents themselves are often unable to recognize treatment need and need support from adults in order to enter treatment, collaboration of professionals and families is needed to improve early recognition and treatment of depression.

8.6 Implications for further research

Research on the mechanisms behind comorbidity deserves attention. Comorbidity between depression and substance use is an important issue and has gained increasing interest in recent years, but the underlying mechanisms still remain largely unknown. Practical methods to identify substance misuse in younger age groups should be further studied. Dimensional patterns of comorbidity should also be analyzed. More studies are needed, especially to better understand the nature and mechanisms of co-occurring somatic illness and depression in young people. Understanding the mechanisms of disability would greatly facilitate the development of appropriate interventions.

The processes behind service use for depression in adolescents and young adults should be studied to develop services better corresponding to the needs of these age groups. Efforts to improve identification of “true cases” and to evaluate treatment need in the general population should be continued, and it seems that measures of severity and impairment could serve as guidelines in these studies. Screening of depression in various treatment settings should be studied to design strategies which on hand would better identify those suffering from depression and on the other hand would be ethically well-founded. Treatment interventions especially should be investigated and further developed.

In general, epidemiological studies would benefit from moving more towards longitudinal studies focusing on hypotheses representing various dimensions of depression. Biological and genetic studies have been sparse among young people, but research on the interaction of “nature” and “nurture” are needed to enlighten the complexities behind juvenile depression. The hypotheses developed within the context of epidemiological research should be further developed for the purposes of clinical trials in order to hasten the development of preventive and treatment interventions for adolescent depression.

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