



KLAUS RANTA

Social Phobia among Finnish Adolescents

Assessment, Epidemiology, Comorbidity, and Correlates



ACADEMIC DISSERTATION

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TIIVISTELMÄ

Ahdistuneisuushäiriöt ovat yleisimpiä mielenterveyden häiriöitä väestössä. Ryhmän häiriöistä sosiaalisten tilanteiden pelon (STP) esiintyvyyden on todettu lisääntyvän varhaisnuoruudesta alkaen. Nuoruusikää voi siten pitää riskivaiheena STP: n kehittymiselle. Hoitamattomana STP on kulultaan pitkäaikainen ja edeltää masennustilojen, myöhempien ahdistuneisuushäiriöiden ja päihteiden käytön ja puhkeamista myöhäisnuoruudessa tai aikuisiällä. STP: n diagnostisesta arvioinnista, esiintyvyydestä tai liitännäistekijöistä ei ole aiempaa tutkimustietoa suomalaisnuorilla.

Tässä tutkimuksessa esitetään uusia tutkimustuloksia suomalaisnuorten STP: n arviointiin soveltuvien menetelmien kehittämistä, sen epidemiologiasta ja liitännäistekijöistä. Tutkimus toteutettiin osana sekä Pirkanmaan sairaanhoitopiirin ja Ylöjärven kaupungin Nuorten Hyvinvointi -hanketta että Tampereen yliopiston ja Kansanterveyslaitoksen Nuorten mielenterveyskohorttitutkimusta. Tutkimus selvitti the Social Phobia Inventory -itsearviointikyselyn suomenkielisen käännösversion (SPIN-FIN) toimivuutta suomalaisnuorten STP -oireiden mittarina. STP: n esiintyvyyttä ja liitännäistekijöitä arvioitiin osatutkimuksessa, jossa SPIN-FIN -mittarilla vähän, kohtuullisesti tai paljon STP -oireita raportoineiden nuorten mielenterveyden häiriöitä arvioitiin kliinisellä strukturoidulla haastattelulla. Ikätoverien kiusaamaksi joutumisen yhteyttä STP: hen tutkittiin erillisessä osatutkimuksessa.

Tutkimuksen aineistona oli neljä 12 - 17 -vuotiaiden koululaisten poikkileikkausaineistoa. Vuonna 2000 kerättiin Kangasalaalla ja Tampereella kahden yläasteen oppilaitoksen 7-9 luokan oppilaiden (n=802) viiden viikon väliajoin toistamat vastaukset SPIN-FIN -kyselyyn. Nuorten Hyvinvointi -hankkeen yhteydessä kerättiin kaikilta Ylöjärven yläasteiden 7-9 -luokkien yleisopetuksen oppilailta lukuvuonna 2000 – 2001 vastaukset SPIN-FIN -kyselyyn (n=752) STP: n oireiden

seulomiseksi, ja ositetun otannan perusteella osaa heistä haastateltiin K-SADS-PL -menetelmällä mielenterveyden häiriöiden esiintyvyyden arvioimiseksi. Nuorten Mielenterveys -kohorttitutkimuksen aineistoja hyödynnettiin siten, että SPIN-FIN -vastaukset (n=5252) kerättiin kaikilta Porin (7-9 luokat, vuosi 2000), Tampereen ja Vantaan (9. luokka, vuodet 2002 ja 2003) yläasteiden oppilailta SPIN-FIN -kyselyn sisäisen yhtenäisyyden, faktorirakenteen ja pistejakaumien selvittämiseksi. Tampereella ja Vantaalla tutkimukseen osallistuneilta (n=3156) kerättiin tietoa paitsi STP: sta myös useiden muiden mielenterveyden häiriöiden oireista sekä ikätoverisuhteiden ongelmista. Tämä mahdollisti STP: n ja kiusatuksi tulemisen yhteyksien tutkimisen monimuuttujamenetelmillä.

Tutkimuksessa todettiin, että SPIN-FIN: in reliabiliteetti nuorten STP: n oireiden mittarina oli hyvä: testi-uusintatestikorrelaatio oli 0.81, ja sisäistä yhtenäisyyttä kuvaava Cronbachin alfa -arvo oli 0.89. SPIN-FIN: in faktorirakennetta kuvasivat konfirmatorisessa faktorianalyysissä parhaiten yhden ja kolmen faktorin mallit. SPIN-FIN: iä käyttäen oli sekä mahdollista tunnistaa kliininen STP nuorilla että erotella STP: sta kärsivät nuoret nuorista, joilla oli muu ahdistuneisuushäiriö tai käyttäytymisen häiriö. STP: sta kärsivien nuorten SPIN-FIN -pistemäärät olivat myös viitteellisesti, mutta ei tilastollisesti merkittävästi korkeampia kuin masennustiloista kärsivillä nuorilla. SPIN-FIN: lla voitiin koululaisaineistossa parhaiten seuloa mahdollista STP: a katkaisupistemäärällä 24 pistettä.

Tutkimus osoitti, että suomalaisnuorista 3.2 % kärsii DSM-IV -kriteerit täyttävästä STP: sta. Lisäksi 4.6 % kärsii STP -oireista, jotka eivät kuitenkaan aiheuta nuorelle merkittävää toiminnallista haittaa. STP: n esiintyvyys nousi 12 - 14 -vuotiaista 15 - 17 -vuotiaisiin tullessa noin puolitoistakertaiseksi, samoin häiriön esiintyvyys nousi tytöillä poikia suuremmaksi iän myötä. STP: hen liittyi samanaikaisena häiriönä usein muu ahdistuneisuushäiriö (41 %: lla) sekä

masennustila (41 %: lla). Vain 20 % nuorista, joilla oli STP ilman muuta samanaikaista häiriötä, oli saanut ammattimaista hoitoa oireisiinsa. STP: sta kärsivistä nuorista jopa 68 % raportoi tulleen ikätoveriensa kiusaamaksi.

Ikätovereiden kiusaamaksi joutuminen osoittautui eri psykiatrisista oirekuvista liittyvän nimenomaan STP: n oireisiin, ei niinkään masennusoireistoon tai käyttäytymisen oireisiin – kuten aiemmissa tutkimuksissa on esitetty. Tämä tutkimustulos oli kansainvälisestikin uusi, ja selittyy todennäköisimmin sillä että STP: n ja masennuksen välistä huomattavaa samanaikaissairastavuutta ei ole riittävästi huomioitu aiemmissa tutkimuksissa.

Tutkimuksen tulokset osoittavat uuden tutkimusmenetelmän SPIN-FIN: in käyttökelpoisuuden suomalaisnuorten STP: n mittarina. STP on yleinen, siitä kärsivät nuoret hakeutuvat harvoin hoitoon, ja siihen liittyy neljällä nuorella kymmenestä muu ahdistuneisuushäiriö tai masennustila. Nuorten mielenterveyden häiriöstä STP: lla näyttää olevan masennusta ja käytöshäiriöitä vahvempi yhteys kiusatuksi tulemiseen.

ABBREVIATIONS

ADIS-C/P Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Version

AGFI Goodness of fit index adjusted for degrees of freedom

AIC Akaike's Information Criterion

APA American Psychiatric Association

AUC Area Under Curve

BDI Beck Depression Inventory

BI Behavioural Inhibition

CAPA Childhood and Adolescent Psychiatric Assessment

CBCL Child Behavior Checklist

CBT Cognitive Behavioural Therapy

CGAS Children's Global Assessment Scale

CI Confidence Interval

CIDI Composite International Diagnostic Interview

CFA Confirmatory factor analysis

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

EFA Exploratory factor analysis

GFI Goodness of fit index

ISCO-88 International Standard Classification of Occupations

K-GSADS-A Kutcher Generalized Social Anxiety Disorder Scale for Adolescents

K-SADS-PL Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime Version

LEAD Longitudinal, Expert, All Data

LRA Logistic regression analysis

LSAS-CA Liebowitz Social Anxiety Scale for Children and Adolescents

MASC Multidimensional Anxiety Scale for Children

M-CIDI Munich-Composite International Diagnostic Interview

NCS National Comorbidity Survey

NOS Not otherwise specified

OR Odds Ratio

PCA Principal component analysis

RBDI Beck Depression Inventory, 13-item Finnish modification

RMR Root mean square residual

RMSEA Root mean squared error of approximation

ROC Receiver Operating Characteristic

SAS-A Social Anxiety Scale for Adolescents

SASC-R Social Anxiety Scale for Children, revised

SCARED Screen for Child Anxiety Related Emotional Disorders

SCARED-R Screen for Child Anxiety Related Emotional Disorders, revised

SP Social phobia

SPAI-C Social Phobia and Anxiety Inventory for Children

SPAI Social Phobia and Anxiety Inventory

SPIN Social Phobia Inventory

SPIN-FIN Social Phobia Inventory, Finnish version

SSP Sub-clinical social phobia

SNRI Serotonin norepinephrine reuptake inhibitor

SSRI Selective serotonin reuptake inhibitor

WHO World Health Organization

1 ABSTRACT

Early adolescence is considered a key risk period for the onset of social phobia, an anxiety disorder of which the principal symptom is persistent and intensive anxiety arising in one or more situations where there are other people around. The excessive anxiety leads to subjective suffering or avoiding one or more such situations altogether (APA, 1994). Adolescence coincides with increased demands for social interaction with peers and in formal social situations. Thus, suffering and the functional harm that social phobia invokes rise significantly. Longitudinal research indicates that earlier social phobia may precede anxiety, depression, or alcohol use in early adulthood. Thus, assessment, identification and epidemiological knowledge of adolescent social phobia are indeed important.

The present study investigated the psychometric assessment, epidemiology and correlates of social phobia among Finnish adolescents aged 12 to 17 years. Of the psychosocial correlates of social phobia, special emphasis was placed on peer victimization. The specific aims of the study were to demonstrate the psychometric properties of the Finnish version of the Social Phobia Inventory (SPIN-FIN), a 17-item self-report instrument of social phobia symptoms, for use among Finnish adolescents, and to examine the prevalence, comorbidity, and psychosocial correlates of social phobia among Finnish adolescents using both the SPIN-FIN and semi-structured clinical interview, the Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (K-SADS-PL) as principal research methods.

Four school-based samples of adolescents were utilised. A total of 802 13 to 17-year-old-adolescents from two secondary schools in Kangasala and Tampere completed the SPIN-FIN twice over five weeks in the SPIN-FIN Test-Retest Study in 2000. Secondly, a sample of 752 12 to 17-year-old adolescents representing three age cohorts in Ylöjärvi participated in the two-stage Well-

Being in Adolescence Study in 2000-2001; Stage I consisting of screening with the SPIN-FIN, Stage II consisting of clinical interview with the K-SADS-PL. Finally, two separate samples from a large prospective survey study among Finnish adolescents, the Adolescent Mental Health Cohort study were used, representing students from all secondary schools in the participating cities. The first of these comprised 5252 12 to 17-year-old students from Pori in 2000, Tampere in 2002 and Vantaa in 2003 and completing the SPIN-FIN; and the other comprised 3156 15 to 19-year-old students from Tampere and Vantaa in 2002 and 2003, completing a questionnaire containing the SPIN-FIN, the Finnish adaptation of the 13-item Beck Depression Inventory (RBDI), and a broad range of self-report instruments assessing mental health and questions of family, school, and peer relationships and socio-demographic factors.

The SPIN-FIN was found to be a reliable self-report instrument used among Finnish adolescents. Test-retest reliability (Spearman's correlation coefficient 0.81) and internal consistency (Cronbach's alpha 0.89) were both good. Confirmatory factor analysis suggested a one-factor structure, or alternatively a three-factor structure, both of which need to be replicated in subsequent studies. SPIN-FIN demonstrated good construct validity, differentiating adolescents with DSM-IV social phobia and sub-clinical social phobia from those without these diagnoses. It was also capable of differentiating adolescents with social phobia from those with other anxiety disorders, disruptive disorders, and, to some extent, depressive disorders. The diagnostic efficiency analyses indicated adequate screening properties for the SPIN-FIN. A cut-off score of 24 points can be used when using the scale as a screen for social phobia in general adolescent populations.

A 3.2 % prevalence rate for 12-month DSM-IV social phobia among 12 to 17-year-old Finnish adolescents was found. In addition, 4.6 % suffered from sub-clinical social phobia, having full symptoms of SP without functional impairment. The prevalence of social phobia rose and the

gender ratio shifted to female preponderance as age increased. SP was frequently comorbid with other anxiety disorders (41%) and depressive disorders (41 %). Adolescents with social phobia and sub-clinical social phobia were impaired in their academic and global functioning, and reported more parental psychiatric treatment contacts than adolescents without psychiatric disorders. Two thirds (68 %) of adolescents with SP reported having been bullied by peers. Only one fifth of adolescents with non-comorbid SP had been in contact with a mental health professional.

In studying the peer relationship correlates of comorbid and non-comorbid social phobia and depression it was found that comorbidity between the two conditions was associated with higher frequencies of peer victimization than what was found for social phobia or depression alone. Multivariate analyses showed that depression alone did not maintain an independent association with peer victimization when social phobia and other common correlates of depression were controlled for.

To conclude, this study demonstrated that the SPIN-FIN is a reliable and valid measure of social phobia among Finnish adolescents. Social phobia seems to be a common and undertreated disorder among Finnish adolescents, and is associated with depressive disorders and other anxiety disorders in over 40 % of cases. Overt and covert peer victimization seem to be associated with social phobia, rather than depression, among adolescents.

2 LIST OF ORIGINAL PUBLICATIONS

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

- I Klaus Ranta, Riittakerttu Kaltiala-Heino, Anna-Maija Koivisto, Martti T. Tuomisto, Mirjami Pelkonen, Mauri Marttunen. Age and gender differences in social anxiety symptoms during adolescence: the Social Phobia Inventory (SPIN) as a measure. *Psychiatry Research* 2007; 153, 261-270.
- II Klaus Ranta, Riittakerttu Kaltiala-Heino, Päivi Rantanen, Martti T. Tuomisto, Mauri Marttunen. Screening social phobia in adolescents from general population: the validity of the Social Phobia Inventory (SPIN) against a clinical interview. *European Psychiatry* 2007; 22, 244-251.
- III Klaus Ranta, Riittakerttu Kaltiala-Heino, Päivi Rantanen, Mauri Marttunen. Social phobia in Finnish general adolescent population: prevalence, comorbidity, individual and family correlates, and service use. *Depression and Anxiety* (in press)
- IV Klaus Ranta, Riittakerttu Kaltiala-Heino, Mirjami Pelkonen, Mauri Marttunen. Associations between peer victimization, and self-reported depression, and social phobia among adolescents: role of comorbidity. *Journal of Adolescence* (in press)

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3 INTRODUCTION

The experience of anxiety is universal. We can *feel* the bodily symptoms, trembling of the hands, pounding of the heart, and nauseous feeling in the gut associated with distress upon encountering the thing we fear. Sometimes these affective and bodily symptoms arise in us at the mere mention of the thing we fear or when imagining it. We fear that something close at hand will do us harm, or construct catastrophe scenarios that something adverse will happen in the future. The associated affect is panic. Moreover, the experience of anxiety is associated with avoidance of situations and triggers that start it. Such a model encompassing cognitive/affective, physiological, and behavioural dimensions of anxiety (see Barlow 2002) is represented in modern conceptualizations of anxiety disorders (APA 1994). How can we help but remember from own experience how it was when we had to give an oral presentation before the class at fourteen years of age: “*They’ll laugh at me, I feel sick..., I don’t want to go... “.*

The field of empirical study of child and adolescent anxiety disorders was substantially expanded in the 1980’s (Vasey and Dadds 2001). Major changes to the conceptualization and classification of children’s and adolescents’ fears, phobias, and anxiety states were made. This also gave rise to the study of social anxiety and social phobia (SP), the clinical manifestation of persistent and intense anxiety occurring in social situations, among children and adolescents (Albano et al. 1995; Morris 2001). Yet until the DSM-IV (APA 1994) classification of mental disorders, there were methodological drawbacks in the reliability and validity of diagnostic categories of child and adolescent anxiety disorders, resulting in overlapping categories (Beidel and Morris 1995). As a result of diagnostic refinement, at least the reliability of the diagnoses has now improved. Though many researchers now agree that the degree of functional impairment required for a diagnosis of an

anxiety disorder, such as SP, explains most diagnostic disagreements (Frances 1998; Furmark 2002), the finding that many children and adolescents suffer from anxiety symptoms crossing several anxiety disorder categories still suggests problems for present classification systems. They probably need still to be revised, for example, to more accurately reflect the interplay between individuals' unique biological makeup and the environment (Jensen et al. 2006).

The DSM-IV classification (APA 1994) defines social phobia (300.31) among children and adolescents in much the same way as it is defined among adults, the core symptom being persistent and intensive fear and distress experienced in one or more social situations. The main fear is of being negatively evaluated (Watson and Friend 1969), the individual fears that one will do something that is embarrassing or that one is showing symptoms of anxiety. Four developmental features of SP are specified in DSM-IV, of which the most notable is that the anxiety should occur in peer settings, not just in interactions with adults (APA 1994).

Although the etiology of SP is most likely multifactorial (Ollendick and Hirschfeld-Becker 2002; Rapee and Spence 2004), peer influences on the maintenance or even on onset of SP are likely to contribute (Parker et al. 2006), considering, for example, the accounts of adults with clinical SP of their early social traumas (Öst and Hugdahl 1981; Stemberger et al. 1995), and consistent associations between self-reported high social anxiety and being bullied among adolescents (Vernberg et al. 1992; Juvonen et al. 2003; Storch et al. 2005).

Despite the nosological advances, few instruments have yet been conceptualized for the assessment of SP among adolescents based on the three dimensions of social anxiety (fear, avoidance and physiological symptoms) as it is defined in the DSM-IV (Myers and Winters 2002).

The study of child and adolescent anxiety disorders has been limited in Finland. Research groups in child psychiatry have presented prevalence estimates of selected mental disorders (Almqvist et al. 1999) among 8 to 9-year-old children. Adolescent studies have been presented (Pelkonen et al. 2003; Holm et al. 2005; Karlsson et al. 2006) concentrating mainly on epidemiology, assessment and correlates of mood disorders and suicidal behaviour, and also following adolescents into early adulthood. Prevalence estimates have been presented for mental disorders among Finnish young adults (Aalto-Setälä et al. 2001). However, Finnish epidemiological studies concentrating on anxiety disorders in adolescence have so far been lacking. This seems a drawback, knowing that SP has its risk period for onset just at that point. The present study, based on data from the Adolescent Mental Health Cohort and the Well-Being in Adolescence Studies seeks to provide important results on social phobia at early to mid-adolescence - at the time when it begins to have impact on adolescent lives, and begins to cause considerable suffering to those who have it.

4 REVIEW OF THE LITERATURE

4.1 Social phobia as a clinical disorder among adolescents

Social phobia, or Social Anxiety Disorder (APA 1994), is an anxiety disorder in which the principal symptom is the fear of being negatively evaluated in one or more social situations. This fear leads to anxiety and distress in those situations, and to considerable suffering in those situations or to avoiding them. If the anxiety is present on most or several social occasions, the DSM-IV specifies it as a “generalized subtype” of SP (APA 1994).

The definition of social phobia among children and adolescents has changed during in the recent decades. Although it has been possible to establish the formal diagnosis of social phobia among children and adolescents from the classification system DSM-III (APA 1980) onwards, the DSM-III and the DSM-III-R (APA 1987) systems still defined two distinct child and adolescent anxiety disorders which also included symptoms clearly relating to social-evaluative anxiety: avoidant disorder, and overanxious disorder. However, empirical studies failed to make distinctions between avoidant disorder and social phobia: there was significant overlap in the criteria, leading to substantial comorbidity between these disorders among children and adolescents affected by them (Francis et al. 1992). Overanxious disorder was also poorly distinguished from other anxiety disorders (Silverman and Ginsburg 1995). Both avoidant disorder and overanxious disorders were subsequently dropped from the DSM-IV. The DSM-IV, in turn, stresses the continuity between child, adolescent and adult social phobia, but defines some additional features which characterize

the disorder among children and adolescents. The full DSM-IV criteria for social phobia (APA 1994) are listed in Table 1.

Table 1. DSM-IV definition of social phobia (APA 1994)

-
- A. A marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. The individual fears that he or she will act in a way (or show anxiety symptoms) that will be humiliating or embarrassing. Note: In children, there must be evidence of the capacity for age-appropriate social relationships with familiar people and the anxiety must occur in peer settings, not just in interactions with adults.
 - B. Exposure to the feared social situation almost invariably provokes anxiety, which may take the form of a situationally bound or situationally predisposed panic attack. In children, the anxiety may be expressed by crying, tantrums, freezing, or shrinking from social situations with unfamiliar people.
 - C. The person recognizes that the fear is excessive or unreasonable. In children, this feature may be absent.
 - D. The feared social or performance situations are avoided or else are endured with intense anxiety or distress.
 - E. The avoidance, anxious anticipation, or distress in the feared social or performance situation(s) interferes significantly with the person's normal routine, occupational (academic) functioning or social activities or relationships, or there is marked distress about having the phobia.
 - F. In individuals under 18 years of age, the duration is at least six months.
 - G. The fear or avoidance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition and is not better accounted for by another mental disorder (e.g., panic disorder with or without agoraphobia, separation anxiety disorder, body dysmorphic disorder, a pervasive developmental disorder or schizoid personality disorder).
 - H. If a general medical condition or another mental disorder is present, the fear in Criterion A is unrelated to it; (e.g., the fear is not of stuttering, trembling in Parkinson's disease or exhibiting abnormal eating behaviour in anorexia nervosa or bulimia nervosa.)

Specify if: Generalized: if the fears include most social situations (also consider the additional diagnosis of Avoidant Personality Disorder)

Although the distinction non-generalized / generalized has been criticized as arbitrary (Stein et al. 2000; Hook and Valentiner 2002; Hofmann et al. 2004; Ruscio et al. 2008), Hofmann et al. (1999) found some evidence that the presentation of the generalized subtype of social phobia among adolescents seeking clinical attention seems to be roughly similar to that described among adults. In their clinical sample, 45 % of adolescents who sought treatment for SP had generalized SP, and presented fears broadly over four "situational domains": formal speaking/interaction situations, informal speaking / interaction situations, situations in which one is observed by others, and situations in which they need to be assertive. Piqueras et al. (2008) found evidence for four distinct subtypes of social phobia among a large sample of Spanish adolescents with DSM-IV SP using factor analytic and cluster analysis methodology: specific SP (consisting of symptoms evident only in one or more performance situations, or alternatively of interaction anxiety symptoms in one specific situation); and mild, moderate, and severe generalized SP. The last three were found to be quantitatively different from each other with respect to the number of situations being feared, and also with respect to different kinds of comorbidity patterns.

The ICD-10 criteria for social phobia (WHO 1992), officially in use in Finland, are largely equivalent to the DSM-IV criteria for social phobia. A minor difference is that ICD-10 describes a list of autonomic nervous system symptoms associated with fear and anxiety. More notable for children and adolescents is that ICD-10 lists a group of childhood anxiety disorders (Group F93 - including F93.2 - social anxiety disorder of childhood), defining these as exaggerated variants of normative age-related fear and anxiety symptoms. Despite this, the ICD-10 definition for adult social phobia (F40.1) can also be used for children and adolescents (WHO 1992). Thus, the DSM-IV stresses the continuity between child, adolescent and adult social phobia more so than the ICD-10.

4.2 The developmental psychopathology of social phobia

Developmental psychopathology is an evolving scientific discipline whose predominant focus is elucidating the interplay between the biological, psychological, and social-contextual aspects of normal and abnormal development across the life span (Cicchetti 2006). In this context attempts to integrate the findings from the research in these areas have begun to trace the pathways leading to a heightened risk for the emergence of social phobia (Morris 2001; Ollendick and Hirschfeld-Becker 2002; Neal and Edelmann 2003). In this broader view, the constructs of shyness and social anxiety refer to a phenomenon lying on the same continuum as social phobia, social phobia being the extreme form of social anxiety, and leading to functional impairment (Rapee and Spence 2004).

Developmental psychopathologists have integrated research done by social psychologists in the area of shyness – the tendency to be withdrawn in novel social situations. The findings indicate that even in the first year of life, a fear for strangers (fearful shyness) - often associated with anxiety or fear of physical threat - is clearly evident in some individuals. A fear precipitated by social evaluation, on the other hand, emerges around 4-6 years of age in some children (Buss 1986; Asendorpf 1989). In another stream of longitudinal research, reserved and fearful infant temperament type termed behavioural inhibition (BI), has been linked to later social phobia in some longitudinal studies (Schwartz et al. 1999; Biederman et al. 2001). However, it remains open whether BI acts as a precursor to social anxiety specifically, or to anxiety disorders in general (Hirshfeld-Becker et al. 2003; Rapee and Spence 2004; Chavira and Stein 2005; Hirshfeld-Becker et al. 2007).

Support for a genetic contribution in the etiology of social phobia has been gained from family studies. These studies have found aggregation of social phobia, especially the generalized subtype, in the parents of children with social phobia, as well as in first-degree relatives of adults with social

phobia (Merikangas et al. 1998; Stein et al. 1998; Lieb et al. 2000; Merikangas et al. 2003).

Family studies alone, however, cannot rule out shared familial or individual-specific environmental etiological factors, such as maladaptive interaction patterns in the family or in a broader social context. Twin studies have found that homozygotic twin pairs show a higher concordance rate than dizygotic pairs for social phobia symptoms (Kendler et al. 1992; Kendler et al. 2001) and for social-evaluative fears (Stein et al. 2002a) suggesting a possible direct genetic contribution. Results from female twin studies suggest a moderate heritability for social phobia: 31 % of the variance underlying susceptibility to SP has been estimated to be due to genetic influence - of this 10% due to genetic factors shared by all phobias (Kendler et al. 1992). Among men Kendler et al. (2001) found evidence of only a modest genetic contribution to SP (heritability estimate 11 %) plus evidence of shared familial environmental contribution. However, when analyzing male social fears and phobias as one group, Kendler et al. (2001) arrived at an estimate of 24 % of purely genetic contribution, no more evidence of shared familial environmental contribution, and the rest of variation explained by individual-specific factors. As a whole genetic studies indicate a moderate role for genetic factors to the liability to the symptom continuum ranging from social fears to SP (Kendler et al. 1992; Kendler et al. 1999; Nelson et al. 2000; Kendler et al. 2001; Stein et al. 2002). Behavioural inhibition as an innate temperament type has been suggested as a possible phenotype of the genetic transmission of social phobia.

Neurobiological factors associated with social phobia may include dysfunctions in the regulation of the neurotransmitters dopamine and serotonin, but it is uncertain if the differences observed between subjects with social phobia and controls are functional and evident only when situational triggers cause them in social encounters, or if they are constitutional to the central nervous system (Agyropoulos et al. 2001). In contrast to other anxiety disorders, pre- and postsynaptic striatal

dopamine dysfunction in particular seems to play a prominent role in social phobia (Li et al. 2001). Autonomous nervous system and heartbeat hyper-reactivity in public speaking situations may mediate symptoms of social anxiety among subjects with non-generalized social phobia (i.e. among those with pure public speaking fears) in contrast to individuals with generalized social phobia, who do not show the same hyperreactivity (Agyropoulos et al. 2001).

Information-processing studies have found that subjects with generalized social phobia may process emotional cues in social situations, such as angry or contemptuous facial expressions, in a different way than normal controls. Exaggerated amygdala action in the limbic system may be the neural pathway involved in this (Stein et al. 2002b). Battaglia et al. (2005) found that 8- to 9-year-old children with temperamental characteristics of BI and biased processing of facial expressions have specific genotype with regard to serotonin transporter promoter genes. Thus shyness or BI may be associated to neurobiological and genetic markers and social-emotional information processing biases, which are identifiable in childhood already.

Developmental researchers have found some support linking insecure attachment relationship in the infant and development of subsequent anxiety disorders in adolescence, although the association seems non-specific to social phobia (Warren et al. 1997). Family atmosphere of over-controlling (Rapee and Melville 1997) or authoritative, rejecting (Klonsky and Dutton 1990) parenthood have also been found to be associated with subsequent social anxiety and social phobia. Both insecure attachment type and poor emotional availability of the parent (i.e. parent being critical, anxious, irritable, or depressive) may mirror significant compromising in the central role of the parent as a provider of reliable and gentle regulation of the emotional states of the child, and subsequently lead to dysfunction of the child's own emotional regulation (Thompson 2001).

Retrospective studies of adults with social anxiety or social phobia (Öst and Hugdahl 1981; Stemberger et al. 1995; Hackmann et al. 2000) first suggested a role for early traumatic social experiences in the development of social phobia. The potential contribution of peer interactions, namely peer harassment and victimization, to the development of heightened social anxiety has also been studied. There is a body of research consistently showing the cross-sectional associations between self-reported social anxiety and being indirectly or directly bullied, and some longitudinal studies also pointing to the role of dysfunction in peer relationships as a risk factor for social anxiety or social phobia (See Section 4.6.3).

According to the tenets of developmental psychopathology, a single psychopathological process, such as the development of social phobia, may be manifested as different symptoms in different phases of development (Cicchetti 2006). Furthermore, the manifestation of a disorder may be different among boys and girls (Zoccolillo 1993). In the same vein, “developmental epidemiology” should be sensitive to detect the age and gender-bound manifestations of the same psychopathology continuum, thus epidemiological research has much to offer to the understanding of the developmental trajectories underlining SP (Costello et al. 2005). A significant and consistent finding has been the peaking of symptoms of social anxiety and clinical social phobia in adolescence (Essau et al. 1999; Wittchen et al. 1999), suggesting the typical onset in early to mid-adolescence (Wittchen and Fehm 2001). Girls report more symptoms of social anxiety and social phobia in population samples (Vernberg et al. 1992; La Greca and Lopez 1998; Costello et al. 2005), but evidence comes only from limited geographical areas.

It seems, thus, that the potential pathways for the emergence of social phobia are diverse. Different innate, early infancy, childhood and adolescence -related risk factors may contribute to the psychopathology in different individuals. Clearly more research is needed on the possible social

phobia subtypes which may be associated with different combinations of risk factors. It has been claimed that the emergence of social phobia in early adolescence, found in epidemiological studies, may be more dependent upon the diagnostic criteria, which require that the individual suffers from functional impairment and considerable distress about the symptoms. Both of these may be evident for the first time in early adolescence, with the need for more social interaction outside the family (Rapee and Spence 2004). Indeed, there is some evidence from epidemiological studies that the avoidance of social situations develops first in adolescence, at 12 to 14 years of age, about 1 to 2 years later than the age of first significant social fear (Ruscio et al. 2008).

In sum, it seems that the emergence of more severe social anxiety and social phobia in adolescence likely results from the combined action of diathesis for social phobia and all the more stressful, even potentially traumatizing social interactions with peers and broader social environment.

4.3 Epidemiology of social phobia in adolescent population samples

4.3.1 Prevalence and gender differences

In light of current knowledge, social phobia has seemed a relatively common psychiatric disorder among adolescents in general population studies. The prevalence of DSM-IV SP has for the main part ranged between 2-3 % in studies presented in recent years: in the Munich Early Developmental Stages of Psychopathology (EDSP) Study in Germany Wittchen et al. (1999) estimated a 12-month prevalence of 3.0 % for combined generalized and non-generalized SP among 14 to 17-year-old adolescents, and Essau et al. (1999) found a lifetime prevalence of 1.6 % for SP among 12 to 17-

year-olds. In Puerto Rico Canino et al. (2004) reported a prevalence rate of 2.5 % for SP among 4 to 17-year-old children and adolescents. Substantially lower prevalence estimates were found in the USA: Costello et al. (2003) reported a three-month prevalence for SP ranging between 0.1 and 1.2 % among adolescents aged 12-16 from general population.

Higher prevalence estimates for SP have been presented for subjects in late adolescence: in the USA Nelson et al. (2000) reported a lifetime DSM-IV SP prevalence of 16.3 % among female adolescents with a mean age of 18 years. Studies using the DSM-III-R criteria have also reported high lifetime prevalence among subjects in late adolescence and early adulthood: for example a lifetime prevalence of 14.9 % among 15 to 24-year-old adolescents and young adults from the National Comorbidity Study (NCS) was found (Magee et al. 1996). The Finnish studies reporting prevalence estimates for SP include young adults (Aalto-Setälä et al. 2001, reporting an 1-month estimate of 1.2 % for 20-24 year-olds), adults (Pirkola et al. 2005, reporting a 12-month estimate of 1.1 % for over 30-year-old adults), and children (Almqvist et al. 1999, reporting a low DSM-III-R estimate of 0.1 % for 8-9-year-olds).

Self-reported social fears are indeed common among adolescents, as from 30 to 50 % report at least one social fear, the most common being fears of public speaking (Essau et al. 1999; Wittchen et al. 1999). Around 20 % of adolescents exceed the cutoffs for increased social anxiety in self-report measures (Storch et al. 2004). Social-evaluative fears, especially, seem to increase from childhood to adolescence (Westenberg et al. 2004).

Community studies have mainly found the female to male ratio to be about 2:1 in adolescents with SP (Essau et al. 1999; Wittchen et al. 1999; Romano et al. 2001), with one study reporting an approximately even distribution between the sexes (Reinherz et al. 1993), although in this study the

gender ratio was presented for phobias, with two thirds of adolescents fulfilling the criteria for SP. Studies of mixed child-adolescent samples have yielded inconsistent results: some studies show a preponderance of girls (Angold et al. 2002; Costello et al. 2003), others an even distribution between the sexes (Canino et al. 2004). In adult samples from Western societies the female to male ratio of SP has varied mainly between 1.5:1 and 2:1 (Furmark 2002).

4.3.2 Comorbidity

In community samples adolescent social phobia has been found to be a highly comorbid condition. Comorbid depressive disorder has been found in approximately one third of adolescents and young adults with lifetime DSM-IV SP: Essau et al. (1999) in 29 % of 12-17-year-old adolescents, Wittchen et al. (1999) in 31 % of 14- to 24-year-olds, and Nelson et al. (2000) in 30 % of females identified from a twin register. Other anxiety disorders than SP have also frequently been reported in adolescents with SP: Wittchen et al. (1999) found nearly 50 % comorbidity of another anxiety disorder with a lifetime SP; whereas Essau et al. (1999) reported a lifetime comorbidity of 24 % for both agoraphobia and Anxiety disorder NOS.

Results from community studies investigating the association of DSM-IV SP and alcohol use disorders among adolescents have produced somewhat mixed results. Essau et al. (1999) reported comorbid alcohol use disorder occurring in 24 % of 12 to 17-year-olds with lifetime SP in Germany; whereas in the U.S. Nelson et al. (2000) reported a comorbidity of 18 % between lifetime SP and alcohol use disorder among female adolescents with a mean age of 18 years. The Munich EDSP follow-up study found a lifetime association of around 20 % between SP and alcohol abuse / dependence. More detailed analyses and follow-up measurements at four years showed that SP had

a significant effect on the persistence of alcohol dependence and subsequent onset of regular or hazardous use of alcohol, defined as an average ethanol consumption of 40 g/day in men and 20 g/day in women in the period of peak lifetime use (Zimmerman et al. 2003).

Adult studies have indicated that the generalized subtype of SP is more invalidating and comorbid than the non-generalized subtype (Kessler et al. 1999). Prospective population studies among adolescents have indeed shown the same: adolescents with generalized SP are more impaired in their functioning, suffer more commonly from comorbid disorders, and are prone to subsequent anxiety and depressive disorders (Pine et al. 1998; Wittchen et al. 1999; Stein et al. 2001). Self-medication with alcohol or non-prescribed drugs among those with SP likely increases with age: Bolton et al. (2002) found 21% of adults using this kind of self-medication to alleviate their symptoms.

4.3.3 Impairment

Adolescent social phobia seems to associate with significant functional impairment in the areas of education, peer settings and hobbies. In the EDSP Study about 20 % of 15 to 24-year-old youths with comorbid generalized SP had been unable to go to school or to work for more than 2 days in the past month because of SP, and around 40 % reported impaired work performance (Wittchen et al. 1999) In the study by Essau et al. (1999) 60 % of adolescents with SP had been somewhat or severely impaired at school or work, 27 % in leisure time and 53 % in social contacts during the past month. Kessler (2003) analysing data from the National Comorbidity Survey found that of all mental health disorders SP had a specific association with being unable to perform a role transition from high school to college in late adolescence. This suggests that SP may have a role in narrowing

the major life or career decisions of late adolescents, possibly because of a fear of new social situations.

4.3.4 Onset, course and outcome

Epidemiological and clinical studies among adolescents (Strauss and Last 1993; Wittchen et al. 1999; Nelson et al. 2000), and among adults using retrospective assessment (Schneier et al. 1992; Davidson et al. 1993; Degonda and Angst 1993; Magee et al. 1996; Chartier et al. 1998; Otto et al. 2001; Merikangas et al. 2002), point to the onset of clinical social phobia as occurring in early- to mid-adolescence, with the mean age of onset between 10 and 17 years (Wittchen and Fehm 2003). The results from the EDSP study indicate that the age at onset of the generalized subtype of SP may be lower (11 to 12 years), compared to the non-generalized subtype (14 to 15 years) (Wittchen et al. 1999).

The course of SP in prospective studies seems to be chronic, with periods of exacerbation and alleviation of symptoms, but full remission during adolescence and young adulthood seems rare. For example, a supportive relationship with a partner may bring relief from symptoms, but rigorous challenges in work or in educational settings to participate in new performance or social situations may again cause full-blown symptoms. With a follow-up period to the mid-thirties, the EDSP study found few new cases of social phobia after 20 years of age (Wittchen and Fehm 2003). The same pattern has been demonstrated in adult studies. The long-term outcome of SP, in the light of retrospective adult studies, is of continuation with only 20 to 40 % of adults recovering over a time span of 20 years from onset (Wittchen and Fehm 2001; Ruscio et al. 2008).

4.3.5 Individual, familial, and socio-demographic correlates

A number of studies, mostly using retrospective assessment among adults, have suggested that social phobia is associated with impairment in school, lower grades, failing a grade, or dropping out of school prematurely during adolescence (Davidson et al. 1993; Davidson et al. 1994; Wittchen et al. 1999; Essau et al. 2000; Stein and Kean 2000; Chartier et al. 2001; Van Ameringen et al. 2003). Experiences of having been bullied have been found to correlate with heightened self-reported social anxiety among adolescents (Juvonen et al. 2003, Storch and Masia-Warner 2004). However, to the best of the author's knowledge, there is still little evidence on the associations between clinical, interview-ascertained SP and being bullied among adolescents.

Familial correlates of SP identified mainly in adult community and clinical studies, have included parental marital conflict and divorce during childhood, lack of close relationships with an adult, over-controlling rearing style of the parent, parental depression or anxiety disorder, notably social phobia (Davidson et al. 1993; Chartier et al. 1998; Magee 1999; Lieb et al. 2000; Chartier et al. 2001; Merikangas et al. 2002, Merikangas et al. 2003; Bandelow et al. 2004). Some studies suggest that being an only or firstborn child may contribute to subsequent social anxiety, but other studies have failed to support this finding (Klonsky and Dutton 1990; Rapee and Melville 1997; Chartier et al. 2001). SP may lead to ultimate compromised educational level and income in adulthood, but associations between low parental social class and offspring SP have not been found (Davidson et al. 1993; Chartier et al. 2001).

Familial aggregation studies have found that if the parent has SP, there is a five-fold risk of the child having SP by late adolescence compared to the children of parents without a mental disorder. If the parent has a mood disorder or anxiety disorder other than SP, this is associated with a three-

fold risk for the child having SP compared to the children of non-disordered parents. The associations between parent and child SP seem to be significantly stronger for the generalized subtype than for the non-generalized subtype (Merikangas et al. 1998; Lieb et al. 2000; Merikangas et al. 2003).

4.3.6 Treatment seeking

Community-based studies have discovered that only a small proportion of adolescents with social phobia receive professional help. Essau and colleagues (1999) reported that about one fifth of adolescents with SP had sought treatment for their problems. The EDSP study (Wittchen et al. 1999) reported that approximately 10 % of adolescents and young adults with non-generalized SP, and 27 % of those with generalized SP had sought professional treatment; comorbid disorders increased the percentage to 15 %, and 44 % respectively.

4.3.7 Methodological issues in epidemiological studies

The varying criteria used for differentiating threshold and near-threshold symptoms between epidemiological studies are likely to be one of the major reasons for the differing prevalence estimates found for social phobia (Furmark 2002). Methodological differences between using highly structured interviews administered by lay interviewers or semi-structured interviews by clinicians may yield differing criteria for what constitutes the clinical significance of an anxiety symptom or when it is impairing (Frances 1998). In social phobia, this may be difficult (Heimberg 2003). Age-sensitive assessment of impairment may be especially difficult. Adolescent studies may

differ between whether parental interview has been used as an additional source of information or not (Verhulst et al. 1997; Essau et al. 1999; Wittchen et al. 1999). The decision on which information to use may be difficult given the frequently poor agreement between parents and adolescents on the presence of anxiety disorder symptoms (Verhulst et al. 1997; Choudhury et al. 2003).

Different screening methods are utilised between studies, with obviously different sensitivity to detect anxiety symptoms. Clinical interview methods may cover the range of different symptom areas of distinct anxiety disorders differentially, and possess varying psychometric qualities to assess different anxiety disorders (Schniering et al. 2000; Langley et al. 2002).

4.4 Adolescent social phobia in clinical studies

4.4.1 Clinical phenomenology

Children and adolescents who have sought treatment because of social phobia have scarce or nonexistent peer relationships, poorer social skills than controls, and, as judged by peers, tend to perform worse than others in social-evaluative situations (Beidel et al. 1999). Likewise, Spence et al. (1999) found among clinically referred 7 to 14-year-olds with SP clear deficits in social skills, expectations of poor performance and negative outcome in situations with social-evaluative characteristics, and a tendency to poor self-appraisal of performance. Furthermore, peers judged their performance in such situations worse compared with the performance of children and adolescents without SP.

Using the same interview method (Anxiety Disorders Interview Schedule for DSM-IV – Children and Parent Versions; ADIS-C/P; Silverman and Albano 1996) as used in their earlier child and adolescent study (Beidel et al. 1999), Beidel et al. (2007) studied the clinical phenomenology of SP in a solely adolescent (age range 13 to 16 years) volunteer sample. They concluded that compared to their earlier results on children with SP (Beidel et al. 1999), adolescents with SP showed anxiety across a much wider range of informal and formal social situations, and suffered from a much more pervasive pattern of avoidance than children with SP. One third of adolescents with SP were not involved in any extra-curricular activities and more than three out of four reported having fewer friends than most other teens (Beidel et al. 2007). Inferences from the comparison of these results must be cautious because the severity of symptoms may vary in different samples.

Besides the obvious impairment in forming friendships, generalized SP may cause interference for adolescents in school in a wide variety of situations: oral presentations, speaking or answering in class, asking the teacher for help, writing on the blackboard, eating in the school canteen, participating in group-work, walking in the hallways, doing sports. Adolescents with generalized SP may be frequently absent from school, and present with school refusal (Albano et al. 1995).

4.4.2 Clinical treatment

The most investigated psychosocial treatment models for adolescent social phobia are cognitive-behavioural group treatments (Social Effectiveness Therapy for Children - SET-C; Beidel et al. 2000; Social Skills Training - SST; Spence et al. 2000; Cognitive-Behavioral Group Therapy for Adolescents - CBGT-A; Albano 2003; Skills for Academic and Social Success - SASS; Masia-Warner et al. 2005). The main components of these treatment models include psychoeducation

about the symptoms of social phobia, social skills training; providing adolescents with tools that help them to cope with anxiety, and exposure to anxiety-provoking social situations. Adolescents are encouraged to go into situations with same-age peers which they have previously avoided. In some models teachers or volunteer adolescents are recruited for support in this. The main aim is to practise newly acquired social skills and cognitive abilities to cope with anxiety in real settings (Beidel et al. 2000; Spence et al. 2000; Albano 2003; Masia-Warner et al. 2005). Adolescent and adult (Zaider and Heiberg 2003) studies taken together, the key component of cognitive-behavioural therapy (CBT) appears to be exposure to feared social situations.

Research on the treatment of adolescent SP with medication has been sparse. Few placebo-controlled trials have been conducted primarily in mixed samples of children and adolescents. The results suggest a potential benefit from selective serotonin reuptake inhibitors (SSRI) fluoxetine (Birmaher et al. 2003), fluvoxamine (Walkup et al. 2001), and paroxetine (Wagner et al. 2004), and of serotonin norepinephrine reuptake inhibitor (SNRI) venlafaxine (March et al. 2007) in generalized social phobia.

4.5 Social phobia and peer victimization

4.5.1 The developmental significance of peer relationships

Theoretical and empirical research indicates that adolescents spend much of their leisure time with peers (Parker et al. 2006), rely on peers as an important source of social support (Hartup 1996), and as a basis for social comparison (Harter 1999). The gradual establishment of personal autonomy from parents is gained through peer relationships. Thus being subjected to overt or covert forms of

aggression from peers, such as bullying, is likely to interfere with important developmental processes and cause emotional adjustment problems (Prinstein et al. 2001).

4.5.2 Types of victimization

Overt or direct victimization defined as bullying, hitting, name-calling, threatening, or otherwise directly and deliberately hurting a weaker peer, was the first type of aggressive behaviour between same-aged children and adolescents examined in research in the 1980's (Smith et al. 2002).

However, it became evident that direct forms of aggression did not cover the range of rejecting behaviours between adolescents. Especially among girls, indirect and often covert forms of aggression such as gossiping or spreading rumours and social exclusion – deliberately excluding a peer from a group – seemed to be relatively common (Björkvist et al. 1992). Researchers have subsequently termed this type of aggression either indirect/covert or used the term relational victimization, defined as an act of harming others through purposeful manipulation and damage of their peer relationships (Crick and Grotpeter 1995). A reliable measurement of victimization most likely requires the use of multiple perspectives, combining reports from victims and bullies, sociometric ratings from peers, and teacher reports (Graham and Juvonen 1998; Ladd and Kochenderfer-Ladd 2002).

4.5.3 Social anxiety and peer victimization

In epidemiological research, peer victimization has consistently been associated with mental health problems among children and adolescents. Clear associations between being victimized and externalizing symptoms (aggressiveness and conduct problems) have been found among children. Among adolescents victimization seems to associate more with internalizing (emotional) symptoms, such as depression and anxiety – conceptualized either as general level of anxiety or as social anxiety. (Hawker and Boulton 2000; Grills and Ollendick 2002)

A number of cross-sectional studies have demonstrated that elevated levels of social anxiety are present among adolescents who report being bullied (Juvonen et al. 2003; Storch and Masia-Warner 2004; La Greca and Harrison 2005). Studies assessing longitudinal associations (Vernberg et al. 1992; Gazelle and Ladd 2003; Storch et al. 2005) indicate that the relationship between peer victimization and heightened social anxiety is likely to be reciprocal and bidirectional.

However, most of the studies have been cross-sectional, have relied on self-report scales, and have not controlled between comorbidity between different maladjustment symptoms. Little is known of the associations between DSM-IV defined social phobia and victimization in community samples. Associations of peer victimization with adolescent depression and social phobia, while controlling for comorbidity between them, have not been explored in earlier research.

4.6 Assessment of social phobia among adolescents

4.6.1 Psychometric research of scales assessing psychopathology

Measuring anxiety is like measuring any complex psychological construct. Anxiety may be defined as a set of emotional reactions arising from the anticipation of a real or imagined threat to the self (Fonseca and Perrin 2001). As such, direct measurement of anxiety in the same manner as measuring some physical variable in natural science is not possible. Rather, the aim is to measure the underlying theoretical construct of anxiety, the “latent variable” (De Vellis 1991). The construct of social anxiety refers to emotions (fear, distress), cognitions (worrisome and fearful thoughts related to the different aspects of the social situation), and to the physiological responses aroused in the nervous system. Measuring the related construct of social phobia, for example as defined in DSM-IV, requires also taking account of avoidance behaviour.

In addition to what is measured, elementary questions regarding the use of the test are: what is the test aimed at? I.e. is it a diagnostic test aiming at confirming a psychological state or mental disorder, or is it a screening test, aiming to maximize the correct classification of individuals who have the target state/disorder, and simultaneously also minimizing false classifications? At which age and in which cultural population is it intended to be used? How common is the state/disorder one wishes to measure in the population in which one wishes to measure it? (Beaglehole et al. 1993; Fonseca and Perrin 2001; Grimes and Shulz 2002; Bossuyt et al. 2003)

4.6.1.1 Validity of a test

Validity is the most important characteristic of a test. The validity of a test depends on the ability of

the test to truly measure the underlying phenomenon or construct for what it was designed to measure. This basic property of a test is usually referred to as its construct validity. Several other types of validity, however, can be distinguished when judging the test, and different authors and experts may even classify and subdivide them in different ways. The following classification follows De Vellis (1991) and Rust and Golombok (1999).

1) *Face validity* refers to the overall credibility and acceptability of the test and the items for both the respondent and the user of the test. For example, an adolescent may not regard items with the wording “I don’t like playing with other children” as feasible, whereas a researcher may have wanted to measure the subjects’ avoidant tendency. Such an item may not have face validity because it is developmentally inappropriate (Schniering et al. 2000).

2) *Content validity* refers to how well the test as a whole is capable of representing all dimensions of the particular construct which it was intended to measure. Thus, a measure of social anxiety which does not capture the range of emotional, cognitive, physiological and behavioural symptom areas associated with it does not have good content validity. Thus, there is no statistical test to indicate how high the content validity of the test is, and often expert opinion is needed.

3) *Criterion-related validity* refers to the ability of the test to produce results that are in empirical association with some outside criterion used as a “gold standard”, against which the test results are compared. In psychiatric research, gold standard procedures (for example Longitudinal, Expert, All Data - LEAD procedure; Spitzer 1983) have included a structured clinical interview administered by an expert and construing a diagnosis based on that information and combining it with longitudinal data on the tested subject which is as comprehensive as possible. *Predictive validity*, belonging essentially in the category of criterion-related validity, refers to the ability of a test to

produce results that allow correct predictions about the future state / classification / performance of the subject.

4) *Concurrent validity*: This refers to the co-variation or concurrence of the results of the test with the results of another, psychometrically valid test when they are given at the same time. If the results of the new test are in line with the earlier, valid test (i.e. both show variation in the same direction or give the same result / diagnosis), then this lends credibility to the validity of the new test. In contrast, the test's *divergent validity* is demonstrated through a low correlation with a test that measures a different construct.

5) *Construct validity*: A test has good construct validity if it accurately measures a theoretical, non-observable construct, such as social phobia. The construct validity of a test is worked out over a period of time on the basis of an accumulation of evidence (De Vellis 1991; Rust and Golombok 1999). In psychiatric research the term construct validity is often used when a test shows an ability to produce results positively associated with diagnoses from structured interviews i.e. those who have the disorder score higher than those without the disorder. Thus, construct validity emerges gradually through repeated trials in which the test shows good criterion-related validity. The term *discriminative validity* refers to the ability of the test to discriminate between subjects with different disorders, for example the ability to distinguish those with anxiety from those with depression.

If the purpose of the test is screening, the test should demonstrate good diagnostic efficiency statistics in order to demonstrate validity. *Sensitivity* reflects the proportion of subjects with the target disorder who have a positive test result (i.e. above a given cut-off score); *specificity* reflects the proportion of subjects without the target disorder who have a negative test result (i.e. below a given cut-off score); both of them should be reasonable. *Positive* and *negative predictive values* (PPV, NPV) of a test, unlike sensitivity and specificity are dependent on the frequency of the

disorder screened in the population (Grimes and Schultz 2002; Streiner 2003). Thus, lower test PPV s' may be satisfactory in unselected general populations, in which the disorder is rare compared to the PPV s' of the same test in a clinical population, in which the disorder is frequent.

4.6.1.2 Reliability of a test

Reliability refers to how consistent a test is. How consistently components of the instrument, i.e. groups of items, compared to each other - or the test as a whole as used in different contexts (in repeated measures or by different users) - produces the same results on the underlying phenomenon. Thus, reliability may be inherent in the test or it may be dependent on the use of a test.

The homogeneity of the items comprising a scale, the extent to which items measure the same underlying construct, is referred to as the *internal consistency* of the test. Items should, thus, be highly correlated to one another (De Vellis 1991). This type of reliability is typically measured by computing the Cronbach's alpha (Cronbach 1951) for the test. This statistic requires just a single measurement, and is regarded as an integral part of the reliability of a measure (Gliner et al. 2001). Alpha values below 0.70 are considered unacceptable, 0.71–0.80 fair, 0.81–0.90 good and 0.91–1.00 excellent (Cicchetti 1994). It is to be remembered in interpretation that the number of items affects the alpha, making it higher when the number of items is higher (Gliner et al. 2001).

Test-retest reliability refers to stability over time: How reliable the test is with respect to producing the same result when the measurement is repeated. The same test is given to subjects on two different occasions, sometimes even more. The scores of each subject on the second administration should be similar to the scores from the first administration if the test has good test-retest reliability.

Test-retest reliability is most often measured with Spearman's correlation coefficient r with values of 0.7 or higher generally considered as indicators of reliability of the test (Gliner et al. 2001).

Intraclass correlation coefficient (ICC; Shrout and Fleiss 1979) may also be used, allowing an estimation of the true variance between measurements as a proportion of the total variance plus error.

A potential problem when making inferences about how good test-retest reliability is for a given test is the memory effect. For example, if the two administrations of a brief test are only a few days apart, many subjects will remember their responses. Instead of responding on the basis of their present judgment, they will answer in the same way as they did the first time. Thus, a high test-retest reliability coefficient may thus mirror the effects of memory rather than the test itself. On the other hand, when two administrations of a test are several weeks or months apart the underlying phenomenon being measured may have changed. In this case low test-retest reliability does not indicate a drawback for the test, but is dependent on the state-like fluctuation in the underlying phenomenon.

4.6.1.3 Use of factor analysis in psychometric research

The purpose of factor analysis in scale construction is to represent a large number of variables by reducing them to a smaller number of constructs. In psychometric research factor analysis can be utilised in the construction of psychological scales, in guiding the selection of variables for the scale. The two main approaches of the factor analysis related to the investigation of validity of scales are exploratory factor analysis (EFA), in which the aim is to explore underlying latent factors, and confirmatory factor (CFA) analysis, which aims at verifying the factor structure on the

basis of earlier findings (Miettunen 2004). CFA is considered superior EFA for examining the factorial structure of an instrument, because it allows for testing of hypotheses of possible dimensions of psychological constructs and confirmation / disconfirmation of previous factorial solutions (Ullman 2001).

4.6.1.4 Cultural aspects in translating a test

When translating psychiatric scales from one language to another, the translation-back-translation method is generally utilised, aiming to diminish the semantic differences between the versions and making conceptual equivalence of items across languages as good as possible. A native speaker back-translates the new translated version of the scale back to the original language, enabling subsequent discussion with the original authors of the scale of possible differences between the original and the translation (for a review and recommendations on translations of tests between languages and cultural areas, see Wild et al. 2005). While this raises the similarity between two versions of an instrument, significant and true cultural differences in anxiety symptoms have been shown, for example, in the prevalence of adolescents' social fears between Western and Eastern cultures (Dong et al. 1994) suggesting a possible impact of societal influences on what is considered as socially threatening.

4.6.2 Self-report scales for the assessment of social anxiety and social phobia

Currently data on the validity and reliability of four self-report instruments as measures of adolescent social anxiety have been presented. The measures differ from each other in time required

for completing the test, and the range of symptoms covered.

The Social Phobia and Anxiety Inventory for Children: The SPAI-C (Beidel et al. 1995, 1996) is a 26-item self-report instrument covering somatic, cognitive and avoidance symptoms of SP in children, as defined in the DSM-IV. Items are rated on a three-point scale assessing symptom frequency. Several items require multiple ratings. The scale takes approximately 20 minutes to complete. It has good internal consistency, moderate test-retest reliability, and the ability to differentiate social phobia from other anxiety disorders among children (Myers and Winters 2002). Among adolescents it has shown acceptable internal consistency, weak test-retest reliability over 12 months, modest concurrent validity, and sensitivity of 61.5 % for correctly identifying adolescents with social phobia (Storch et al. 2004; Inderbitzen-Nolan et al. 2004). A possible limitation of using the scale among adolescents may be its length.

The Social Phobia and Anxiety Inventory: The SPAI (Turner et al. 1989) is a self-report scale originally intended for use with adults, with a 32-item subscale assessing social phobia and a 10-item subscale assessing agoraphobia on a 7-point scale. Of the social phobia subscale items, the majority require multiple ratings. Completion of the scale requires approximately 40 minutes. Items cover cognitive, somatic, and behavioural dimensions of social anxiety. The SPAI has demonstrated acceptable internal consistency (Clark et al. 1994; Olivares et al. 1999), test-retest reliability (García-López et al. 2001), and construct validity (Clark et al. 1994; García-López et al. 2001) among American and Spanish adolescents. Potential limitations of this scale, too, include the length and time required for completion.

The Social Anxiety Scale for Adolescents: The SAS-A (La Greca 1998), an adolescent adaptation of the Social Anxiety Scale for Children-Revised (SASC-R; La Greca and Stone 1993) is a 22-item

self-report measure for the assessment of social anxiety among adolescents, including dimensions of fear of a negative evaluation (FNE), general social avoidance and distress in general (SAD-General) and in new situations (SAD-New) (La Greca and Lopez 1998). The three-factorial structure was replicated by Inderbitzen-Nolan and Walters (2000); while Myers et al. (2002), using confirmatory factor analysis, also found support for the three-factor structure, but retained only 13 items. Inderbitzen-Nolan et al. (2004) found 43.6 % sensitivity and 82.7 % specificity for SAS-A at a suggested cutoff score in comparison to a composite diagnosis of SP from structured adolescent and parent interviews. SAS-A has presented acceptable test-retest reliability and ability to distinguish adolescents with SP from those among Spanish adolescents (García-López et al. 2001).

The Social Phobia Inventory: The 17-item Social Phobia Inventory (SPIN; Connor et al. 2000), was developed to assess core symptoms of DSM-IV generalized social phobia among adults. It measures a range of avoidance behaviours, physical symptoms and social fears during the previous week. In the original study the SPIN demonstrated good reliability, construct and discriminative validity among healthy volunteers and psychiatric patients (Connor et al. 2000). Antony et al. (2006) replicated reliability and validity findings in an independent adult sample, also reporting discriminative validity for the scale to distinguish subjects with social phobia from those with other anxiety disorders.

Among adults with social phobia, a principal component analysis (PCA) of the SPIN yielded five factors loading on items measuring fear and avoidance of talking to strangers and in social gatherings (Factor I), fear and avoidance of criticism and embarrassment (Factor II), physiological symptoms (Factor III), fear and avoidance of people in authority (Factor IV), and avoidance of being the centre of attention and public speaking (Factor V) (Connor et al., 2000).

Johnson et al. (2006) studied the SPIN in a sample of 174 13 to 17-year-old volunteer adolescents, of whom 41 had SP as measured by a semi-structured diagnostic interview, the Anxiety Disorders Interview Schedule for DSM-IV: Child Version (ADIS-IV:C; Albano and Silverman 1996). They found good test-retest reliability ($r=0.86$), and good internal consistency (total scale alpha 0.92, subscale alphas from 0.69 to 0.83) for the scale. Convergent validity as measured by correlation coefficients between total SPIN score and SAS-A, and SPAI-C was also good ranging between 0.82 and 0.91 respectively; and SPIN showed construct validity in distinguishing adolescents with social phobia from those without diagnosis (mean scores 26.6 vs. 12.8). However, difference in mean SPIN cores between adolescents with social phobia and a group with generalized anxiety disorder ($n=9$) did not reach statistical significance. Thus, no discriminative validity was found for the SPIN for differentiating adolescents with social phobia from those with another type of anxiety disorder. In their sample, the SPIN produced most satisfactory screening efficiency at a cutoff-point of 21 points, with a sensitivity of 68.3 % and specificity of 81.4 %.

To the best of the author's knowledge, only one study examining the psychometrics of the SPIN in other cultural areas than the United States has so far been published. Vilete et al. (2004) reported good internal consistency (Cronbach's $\alpha = 0.88$), and test-retest reliability (intra-class correlation coefficient = 0.78 for total score) for a Portuguese-language version of the SPIN among 190 Brazilian adolescents from normal population.

Due to its brevity and simple design, the SPIN is promising for use both in epidemiological research and as a clinical screening instrument, also suggesting its potential applicability among adolescents. However, further evidence for the applicability of the SPIN in adolescent population samples in different cultures and samples representing unselected adolescent general population is needed.

4.6.3 Multi-dimensional self-report scales of anxiety

Item domains assessing social anxiety among children and adolescents are also included in multidimensional self-report instruments covering a wider range of anxiety symptoms, such as the *Screen for Child Anxiety Related Emotional Disorders* (SCARED; Birmaher et al. 1999), the *Screen for Child Anxiety Related Emotional Disorders - revised version* (SCARED-R; Muris et al. 1999), and the *Multidimensional Anxiety Scale for Children* (MASC; March et al. 1997).

4.6.4 Clinician-rated scales of social phobia

Clinician-rated scales can serve as important checklists in supporting diagnostic decisions, or act as detailed measures aimed at detecting treatment response in clinical patients. Two social phobia scales have been designed specifically for use among children and adolescents, and reports have been published on their psychometrics. *The Liebowitz Social Anxiety Scale for Children and Adolescents* (LSAS-CA; Masia-Warner et al. 2003) has demonstrated good internal consistency and test-retest reliability, as well as good construct and discriminative validity in mixed sample of children and adolescents. *The Kutcher Generalized Social Anxiety Disorder Scale for Adolescents* (K-GSADS-A; Brooks and Kutcher 2004) was developed to assess the severity of social phobia in adolescents. It has been studied among 11 to 17-year-old adolescents and shown to have adequate internal consistency, convergent validity in relation to the LSAS-A, and divergent validity related to the clinical diagnosis of depression.

4.6.5 Interview methods

Modern psychiatric research increasingly utilizes interview methods as the most reliable methods of inquiry (Roberts et al. 1998). Semi-structured interviews provide guidelines for items to be elicited, while the exact wording of questions is relied on the choice of the interviewer. The appropriate use of a semi-structured interview requires experience of clinical work. On the other hand, fully structured interviews provide strict and predetermined questions, are less time-consuming and perhaps more economical. Semi-structured interviews are used by trained clinicians in clinical practice and research; fully structured interviews usually by trained lay interviewers in epidemiological studies.

There are examples of both wide range- and anxiety focused interviews in child and adolescent psychiatric research. Examples of wide-range semi-structured interviews in child and adolescent psychiatric research are the *Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Version* (K-SADS-PL; Kaufman et al. 1997), and the *Childhood and Adolescent Psychiatric Assessment* (CAPA; Angold et al. 1995). Of the highly structured instruments, the *Diagnostic Interview Schedule for Children and Adolescents* (DISC; Shaffer et al. 1996) is specifically designed for and validated in child and adolescent population, whereas for example the *Composite International Diagnostic Interview* (CIDI; WHO 1990) and the *Munich-Composite International Diagnostic Interview* (M-CIDI; Wittchen et al. 1998) have been used among adolescent and young adult populations (Wittchen et al. 1999). One interview, the *Anxiety Disorders Interview Schedule for Children* (ADIS-C/P; Silverman and Albano 1996) has been specifically designed to assess DSM-IV anxiety disorders among children and adolescents.

4.7 Summary of the literature reviewed

According to research published to date, there seems to be severe lack of epidemiological and clinical instruments for assessing adolescent anxiety disorders, specifically social phobia in Finland. No validated Finnish self-report instruments for assessment or screening of social phobia or other anxiety disorders were available at the time the present study was planned. Prior to this study this methodological drawback limited both epidemiological research and the early identification of anxiety disorders in Finland.

In a broader view, studies reporting robust psychometric findings from unselected, large community samples on the screening abilities of social phobia measures are sparse. No studies have previously examined the factorial structure of the brief 17-item SPIN, using adolescent samples from general population.

The existing epidemiological research on adolescent social phobia indicates that for the moment, few interview-based community studies have examined SP in early adolescence, the time point when symptoms of SP are often reported to emerge. These studies cover few cultural and geographical areas. More research is needed to investigate whether prevalence, age and gender associations of SP symptoms show the same patterns across various cultural areas, thereby pointing to the possible common genetic, biological and developmental trends behind the onset of SP.

Furthermore, in studying the interrelationships between peer victimization, depression and social phobia the simultaneous occurrence of social phobia and depression has not been controlled for in earlier research.

5 AIMS OF THE STUDY

The general aim of this study was to validate an instrument (SPIN-FIN) for assessing social anxiety and social phobia among Finnish adolescents and to explore the epidemiology and correlates, specifically peer relationship correlates of adolescent social phobia among 12 to 17-year-old Finnish adolescents.

The specific aims of the study were:

I: To demonstrate the reliability and explore the factorial structure of the SPIN-FIN as used among Finnish adolescents, as well as to report age and gender differences of SPIN-FIN scores in 12 to 17-year-old girls and boys (Study I).

II: To demonstrate the construct and discriminative validity and screening properties of the SPIN-FIN compared to DSM-IV diagnoses of social phobia and other Axis I disorders among Finnish adolescents (Study II).

III: To study the frequency, comorbidity, individual and familial correlates, and service use associated with DSM-IV social phobia among 12 to 17-year-old Finnish adolescents (Study III).

IV: To study the associations between self-reported peer victimization, depression and social phobia among Finnish adolescents with special emphasis on the role of comorbidity between depression and social phobia (Study IV).

6 SUBJECTS AND METHODS

6.1 General study design

This study is based on data from three different studies conducted among Finnish secondary school students aged 12 to 17 years (Figure 1).

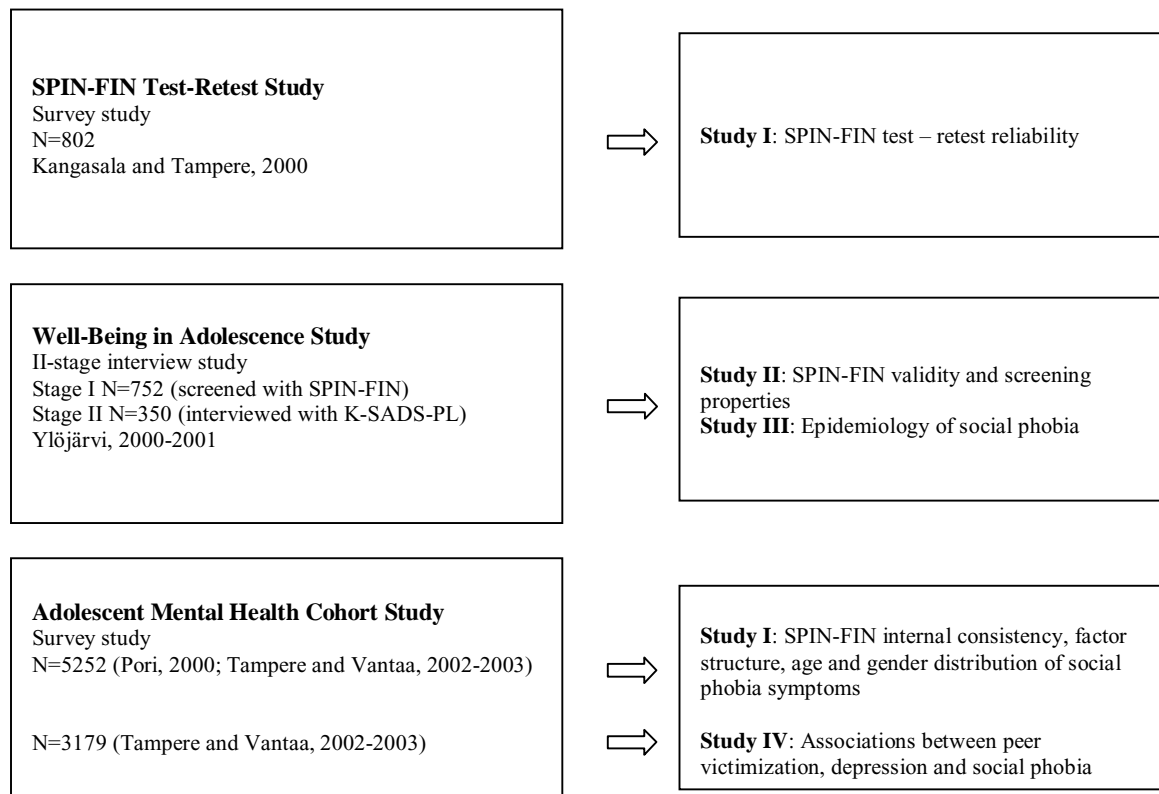
The SPIN-FIN Test-Retest Study was performed in two secondary schools in Kangasala and Tampere, and used repeated tests design to examine the temporal stability of the Social Phobia Inventory (SPIN-FIN), a self-report instrument of social phobia, over a five-week period. (Study I).

The two-stage Well-Being in Adolescence Study was conducted in the two secondary schools of Ylöjärvi, examining the validity of the SPIN-FIN and the epidemiology of social phobia among Finnish adolescents using a diagnostic interview, the Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (K-SADS-PL). (Studies II and III).

Two data sets from the Adolescent Mental Health Cohort Study were used as used to examine internal consistency, factorial structure, and age and gender distribution of scores of the SPIN-FIN, and to examine the relationships between peer victimization, depression, and social phobia. (Studies I and IV).

The study was approved by the ethics committee of Tampere University Hospital.

Figure 1. General Study Design: Boxes on the left provide design, sample size, location, and timing of the three individual studies utilised as data bases. Boxes on the right show how the findings from these three studies are reported in Studies I-IV.



6.1.1 The SPIN-FIN Test-Retest Study

All students from the 7-9th grades of two selected secondary schools in Kangasala and Tampere were recruited for a survey study using repeated tests design. In Kangasala (population approximately 20, 000) all students at the only secondary school in the municipality participated in the study; in the city of Tampere (population approximately 200, 000) several secondary schools were contacted and the first school to offer its co-operation was selected. Adolescents completed a study questionnaire containing the SPIN-FIN and questions on age, grade, and hobbies in their classes in class on two occasions separated by a five-week interval in the spring of 2000. The

instructions for completing the instrument were also read aloud by the teacher. To reduce the effect of social desirability, participants were identified by numbers only.

6.1.2 The Well-Being in Adolescence Study

The Well-Being in Adolescence Study is a study on adolescent mental health conducted as a joint effort by Pirkanmaa Hospital District and the Public Health Organisation of the town of Ylöjärvi. The validity of the SPIN-FIN and the epidemiology of social phobia among Finnish adolescents were studied using a two-stage design in a sample representing three total age cohorts in Ylöjärvi during the academic year 2000-2001.

In the first stage all adolescents in the 7th to 9th grades of the two secondary schools of Ylöjärvi completed the SPIN-FIN. In the second stage three sub-samples of participants were interviewed with a clinical interview, the Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (K-SADS-PL) within one month: 1) all screen positive students (SPIN-FIN score 19 points or over; based on the adult-set cut-off score of Connor et al. (2000); and age and gender matched controls from both adolescents with 2) medium-high scores (SPIN-FIN score 10-18 points), and 3) low scores (SPIN-FIN score 0-9 points). DSM-IV social phobia and a wide range of other Axis I disorders were recorded.

The stratified sampling ensured that sufficient numbers of subjects with SPIN-FIN scores over the whole range of all possible SPIN-FIN scores (0-68 points) were evaluated against possible diagnoses of social phobia, thus forming evidence for the construct validity of the SPIN-FIN. Since a range of other DSM-IV Axis I disorders were also covered with the K-SADS-PL, evaluation of

discriminative validity of SPIN-FIN against possible diagnoses in other main DSM-IV child and adolescent Axis I diagnostic groups – disruptive disorders (conduct disorders and attention deficit disorders), depressive disorders, and other anxiety disorders was possible.

All students in the 7-9th grades in Ylöjärvi completed the SPIN-FIN in their classrooms (1-3 classrooms at each screening round). Instructions for filling it in were read aloud by either a teacher or a school nurse, including the information that adolescents getting all types of scores could be asked to participate in an interview. This was done to reduce the effect of social desirability in the answers. The low and medium-high SPIN-FIN controls were chosen by blindly pulling one SPIN-FIN answer sheet from two piles, held by the research assistant or school nurse, arranged according to SPIN-FIN total score (0-9, 10-18) as long as needed to find a sex-matched control. This procedure was repeated at each screening round, gathering answer sheets from 1-3 classrooms from the same age cohort, also producing a matching of age. The interviews were carried out by the author, blind to the SPIN-FIN scores. The DSM-IV diagnoses based on the K-SADS-PL were reviewed additionally with a consulting senior child and adolescent psychiatrist to further improve their validity.

6.1.3 The Adolescent Mental Health Cohort Study

The Adolescent Mental Health Cohort Study (AMHCS) is a school-based prospective follow-up survey study of adolescents conducted by a research group representing Tampere School of Public Health, University of Tampere and the National Public Health Institute, Department of Mental Health and Alcohol Research. In their classrooms, subjects filled in a questionnaire covering a wide range of mental health symptoms, including social phobia and depression, as well as questions

about school, family, socio-economic background, peer relationships, self-esteem and social support. The study was piloted in all the secondary schools of the city of Pori in 2000 among 7-9th graders. The baseline cohort data wave was collected in Tampere in 2002 and Vantaa in 2003 among 9th graders, and the subjects have been followed thereafter. Results from the two-year follow-up data have been reported recently by Fröjd et al. (2007).

The data from the pilot database combined with the baseline data was used in the present study to present results on the internal consistency, factorial structure, and the age and gender distribution of scores of the SPIN-FIN scores (Study I). The baseline data was used to report results on the associations between self-reported peer victimization, depression and social phobia (Study IV).

Subjects in Pori, Tampere and Vantaa were identified in the school registers of the participating cities. Respondents' parents were sent an information letter prior to data collection. In Pori (7-9th grades) the parents were advised to contact the researchers if they did not want their child to participate. In Tampere and Vantaa (9th grades) parental consent was not required because the Finnish legislation on participation in medical research allows a 15-year-old subject to decide alone.

Subjects signed written informed consent forms before completing the questionnaire in the classroom. The questionnaire took approximately 40 minutes to complete. Instructions for its completion were written in a covering letter and also read aloud by the teacher. In Tampere and Vantaa, for those absent from school at the first round, a second opportunity to participate was offered in the school within a couple of weeks of the original data collection; for those not present on either occasion, the questionnaires were sent by post. If there was no response after a second reminder, it was concluded that the subject was not willing to participate.

6.2 Subjects

The present study comprises subjects from three studies. The general description of the samples in the FIN-SPIN Test-Retest study (Study I), The Well-Being in Adolescence Study (Studies II, III), and the Adolescent Mental Health Cohort Study (Studies I and IV) is presented in Table 2.

Table 2. Study samples: general description

	Sample size	Age range	Mean age	Gender ratio (boys/girls %)	Social composition
SPIN-FIN Test-Retest Study					
Kangasala and Tampere, 2000 7-9 th grade students	N=802	13.0 - 16.8	14.7	52.7 / 47.3	Urban and semi-urban general population
Well-Being in Adolescence Study					
Ylöjärvi, 2000-2001 7-9 th grade students					
Phase I (screening)	N=752	12.2 -17.2	14.6	50.3 / 49.7	Urban general population
Phase II (interview)	N=350		14.7	50.9 / 49.1	
Adolescent Mental Health Cohort Study					
Pori, Tampere, Vantaa 2000, 2002-2003 7-9 th grade students	N=5252	12.8 – 16.9	15.3	49.4 / 59.6	Urban general population
Tampere, Vantaa, 2002-2003 9 th grade students	N=3156	15.0 – 19.9	15.5	50.8 / 49.2	

6.2.1 The SPIN-FIN Test-Retest Study

In all, 1075 adolescents were enrolled as students in the 7th to 9th grades of the two schools. Of these, 901 (83.8 %) completed the first and 866 (80.6 %) the second SPIN-FIN response form. Ten (0.9 %) responses were excluded from the study due to insufficient identification data and 17 (1.6%) due to poor data quality. Altogether 802 (74.6 %) adolescents completed both SPIN-FIN

response forms, thus comprising the total numbers of subjects in the SPIN-FIN Test-Retest Study. The population of the municipality of Kangasala is semi-urban, with 4 % of the population working in primary production; the population of Tampere is urban (City of Tampere 2003). As a whole subjects in the SPIN-FIN Test-Retest Study represent mainly urban and semi-urban Finnish general population with respect to socioeconomic composition of their region of origin (Statistics Finland 2003). The representativeness of the sample is enhanced by the fact that secondary school students represent the total age cohort of the area except for students with intellectual disabilities or other serious handicaps (Table 6.1).

6.2.2 The Well-Being in Adolescence Study

A total of 840 pupils (423 boys, 417 girls) were enrolled as students in the 7th-9th grades in the two schools of Ylöjärvi (population approximately 25, 000) in the academic year 2000-2001. Of these, 56 (27 boys, 29 girls; 6.7 %) were absent from school during the administration of SPIN-FIN in the screening phase. Thirteen (1.5 %) answer sheets were excluded from the study because of poor data quality or insufficient identification data. Of the 771 remaining SPIN-FIN answer sheets, 19 were incomplete (1 or more items missing). Thus, 752 (89.5 %) adolescents, (of these boys 50.3 %, girls 49.7 %) responded completely to all items, and comprised the total number of subjects in the screening phase. (Table 2)

In the second stage, 352 participants were invited to the diagnostic interview. Of these, 350 (99.4%) could be reached (117 in the high SPIN-FIN group, 110 in the medium-high SPIN-FIN group, 123 in the low SPIN-FIN group), and all agreed to the interview (Table 6.2). The last screening round was late in spring due to the school schedule, and not enough medium-high SPIN-FIN controls

were available in that classroom. Taking them from previous rounds would have violated the procedural time limit of one month between screening and interview. As a consequence, additional six low-SPIN-FIN controls were recruited from the last screening round. This was also done to maintain the ratio between high SPIN-FIN scorers vs. others at 1:2.

The socio-economic composition of the population of Ylöjärvi does not differ from that in major urban areas of Finland (Statistics Finland 2003). The subjects represent the total age cohort of the area except for students with intellectual disabilities or other serious handicaps.

6.2.3 The Adolescent Mental Health Cohort Study

In Pori (population approximately 90, 000), Tampere, and Vantaa (population approximately 200, 000 each), a total of 6325 students were enrolled in the participating secondary schools. Of these, 0.4 % were aged 17 years or more, and were excluded from the study. Answers from 6 % were not available due to either absence from school or not responding to the study. 0.5% of answers were excluded because of poor data quality. Of the remaining adolescents, 5252 (83.4 %) answered all SPIN-FIN items and comprise the total number of subjects in the sample used for analyses on the internal consistency, factorial structure, and age and gender distribution of scores of the SPIN-FIN (Study I). The populations of Pori, Vantaa, and Tampere are representative of Finnish urban general population by socio-economic composition (Statistics Finland 2003). Students in grades 7-9 in secondary schools represent the total age cohort in these cities except for young people with serious handicaps or intellectual disabilities. (Table 2)

In Tampere and Vantaa (2002-2003), a total of 3809 students were enrolled in the ninth grades of the participating schools. Of these, 3597 responded, giving a response rate of 96.5 %. Since it is possible for a person under 15 years to be attending ninth grade, participants who were not yet 15 (n= 313) were later excluded. Six questionnaires had to be excluded due to obvious facetiousness. Adolescents with incomplete responses to measures of social anxiety or depression (n=122) were excluded. The final sample size for Study IV was thus 3156 adolescents. Of the respondents, 70 % came from intact families, 29 % from families with either one parent or one parent and a step-parent, and 1 % had some other legal guardian. Of the respondents' fathers 23.4 % had university degree, and 76.6 % had lower education; of the mothers 22.6 % had a university degree, and 77.4 % had lower education. As a whole the respondents participating in the AMHCS Study represent urban adolescent population in Finland. (Table 2)

6.3 Methods

6.3.1 Self-report measures

The Social Phobia Inventory (Studies I-IV)

The Social Phobia Inventory (SPIN; Connor et al. 2000), is a 17-item self-report instrument of DSM-IV generalized social phobia. It has six items measuring fear in social situations, seven items measuring avoidance of performance or social situations, and four items measuring physiological discomfort in social situations. Subjects are asked to report whether each symptom had bothered them not at all (0), a little bit (1), somewhat (2), very much (3), or extremely (4) during the past

week. The range of sum score is, thus, 0 - 68. Items assessing fear, avoidance and physiological discomfort comprise the fear, avoidance and physiological discomfort subscales, respectively.

Translation and development of the SPIN-FIN: A translation-back-translation procedure for the correct translation of the original SPIN scale into Finnish was adopted. The original version of SPIN was first translated into Finnish by the author (M.D. and professional psychologist). The translated version of the SPIN was translated back into English by an authorised native English translator. Differences between the original version of SPIN and the back-translated version of the scale were then discussed with the authors of the original SPIN scale (Drs Davidson and Connor). No alterations in the meaning of items were found between SPIN and the translated version (SPIN-FIN) of the scale. The applicability and comprehensibility of the SPIN-FIN was then piloted with adolescents at an adolescent psychiatric outpatient unit (n=10), who were suffering from various DSM-IV Axis I and Axis II disorders. The results showed that adolescents understood the questions and were quick to complete the scale. In Studies II-III the adult cut-off score of 19 was used since no published cut-off score for adolescents was available. In Study IV, the cut-off score of 24 identified in Study II was used to identify adolescents with self-reported social phobia.

The 13-item Beck Depression Inventory - Short Version (Study IV)

The Finnish modification (RBDI; Raitasalo 1995, 2007) of the 13-item Beck Depression Inventory - Short version (Beck and Beck, 1972) was used as a measure of self-reported depression. The BDI has been widely used among adolescent samples (Bennett et al. 1997). A cut-off score of 8 points for moderate to severe depression (Beck et al. 1974) was adopted to identify adolescents with self-

reported depression. The psychometric properties of the RBDI have been demonstrated good among Finnish adolescents (Kaltiala-Heino 1999b).

The Youth Self-Report (Study IV)

The Youth-Self Report (YSR; Achenbach 1991) is a self-report instrument for adolescents aged 11 to 18 years of age to assess a range of internalizing and externalizing symptoms associated with mental health problems. Participants' externalizing symptoms were assessed with the Delinquent Behavior and Aggressive Behavior subscales. The Delinquent Behavior subscale comprises 11 items measuring rule-violating behaviour (e. g. "I steal at home"), and the Aggressive Behavior subscale comprises 19 items measuring different types of aggressive behaviour (e. g. "I am mean to others"). The reliability and screening properties of the Finnish version of the YSR have been demonstrated among 15 to 16-year-old Finnish adolescents (Helstelä and Sourander 2001).

Overt and covert peer victimization (Study IV)

The question assessing subjection to bullying by peers was derived from a WHO youth health study (King et al. 1996) and subsequently translated into Finnish (Kaltiala-Heino et al. 1999b). The introduction to the bullying section was: "We say a pupil is being bullied when another pupil, or a group of pupils, says or does nasty and unpleasant things to him or her. It is also bullying when a pupil is teased repeatedly in a way he or she doesn't like. But it is not bullying when two pupils of about the same strength quarrel or fight." Thereafter the adolescents were asked about overt and covert victimization. Overt victimization was assessed with a question: *How frequently have you*

been bullied during the ongoing school term? Covert victimization was defined as purposefully excluding the adolescent from the company of others (Crick and Grotpeter 1995) and was assessed with a question: *How frequently have other pupils not wanted to be with you and you had to be by yourself during the ongoing school term?* Response alternatives to both questions were: “Not at all (=0); one or two times (=1); two to three times a month (=2); about once a week (=3); several times a week (=4).

General Level of Anxiety (Study IV)

General anxiety was assessed by asking participants to rate the alternative that best describes them today: *I don't easily lose my nerve or get anxious (=0) / I don't feel anxious or nervous (=0); I get anxious and nervous rather easily (=1); I get very easily distressed, anxious or nervous (=2), I am constantly anxious and distressed, my nerves are always on edge (=3)*. This item is analogous to the 13 items of the RBDI, and has been designed as an additional item to the RBDI scale to detect the cognitive symptoms of general anxiety (Raitasalo 1995; 2007). It was included in the multivariate analyses in our study because general anxiety has been shown to be associated with peer victimization (Grills and Ollendick 2002).

6.3.2 Interview Methods

The Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (Studies II, III)

The Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (K-SADS-PL; Kaufman et al. 1997) is a clinician-administered semi-structured interview capable of identifying 32 DSM-III-R and DSM-IV Axis I child and adolescent psychiatric disorders. The K-SADS-PL introductory interview covers information about family, school functioning, peer relationships, hobbies, health and prior psychiatric treatment contacts. The clinical screen interview section covers 20 diagnostic areas. The fulfilling of DSM-IV criteria is ascertained in detailed elicitation of symptoms in the supplementary interview. The K-SADS-PL has demonstrated good psychometric properties for assessing psychiatric disorders in adolescents (Kaufman et al. 1997). It has also previously been used in adolescent mental health studies in Finland (Ilomäki et al. 2006; Karlsson et al. 2006).

6.3.3 Measures based on the K-SADS-PL interview (Study III)

Data on the following individual, familial, and socio-demographic correlates of SP were collected from the administration of the K-SADS-PL introductory interview section, which contains questions or measures covering these areas. Data were collected and coded systematically.

Individual correlates: History of failing a grade (yes / no); grade point averages from the last term (range 4-10); and history of being bullied by peers in a way that caused harm or suffering (yes / no)

were recorded. The adolescents' present level of functioning was assessed with the CGAS scale (Shaffer et al. 1983).

Family correlates: All first and second degree relatives (i.e. parents, grandparents, siblings), or other people with whom the adolescent was presently living were recorded. History of divorce in the family (yes / no); and all family members' and parents' treatment contacts to mental health professionals (yes / no) were recorded, likewise the reason for parental mental health treatment contact if known by the adolescent. The parental mental health treatment causes were classified into: anxiety / depression (consisting of anxiety / depressive symptoms or disorder, or suicidal behaviour), and other symptoms (consisting of psychosis / alcohol problems / reason not known by the adolescent). Family caregiver occupational status was recorded, and subsequently coded by the author according to the International Standard Classification of Occupations (ISCO-88) system (ILO 1990), adapted for Finnish society (Finnish Statistics Bureau 1997). Vocational status was defined as low when the caregiver had no working status, or had unskilled worker status (ISCO requirement level 1). Vocational status was defined as middle / high when the caregiver had the status of a skilled worker, expert, professional, or professional in a leading position (ISCO requirement levels 2-4).

6.3.4 Socio-demographic variables (Study IV)

The residential stability of the adolescents during the past five years was assessed with the self-reported alternatives: Not moved at all (=0); once (=1); two times (=2); three times or more (=3). Parental unemployment was assessed by asking if one or both parents had been unemployed during the past year with response alternatives: Neither of the parents (=0); one parent (=1); both parents

(=2). These variables were selected because of the disrupting effect on the social networks of adolescents they present, and because they have been shown to be associated with adolescent depression (Sund et al. 2003).

6.4 Statistical methods

The test-retest reliability of the SPIN-FIN was assessed by calculating the Spearman's correlation coefficient (r) between the first and second SPIN-FIN measurements from the SPIN-FIN Test-Retest Study. The subscales' test-retest coefficients were also calculated. Internal consistency of the SPIN-FIN was assessed using Cronbach's coefficient alpha (Cronbach 1951) for the SPIN-FIN total scale and subscales from the AMHCS pilot and baseline data from Pori, Tampere and Vantaa. Age and gender distribution of the SPIN-FIN scores were examined by calculating mean, and median scores for total and fear, avoidance and physiological discomfort subscales across genders and age groups (7th, 8th, and 9th graders) from in the AMHCS pilot and baseline data. Median scores were calculated as descriptive statistics due to a heavily skewed distribution of SPIN-FIN scores in the population. Non-parametric methods were used in comparisons between subgroups: Kruskal-Wallis test in comparing scores between 7th, 8th and 9th grades, and Mann-Whitney U- test in comparisons of scores between boys and girls.

The factorial structure of the SPIN-FIN was examined in two stages using the AMHCS pilot and baseline data (n=5252). First the SPIN-FIN data was divided into random halves. An exploratory factor analysis (EFA) using principal axis factoring method was performed to explore the potential factorial structure / structures of the SPIN-FIN in the first half (n=2625). Because the factors were not assumed to be uncorrelated with one another, oblimin rotation method was used in the

interpretation of factors. The decision of how many factors to retain was guided by the use of the scree method (Cattell 1966), and the Kaiser rule (factors with an eigenvalue greater than 1.0 to be retained).

A confirmatory factor analysis (CFA) using maximum likelihood estimation method (Olsson et al. 2000), was conducted on the holdout half of the sample ($n=2627$) to evaluate the fit of the alternative models yielded by the EFA in the first half, to the data. The following indices, with the following recommendations as cutoffs were examined: the goodness of fit index (GFI); and the goodness of fit index adjusted for degrees of freedom (AGFI) - with values of ≥ 0.90 , and ≥ 0.80 respectively, indicating reasonable fit to the data (Cole 1987); the root mean square residual (RMR); and the root mean squared error of approximation (RMSEA) with values of ≤ 0.10 , and ≤ 0.08 respectively, indicating reasonable fit (Kline 1998; Browne and Cudeck 1993). The Akaike's Information Criterion (AIC) was examined to compare alternative solutions, smaller value indicating better fit. The chi square index was not used, because it is unreliable when sample size is large (Ullman 2001).

In the Well-Being in Adolescence Study data diagnostic classification was based on the K-SADS-PL (Studies II, III). Social phobia was diagnosed when all DSM-IV criteria for social phobia were met following the definition by the American Psychiatric Association (APA 1994) requiring the clinical significance criterion. The additional specifications that in adolescents anxiety or fear occurs with same-age peers, not just with adults, and symptom duration of over six months were also required. Sub-clinical social phobia (SSP) was diagnosed when all other DSM-IV criteria were fulfilled except for the functional impairment criterion. Other sub-clinical anxiety disorders were also diagnosed in a corresponding way. All other Axis I DSM-IV psychiatric diagnoses were recorded. Comorbidity for other disorders was allowed in the SP and SSP groups.

The construct validity of the SPIN-FIN was assessed by comparing the total SPIN-FIN scores of adolescents with social phobia (SP) and sub-clinical social phobia (SSP) to the scores of adolescents with no SP or SSP diagnosis i. e. the group with no social anxiety (NSA). The discriminative validity of the SPIN-FIN was assessed by comparing total SPIN-FIN total scores in the SP group to those in the other anxiety disorders (ANX; including panic disorder, separation anxiety disorder, generalized anxiety disorder, simple phobia, posttraumatic stress disorder, obsessive-compulsive disorder, and anxiety disorder not otherwise specified), depressive disorders (DEP; including major depressive disorder, depressive disorder not otherwise specified, dysthymia, and adjustment disorder with depressive symptoms), and disruptive disorders (DIS; oppositional defiant disorder, conduct disorder, conduct disorder not otherwise specified, and attention deficit- hyperactivity disorder) groups. Because the distributions of scores in some diagnostic groups were skewed, the differences of total SPIN-FIN scores between pairs of diagnostic groups were compared using Mann-Whitney U-test, which compares median instead of mean values, with Bonferroni correction. (Study II)

Sensitivity, specificity, and positive (PPV) and negative (NPV) predictive values with Wilson corrected confidence intervals were calculated for various SPIN-FIN cut-off scores relative to K-SADS-PL -based SP and SP/SSP. A receiver operating characteristic (ROC) curve and area under curve (AUC) were examined to estimate the best possible cut-off score. Confidence intervals were calculated using the Confidence Interval Analysis (CIA) software package (Bryant 2000). (Study II)

In Study III, prevalence, comorbidity, correlates and treatment seeking were examined across three mutually exclusive diagnostic groups: adolescents with social phobia (SP), sub-clinical social phobia (SSP), and no diagnosis (NO). Adolescents with other psychiatric diagnoses than social phobia were not included in the group-wise comparisons across the three groups in Study III.

Prevalence estimates for SP and SSP were calculated by the double sampling method (Levy and Lemeshow 1991), giving different weights for disorders diagnosed in subjects screening positive and subjects screening negative. Simple frequencies of comorbid disorders and treatment contacts were calculated for SP, SSP, and NO groups. In the analyses comparing the correlates associating with the diagnostic groups, the SP, SSP groups were combined in order to increase statistical power. The Chi-square test / Fisher's exact test where appropriate were used in paired comparisons between groups (SP/SSP vs. NO) for categorical variables. The independent samples t-test was used in paired comparisons for continuous variables.

To define self-reported social phobia and depression in Study IV scores of 24 for the SPIN-FIN and 8 for the RBDI were used as cut-offs. In order to compare symptom groups, four mutually exclusive groups were formed: adolescents with self-reported depression non-comorbid with social phobia (DEP) group, scoring ≥ 8 points on the RBDI and < 24 points on the SPIN-FIN; adolescents with self-reported social phobia non-comorbid with depression (SP) group, scoring < 8 points on the RBDI and ≥ 24 points on the SPIN-FIN; adolescents with both self-reported social phobia and depression (SP+DEP) group, scoring ≥ 8 points on the RBDI and ≥ 24 points on the SPIN-FIN, and adolescents with neither, forming the control group, scoring < 8 points on the RBDI and < 24 points on the SPIN-FIN. Hence, the terms self-reported depression or self-reported social phobia do not refer to clinical diagnoses.

In overt and covert victimization the cutpoint for identifying adolescents who had been victimized repeatedly and frequently was set at a frequency of two to three times a month or more frequently. Both YSR scales (Aggressive and Delinquent Behaviour) were dichotomized at the cut-off of the 90th percentile separately for boys and girls to indicate problems in the clinical range (Achenbach

1991; Zoccolillo 1993; Helstelä and Sourander 2001). Scores 2-3 on the General Anxiety item were used as an indicator of significant general anxiety (Kaltiala-Heino et al. 2000). (Study IV)

Simple frequencies (%) were calculated for overt and covert bullying, self-reported depression and self-reported social phobia for both sexes. Gender differences in frequencies were tested with Pearson's Chi-square test. Bivariate associations between group membership and reported overt and covert victimization (yes / no) were estimated by class frequencies and tested with Pearson's Chi Square test or Fisher's Exact test where appropriate. Post-hoc comparisons between SP+DEP, and DEP and SP groups each were made with Pearson's Chi-square test, with Bonferroni adjusted p values. (Study IV)

Finally, a logistic regression analysis (LRA) controlling for confounding familial (family moving, parental unemployment), and psychopathology (delinquent and aggressive behaviour, general anxiety) covariates was conducted to confirm the associations between peer victimization and the four symptom groups. The confounding psychopathology variables have been shown to be associated with both peer victimization and depression (Salmon et al. 1998; Grills and Ollendick 2002). Confounding family covariates have also been shown to associate with adolescent depression, and may have a disruptive effect on adolescents' social networks (Sund et al. 2003). The LRA was performed separately among boys and girls, given the different presentation of psychopathology, and particularly aggressive behaviour, among adolescent boys and girls (Zoccolillo 1993). Overt and covert victimization were each treated in turn as the dependent variable. The independent variables: disorder (control / DEP / SP / SP+DEP); confounding psychopathology covariates (delinquency [yes/no], aggressiveness [yes/no], general anxiety [yes/no]); and family covariates (number of adolescents' moves within the last five years [no / one /

two / three times or more], and parental unemployment during the last year [no / one parent / both parents]) were all entered simultaneously in the model. (Study IV)

The data from Studies I-IV were analysed using versions 9.0 – 13.0 of SPSS for Windows software. In Study I the Confirmatory Factor Analyses were performed using the PROC CALIS (Covariance Analysis of Linear Structural Equations) procedure for SAS 9.1 for Windows (SAS Institute 1999).

7 RESULTS

7.1 Psychometric properties of the SPIN-FIN (Studies I and II)

7.1.1 Reliability

Test-retest reliability: The Spearman's correlation coefficient r for SPIN-FIN total scores between the first and the second measurement in the Test-Retest Study Sample ($n=802$) was 0.81 ($P<0.001$), 0.77 for boys, 0.84 for girls indicating acceptable test-retest reliability for the SPIN-FIN over five weeks. Spearman's r for 7th graders (mean age 13.7 years), 8th graders (mean age 14.7 years), and 9th graders (mean age 15.7 years) ranged from 0.76 to 0.83. For subscale correlations, see Table 3.

Table 3. Test-retest reliability for SPIN-FIN: Spearman's r coefficients for SPIN full scale and fear, avoidance and physiological sub-scales among 12-16 year old Finnish adolescents ($n=802$).

Group	SPIN full scale	Fear subscale	Avoidance subscale	Physiological subscale
All	0.81	0.75	0.78	0.70
Boys	0.77	0.69	0.76	0.63
Girls	0.84	0.79	0.80	0.71
7 th grade	0.76	0.70	0.71	0.66
8 th grade	0.81	0.76	0.77	0.73
9 th grade	0.83	0.75	0.81	0.69

Internal consistency: In the AMHCS data from Pori, Tampere and Vantaa ($n=5252$), Cronbach's alpha, showing the internal consistency for the full SPIN-FIN scale was 0.89; for boys 0.89 and for girls 0.90. For the full scale alphas ranged from 0.88 to 0.90 across age groups. Alphas for subscales

for the whole sample ranged from 0.65 to 0.80. These analyses showed good internal consistency for SPIN-FIN across genders and age groups. (Table 4)

Table 4. Internal consistency of the SPIN-FIN: Cronbach's alphas for SPIN-FIN total scale and subscales among 12-16 year old Finnish adolescents (n=5252).

Group	SPIN total scale	Fear subscale	Avoidance subscale	Physiological subscale
All	0.89	0.80	0.78	0.65
Boys	0.89	0.79	0.78	0.65
Girls	0.90	0.81	0.79	0.63
7 th grade	0.88	0.76	0.78	0.63
8 th grade	0.88	0.75	0.77	0.59
9 th grade	0.90	0.81	0.78	0.66

7.1.2 Factor structure

The results of the EFA performed on the first half of AMHCS data (n=2625) suggested either a one-factor or a three-factor solution, depending on the method used for deciding the number of factors to be retained. The eigenvalues of the first five factors were in descending order: 6.44, 1.18, 1.03, 0.92, and 0.83. These factors accounted respectively for 38, 7, 6, 5, and 5 percent of the variance between items. The examination of the scree plot suggested a one-factor solution. Loadings for SPIN-FIN items on this single factor were 0.48 – 0.70.

Following the Kaiser rule of maintaining all factors with eigenvalues over 1.0, an alternative three-factor solution was retained. The three-factor solution comprised Factor 1 – items 5, 6, 12, 15, and 2, 7, 13, 17 (fear and avoidance of embarrassment and criticism, and physiological symptoms) plus items 1 and 14; Factor 2 – items 3, 4, 8, and 10 (fear and avoidance of strangers and social gatherings) plus item 16; and Factor 3 – items 9 and 11 (avoidance of making speeches or being the

center of attention). Items relating to fear and avoidance of authority figures were divided between Factors 1 and 2. (Table 5)

Table 5. Loadings of SPIN items on factors of the three-factor model among Finnish adolescents aged 12-16 (n=2625).

Item	Factor		
	1	2	3
1. Fear of people in authority	0.34	-0.29	0.20
2. Bothered by blushing	0.40	-0.09	-0.14
3. Fear of parties and social events	0.11	-0.63	0.03
4. Avoids talking to strangers	-0.12	-0.68	-0.18
5. Fear of criticism	0.41	-0.24	-0.21
6. Avoids embarrassment	0.80	0.10	0.00
7. Distressed by sweating	0.34	-0.03	0.06
8. Avoids parties	0.03	-0.53	-0.02
9. Avoids being the center of attention	0.20	-0.33	-0.39
10. Fear of talking to strangers	0.03	-0.64	-0.01
11. Avoids making speeches	0.24	-0.13	-0.51
12. Avoids criticism	0.70	0.10	-0.07
13. Distressed by palpitations	0.34	-0.31	0.13
14. Fear of others watching	0.50	-0.19	-0.15
15. Fear of embarrassment	0.58	-0.07	-0.13
16. Avoids talking to authority	0.31	-0.37	0.08
17. Distressed by trembling or shaking	0.44	-0.17	0.03

In the second phase, CFA was performed on the holdout half of the sample (n=2627) using both the one-factor, and the three-factor solutions. The results indicate an acceptable fit for both models. For the one-factor model the GFI, AGFI, RMR, and RMSEA values were 0.90, 0.88, 0.05, and 0.08 respectively; whereas for the three-factor model these values were 0.93, 0.91, 0.03, and 0.07 respectively. The AIC indices for the one-factor and the three-factor models were 1962.33 and 1336.91 respectively.

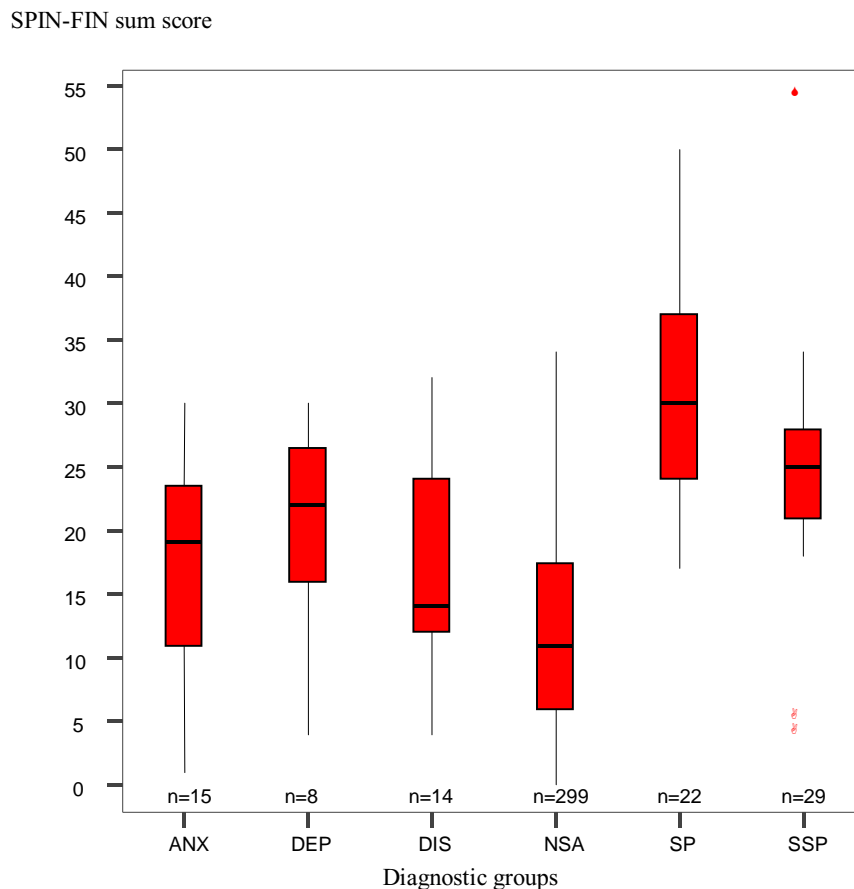
7.1.3 Construct and discriminative validity

Construct validity: The mean SPIN-FIN total score (standard deviation; sd) in the screening phase

of the Well-Being in Adolescence Study (n=752), was for all 11.3 (8.1); for boys it was 11.0 (7.7), for girls 11.5 (8.4) (Mann-Whitney test: $Z=0.671$; n. s.). The mean (sd) SPIN-FIN score of participants in the social phobia (SP) group was 31.2 (9.6), of participants with sub-clinical social phobia (SSP) it was 24.6 (8.7), and of participants with no social anxiety (NSA) it was 12.4 (7.7) points. In comparison between groups, the SPIN-FIN scores of participants in the SP group were significantly higher than those of participants in the NSA (Mann-Whitney test: $Z=6.926$; $p<0.001$) group. A trend for higher scores in the SP group than in the SSP group was observed (Mann-Whitney test: $Z=2.334$; $p=0.10$). The range of SPIN-FIN scores for adolescents with SP was 17-50 points, for adolescents with SSP 4-54 points, and for adolescents with NSA 0-34 points. These results indicate that the construct validity of the SPIN-FIN is good. (Figure 2)

Discriminative validity: The SPIN-FIN differentiated adolescents with SP from those with other anxiety disorders and disruptive disorders. In group comparisons, it was found that the scores of participants in the SP group were significantly higher than those of the participants in the ANX and the DIS groups (Figure 2). Of all participants, 24 had an anxiety disorder other than SP (ANX); and of these 15 had no SP comorbidity. The mean (sd) SPIN-FIN score for these participants was 16.7 (9.4). Of the 14 with at least one disruptive disorder (DIS), 13 had no SP comorbidity. Mean (sd) SPIN-FIN score for these 13 participants was 17.3 (8.6). Participants in the SP group also scored higher on the SPIN-FIN than participants in the DEP group, but the difference was not statistically significant (Figure 2). Of the seventeen adolescents with a depressive disorder (DEP) eight had no SP comorbidity. The mean (sd) SPIN-FIN score for these eight participants was 20.4 (8.8). The results indicate acceptable discriminative validity for the SPIN-FIN. However, with regard to differentiating between adolescents with SP and depression, discriminative validity was not established. (Figure 2)

Figure 2. Construct and discriminative validity for SPIN-FIN: distribution of SPIN-FIN sum scores across diagnostic groups in 350 12 to 17-year-old Finnish adolescents.



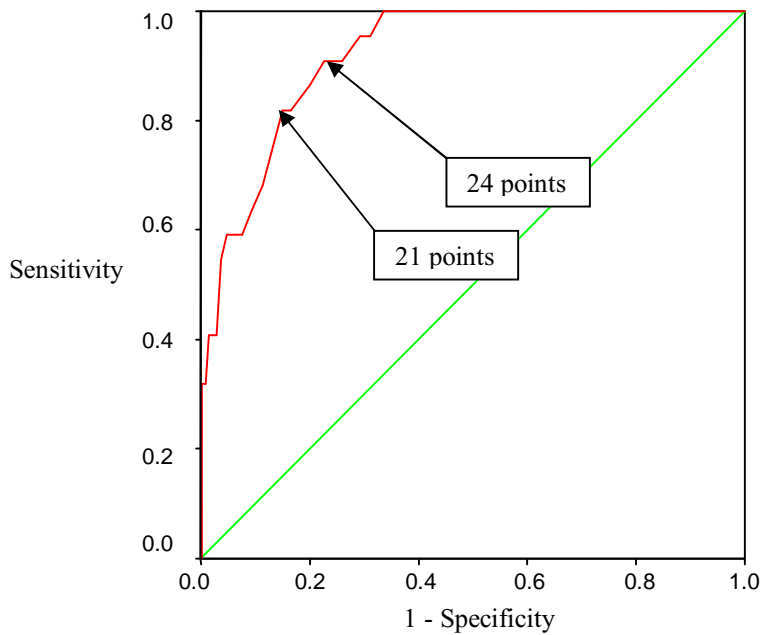
ANX = Anxiety disorders other than SP; DEP = Depressive disorders; DIS = Disruptive disorders; NSA = Normal level of social anxiety; SP = Social phobia; SSP = Sub-clinical social phobia. Placement to multiple categories due to comorbidity allowed except for SP and SSP cases. Group-wise comparisons: SP vs. NSA: $p < 0.001$; SP vs. ANX: $p < 0.001$; SP vs. DEP: $p = 0.07$; SP vs. DIS: $p < 0.001$; SP vs. SSP: $p = 0.10$.

7.1.4 Screening properties

The diagnostic efficiency of the SPIN-FIN and the determination of cut-off scores were examined by means of a ROC curve. This is presented as sensitivity versus 1-specificity values for SPIN total scores compared to a reference standard of diagnosis of social phobia ($n=22$). The area under the ROC curve was 0.92 (95% CI, 0.88 - 0.96), describing good efficiency. On the basis of visual

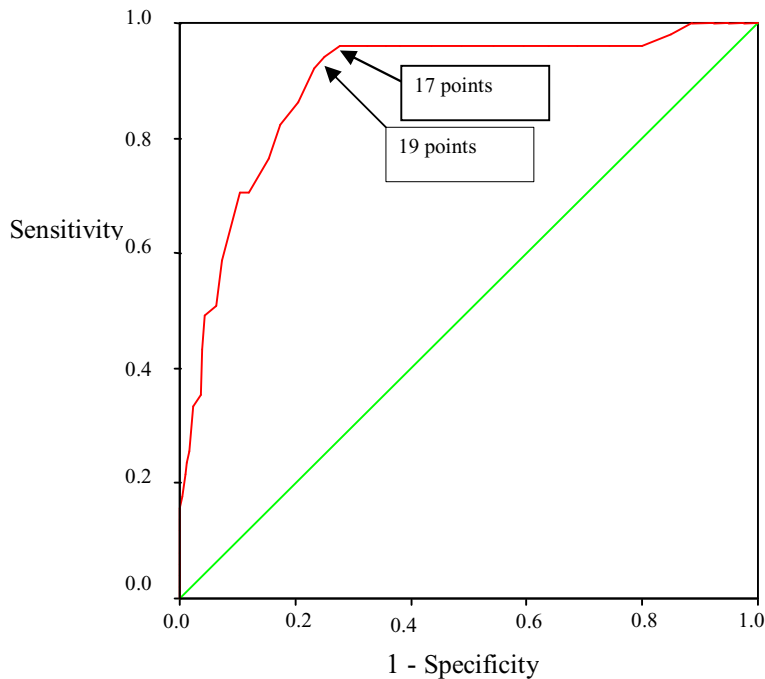
examination of the curve two alternative cut-off scores, 21 or 24 points, could be considered for identification of DSM-IV SP (Figure 3).

Figure 3. ROC curve for the SPIN-FIN among 12 to 17-year-old Finnish adolescents. Reference criterion: SP diagnosis.



An additional efficiency analysis was also done in which a ROC curve was drawn with a reference standard of diagnosis of social phobia or sub-clinical social phobia (n=51). The area under this ROC curve was 0.89 (95% CI, 0.84 - 0.94). Visual examination of the second ROC curve showed that either 17 or 19 points could be considered as cut-off scores for diagnosis of SP/SSP (Figure 4).

Figure 4. ROC curve for the SPIN-FIN among 12 to17-year-old Finnish adolescents. Reference criterion: SP/SSP diagnosis.



The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated over a range of possible cut-off scores. A cut-off score of 19, as suggested by Connor et al. (2000) among adults, produced a sensitivity of 95.5 %, a specificity of 70.9 %, and a PPV of 17.9 % in relation to a SP diagnosis; and a sensitivity of 92.2 %, a specificity of 76.6 %, and a PPV of 40.2 % in relation to a SP/SSP diagnosis. This cut-off score seems suitable for differentiating adolescents with SP/SSP from those without in the general population. For the identification of SP, a cut-off score of 24 produced both good sensitivity (81.2 %) and specificity (85.1 %); with a PPV of 26.9 % and a NPV of 98.6 %. This cut-off score was located near (8.9%) the upper 10th percentile of the distribution.

7.1.5 Age and gender differences in social anxiety symptoms

In the AMHCS data (n=5252), the SPIN-FIN total score mean (sd) / median was 12.2 (8.7) / 11 for all; for boys it was 11.4 (8.5) / 10, for girls 13.0 (8.8) / 11 (Mann-Whitney test: $Z=-7.187$; $p<0.001$). Girls scored significantly higher than boys in each grade (7th grade: $Z=-3.249$; $p<0.01$; 8th grade: $Z=-2.264$; $p<0.05$; 9th grade: $Z=-5.871$; $p<0.001$). Girls scored significantly higher than boys on the fear ($Z=-6.780$; $p<0.001$), avoidance ($Z=-2.497$; $p<0.05$), and physiological ($Z=-13.408$; $p<0.001$) subscales. Differences between total scores across grades were significant (Kruskal-Wallis test: chi-square=41.740; $p<0.001$): subjects in the 8th grade had higher total scores than 7th and 9th graders. When grade analyses were performed separately for each sex, differences between grades were only significant for boys (chi-square=9.711; $p<0.01$); for girls they were not significant (chi-square=3.734; $p=0.16$).

Table 6. Mean (s. d.) and median scores for SPIN-FIN total scale and subscales among Finnish adolescents aged 12-16 (n=5252).

Group	Total SPIN-FIN scale: Mean (sd) / median	Fear subscale: Mean (sd) / median	Avoidance subscale: Mean (sd) / median	Physiological subscale: Mean (sd) / median
All (n=5252)	12.2 (8.7) / 11	3.9 (3.3) / 3	6.1 (4.2) / 5	2.2 (2.2) / 2
Boys	11.4 (8.4) / 10	3.6 (3.2) / 3	5.9 (4.1) / 5	1.9 (2.1) / 1
Girls	13.0 (8.8) / 11 (a)***	4.2 (3.3) / 4 (a)***	6.2 (4.2) / 5 (a)*	2.6 (2.3) / 2 (a)***
7 th grade (n=612)	12.6 (8.5) / 11	4.1 (3.1) / 4	6.3 (4.2) / 6	2.3 (2.2) / 2
Boys	11.6 (8.2) / 10	3.8 (3.0) / 3	6.0 (4.1) / 5	1.8 (2.0) / 1
Girls	13.5 (8.6) / 12	4.3 (3.2) / 4	6.5 (4.3) / 6	2.7 (2.4) / 2
8 th grade (n=641)	13.7 (8.6) / 12	4.4 (3.2) / 4	6.8 (4.2) / 6	2.6 (2.3) / 2
Boys	12.9 (8.1) / 12	4.2 (3.0) / 4	6.7 (4.1) / 6	2.0 (2.0) / 2
Girls	14.6 (9.0) / 13	4.6 (3.3) / 4	6.9 (4.3) / 6	3.1 (2.4) / 3
9 th grade (n=3859)	11.8 (8.6) / 10 (b)**	3.8 (3.3) / 3 (b)**	5.9 (4.1) / 5 (b)**	2.1 (2.2) / 2 (b)**
Boys	11.1 (8.4) / 10	3.5 (3.2) / 3	5.8 (4.1) / 5	1.8 (2.1) / 1
Girls	12.6 (8.8) / 11	4.1 (3.3) / 3	6.0 (4.1) / 5	2.5 (2.3) / 2

*** $p<0.001$; ** $p<0.01$; * $p<0.05$ (a) comparison between boys and girls: Mann-Whitney test; (b) comparisons between 7 / 8 / 9 grades: Kruskal-Wallis test

Girls scored significantly higher than boys on the majority of items (Mann-Whitney test, all p 's<0.001; with the exception of item 16; p <0.05); items 11, 9, and 3 (no difference between genders); and items 4, and 8 (boys scored higher; p <0.001) (See Table 5). Of all respondents 17.9 % had a SPIN-FIN total score of 19 or more, the adult cutoff score for social phobia recommended by Connor et al. (2000), suggesting that social phobia symptoms are common in adolescent general population.

7.2 Epidemiology of social phobia among Finnish adolescents (study III)

7.2.1 Prevalence of 12-month social phobia

Twenty-two adolescents (11 girls, 11 boys) fulfilled all the DSM-IV SP criteria, and additionally 29 (15 girls, 14 boys) fulfilled the DSM-IV SP criteria except for significant functional impairment (SSP cases). According to the double sampling method, the weighted prevalence for 12-month SP was 3.2 %, for SSP 4.6 %. A higher rate for SP was observed among 15 to 17-year-olds than for 12 to 14-year-olds while the younger age group presented with a higher rate of SSP. Female to male ratio was 1:1 in both SP and SSP groups for the whole sample (Table 7). However, female to male ratio of SP shifted from 0.7:1 among 12 to 14-year-olds, to 1.5:1 among 15 to 17-year-olds.

Table 7. Weighted 12-month prevalence rates (%) of DSM-IV social phobia and sub-clinical social phobia by gender and age among Finnish adolescents

	Social phobia (SP)			Sub-clinical social phobia (SSP)			Combined (SP + SSP)		
	n	%	(95 % CI)	n	%	(95 % CI)	n	%	(95 % CI)
Total sample (n=752)	22	3.2	(1.8, 4.6)	29	4.6	(2.8, 6.4)	51	7.8	(5.6, 10.0)
Male (n=378)	11	3.4	(1.2, 5.6)	14	4.2	(1.8, 6.6)	25	7.5	(4.6, 10.4)
Female (n=374)	11	3.0	(1.4, 4.6)	15	5.0	(2.2, 7.8)	26	8.0	(4.7, 11.3)
Age groups									
12-14 years (n=470)	12	2.6	(1.2, 4.0)	18	5.2	(2.8, 7.6)	30	7.8	(4.6, 11.0)
15-17 years (n=282)	10	4.1	(1.5, 6.7)	11	4.0	(1.6, 6.4)	21	8.1	(4.7, 11.5)

7.2.2 Comorbidity of social phobia

Comorbidity for any other disorder was high (59 %) among adolescents with SP, while much less pronounced among those in the SSP group (24 %). Other anxiety disorders and depressive disorders were the most frequent comorbid disorders among adolescents with SP, both being present in 41 % of adolescents. In the SSP group, 17 % of adolescents had another anxiety disorder, and only 3-7 % had depressive or disruptive disorders (Table 8). However, sub-clinical anxiety disorders were common (28 %) in the SSP group.

Table 8. Comorbidity of social phobia and sub-clinical social phobia among Finnish 12 to 17-year-old adolescents

	Social phobia (SP) n=22	Sub-clinical social phobia (SSP) n=29
Comorbid disorder, n (%)		
Anxiety disorders	9 (40.9)	5 (17.2)
Panic disorder	-	1 (3.4)
Simple phobia	3 (13.6)	3 (10.3)
Generalized anxiety disorder	4 (18.6)	-
Obsessive compulsive disorder	1 (4.5)	-
Posttraumatic stress disorder	1 (4.5)	1 (3.4)
Depressive disorders	9 (40.9)	1 (3.4)
Major depressive disorder	4 (18.1)	-
Dysthymia	2 (9.1)	1 (3.4)
Depressive disorder NOS	3 (13.6)	-
Disruptive Disorders	1 (4.5)	2 (6.9)
Conduct disorder	1 (4.5)	-
Conduct disorder NOS	-	2 (6.9)
Other Disorders	1 (4.5)	-
Eating disorder NOS	1 (4.5)	-

7.2.3 Individual and familial correlates of social phobia

Adolescents in the combined SP/SSP group had significantly lower grade point averages, and were more impaired in their level of global functioning than adolescents in the no diagnosis (NO) group. Although impaired in their school work, no significant difference in the occurrence of failing a grade was observed between the SP/SSP and NO groups. Adolescents with SP/SSP also reported significantly more often having been bullied than adolescents without psychiatric disorders. When the frequencies were examined by diagnostic class, previous bullying experiences were reported by 68 % of adolescents with SP, 45 % of adolescents with SSP, and 8 % of adolescents with no diagnosis (NO). The frequency of a mental health contact by any family member was higher in the SP/SSP (18.0 %) compared to the NO (6.7 %) group ($p<0.05$). In total, 7% of the adolescents reported parental mental health contact, of these 56.5 % due to depression or anxiety and 43.5 % due to other symptoms. Any parental mental health contact and parental contact due to anxiety / depression were both more frequent in the SP/SSP than in the NO group. (Table 9)

Table 9. Individual and familial correlates associated with social phobia / sub-clinical social phobia compared to adolescents without diagnosis among Finnish 12 to 17-year-olds.

	Social phobia / sub-clinical social phobia	No diagnosis
Individual correlates		
n	51	272
Age, mean (sd) (years)	14.6 (1.1)	14.8 (1.1)
Gender male, (%)	49.0	50.4
Gender female (%)	51.0	49.6
Failing a grade (%)	2.0	1.8
Grade point average (sd) (4-10) 1)	7.8 (0.7)	8.0 (0.8)
Bullied by peers (%) 2)	54.9	7.7
CGAS mean score (sd) (0-100) 3)	60.3 (7.6)	79.0 (7.0)
Familial correlates		
Living with one biological parent (%)	21.6	25.4
Parental psychiatric contact (%) 4)	14.0	4.5
Parental anxiety / depression (%) 5)	8.0	1.1
Caregiver occupation status (%)		
(I) no work, unskilled worker	31.4	31.7
(II) skilled worker	13.7	28.6
(III) professional	45.1	37.0
(IV) leading position	9.8	2.7

Group-wise comparisons: SP/SSP vs. NO: 1) Grade point averages: $p < 0.05$; 2) Bullied by peers: $p < 0.001$; 3) CGAS: $p < 0.001$; 4) Parental psychiatric contact: $p < 0.05$; 5) Parental anxiety / depression: $p < 0.05$. Statistical test: for dichotomized variables: Chi-square test / Fisher's exact test where appropriate. For continuous variables: independent samples t-test. Only significant differences at the level $p < 0.05$ reported.

No significant differences in the number of children in the family, the birth order of being the first, second, etc. child in the family, or living with only one biological parent were found between SP/SSP and NO groups. No significant differences between family caregiver vocational status as either low versus middle / high were noted between adolescents in the SP/SSP and NO groups.

7.2.4 Treatment seeking

One third (36 %) of the subjects with SP had sought help from a mental health professional, and additionally 23 % had talked to an adult, non-professional, counsellor. However, adolescents with non-comorbid SP had 2-3 times lower contact rates than those with comorbid SP: only two subjects (22 %) with pure SP had been in contact with a mental health professional, and one (11 %) had talked to a counsellor (vs. 46 % and 31 % respectively of those with comorbid disorders). Two thirds

of adolescents with pure SP had not had any contact at all. Adolescents with SSP had a low rate of professional contacts (3 %), which was comparable to that of adolescents with no disorder (7%). However, 28 % of subjects with SSP had had a contact with a counsellor.

7.3 Peer victimization, depression, and social phobia (Study IV)

7.3.1 Frequency of self-reported peer victimization, depression and social phobia

Of all respondents in Study IV, 5.1% reported being overtly victimized at least two or three times a month, with boys reporting this twice as frequently as girls (6.6% vs. 3.5%; $\chi^2=16.245$, $df=1$ $p<0.001$). Covert victimization was reported by 3.5% of respondents, slightly but not significantly more frequently by girls (4.1%) than by boys (2.9%) ($\chi^2=3.288$, $df=1$ $p=0.07$). Of all adolescents 9.9% were suffering from self-reported depression (boys 6.5%, girls 13.4%; $\chi^2=42.070$, $df=1$; $p<0.001$); 8.7% from self-reported SP (boys 7.1%, girls 10.2%; $\chi^2=9.690$, $df=1$; $p<0.005$), and 3.7% from self-reported SP comorbid with depression (boys 2.2%, girls 5.3%; $\chi^2=21.834$, $df=1$; $p<0.001$). The frequency of self-reported depression not comorbid with SP was twice as high among girls as among boys (8.0% vs. 4.3%; $\chi^2=19.091$, $df=1$; $p<0.001$); by contrast, no gender difference was observed in frequency of self-reported SP non-comorbid with depression (4.9% vs. 4.9%; n. s.).

7.3.2 Peer victimization among adolescents with depression and social phobia, with and without comorbidity

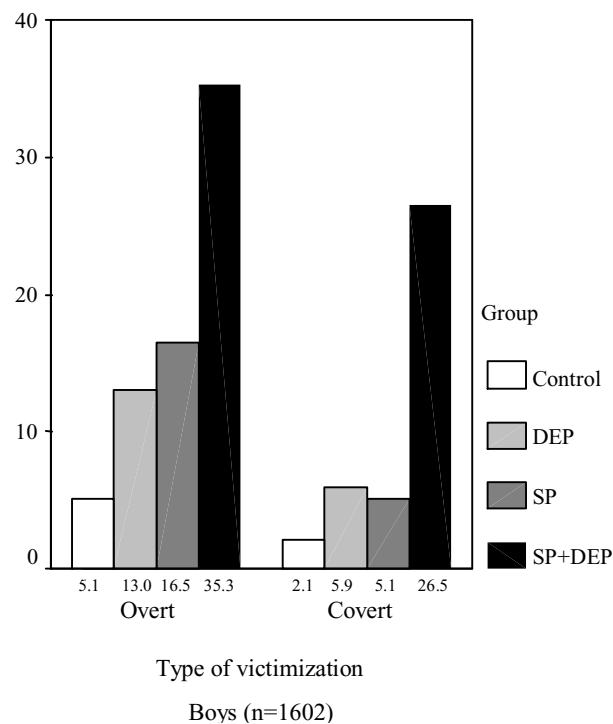
Overt victimization: Over one third (35.3%) of boys in the SP+DEP group reported having been overtly victimized, a rate seven times higher than among adolescents in the control group. Rates of overt victimization among the boys' SP and DEP groups were also higher than among controls. The chi-square test indicated that the difference between the four boys' groups was significant ($\chi^2=67.600$, $df=3$; $p<0.001$). The group-wise post-hoc comparisons showed that boys in the comorbid group were more often overtly victimized than boys in the DEP group, and marginally more so than boys in the SP group, although this difference did not reach statistical significance (Figure 5).

Girls in the SP+DEP group reported overt victimization six times more frequently than controls; while the girls in the DEP and SP groups fell in between these two groups. The difference between the four girls' groups was significant ($\chi^2=40.072$, $df=3$; $p<0.001$). Unlike boys, no statistical difference on the frequency of overt victimization in the SP+DEP group over either DEP or SP groups was observed among girls (Figure 6).

Covert victimization: Over one fourth (26.5 %) of the boys in the SP+DEP group reported covert victimization, this being ten times more frequent than in the control group. Of the boys in both the DEP and SP groups, around five percent reported covert victimization. The difference between the four groups was significant among boys ($\chi^2=74.440$, $df=3$; $p<0.001$). Post hoc comparisons showed that boys in the SP+DEP group suffered from covert victimization more than respondents in both DEP and SP groups (Figure 5).

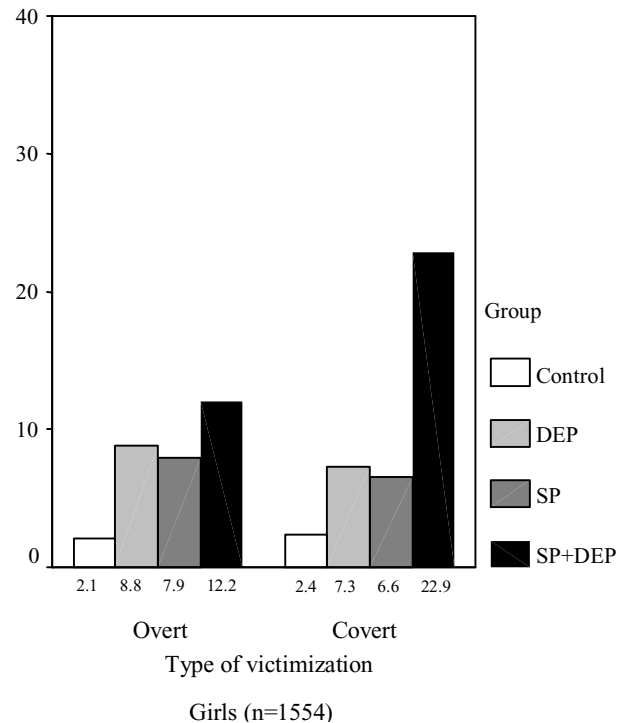
Nearly one fourth (22.9 %) of the girls in the SP+DEP group reported being covertly victimized, this percentage being ten times higher than in the control group. Around seven percent of the girls in both DEP and SP groups reported covert victimization. The difference between the four girls' groups was significant ($\chi^2=89.029$, $df=3$; $p<0.001$), while the post-hoc comparisons indicated that comorbidity was associated with higher rates of covert victimization than that seen in both DEP and SP groups (Figure 6).

Figure 5. Frequency (%) of overt and covert victimization among Finnish 15 to 16-year-old boys in four groups with: no self-reported depression/social phobia (control), self-reported depression without social phobia (DEP), self-reported social phobia without depression (SP), and self-reported SP comorbid with depression (SP+DEP).



Post-hoc comparisons between SP+DEP, and DEP and SP groups: 1) Overt victimization: SP+DEP > DEP ($p<0.05$); SP+DEP vs. SP: ($p=0.05$). 2) Covert victimization: SP+DEP > DEP ($p<0.05$); SP+DEP > SP ($p<0.005$).

Figure 6. Frequency (%) of overt and covert victimization among Finnish 15 to 16-year-old girls in four groups with: no self-reported depression/social phobia (control), self-reported depression without social phobia (DEP), self-reported social phobia without depression (SP), and self-reported SP comorbid with depression (SP+DEP).



Post-hoc comparisons between SP+DEP, DEP, and SP groups: 1) Overt victimization: SP+DEP vs. DEP; SP+DEP vs. SP: both ns. 2) Covert victimization: SP+DEP > DEP ($p < 0.005$); SP+DEP > SP ($p < 0.01$).

7.3.3 Role of comorbidity

The results from the logistic regression analysis among boys indicated that, relative to the risk of the control group, belonging either to the SP, or the SP+DEP group - but not to the DEP group - was associated with an increased risk of being overtly or covertly victimized. Of the other covariates, parental unemployment (one parent) was associated with a slightly increased risk of being overtly victimized. No other significant associations were found (Table 9).

Among girls, covariates associated with overt and covert victimization differed from each other.

Among covertly victimized girls the pattern was similar to that among victimized boys: belonging either to the SP or the SP+DEP – but not to the DEP group – was associated with increased risks relative to the controls. Parental unemployment (one parent) was associated among girls with a slight increase in the risk of being covertly victimized. Unlike covert victimization among girls, belonging to the SP, and the SP+DEP groups, but also significant general anxiety and parental unemployment (both parents) were associated with an increased risk of being overtly victimized relative to controls. (Table 9)

Table 9. Risk of overt/covert victimization by sex [Odds ratio (OR), 95 % confidence interval (CI)] according to having non-comorbid or comorbid depression/social phobia among 15 to 16-year-old Finnish adolescents by sex when confounding psychopathology and family covariates are controlled for

	Odds ratio (95 % CI)			
	<u>Boys</u>		<u>Girls</u>	
	Overt victimization	Covert victimization	Overt victimization	Covert victimization
Group:				
No depression, no SP (<i>ref.</i>)	1.0	1.0	1.0	1.0
Depression without SP (DEP)	1.8 (0.8 - 4.3)	1.1 (0.2 - 5.5)	2.0 (0.8 - 4.8)	1.9 (0.8 - 4.7)
Social phobia without depression (SP)	3.5 (1.8 - 7.0)	3.1 (1.0 - 9.5)	4.3 (1.7 - 11.0)	2.8 (1.1 - 7.7)
Comorbid SP and depression (SP+DEP)	6.7 (2.8 - 16.0)	11.4 (3.9 - 33.2)	3.2 (1.3 - 7.9)	9.6 (4.7 -19.4)
Psychopathology covariates:				
Delinquent behaviour	1.5 (0.7 - 3.2)	1.3 (0.5 - 4.0)	1.8 (0.8 - 3.9)	1.7 (0.8 - 3.6)
Aggressive behaviour	1.1 (0.6 - 2.3)	1.6 (0.6 - 4.4)	2.0 (0.9 - 4.4)	0.9 (0.4 - 2.1)
General anxiety	1.8 (0.8 - 4.2)	1.9 (0.6 - 6.4)	3.0 (1.4 - 6.4)	1.4 (0.6 - 3.0)
Family covariates:				
Family moved within last five years				
once	1.2 (0.7 - 2.0)	1.2 (0.5 - 2.9)	1.0 (0.5 - 2.1)	1.0 (0.5 - 2.0)
two times	1.4 (0.6 - 3.1)	2.2 (0.7 - 6.4)	1.0 (0.4 - 2.7)	0.6 (0.2 - 1.8)
three times	1.2 (0.4 - 3.2)	2.0 (0.5 - 7.6)	0.8 (0.2 - 3.0)	1.8 (0.7 - 4.4)
Parental unemployment during last year				
one parent	1.6 (1.0 - 2.7)	1.2 (0.6 - 2.7)	1.1 (0.6 - 2.2)	1.8 (1.0 - 3.2)
both parents	1.3 (0.4 - 4.1)	0.8 (0.1 - 4.8)	4.5 (1.5 - 13.5)	2.1 (0.6 - 8.0)

8 DISCUSSION

8.1 Overview of the results

The first main finding of the present study was that the SPIN-FIN is a reliable and valid measure for the identification and screening of social phobia in Finnish general adolescent population. It has discriminative validity to differentiate socially phobic adolescents from adolescents with other anxiety disorders and disruptive disorders. Adolescents with a depressive disorder score marginally, but not significantly, lower on the SPIN than adolescents with social phobia. When using SPIN-FIN as a screening method for purposes of identifying adolescents with possible clinical social phobia, 24 points or more seems an appropriate cut-off score. When also screening for significant social phobia symptoms without functional impairment (i. e. sub-clinical social phobia), 19 points seems an appropriate cut-off score.

The second main finding of the study was that DSM-IV social phobia is relatively common among Finnish adolescents. It affects 3.2 % of 12 to 17-year-old adolescents; in addition 4.6 % of adolescents suffer from social phobia symptoms without functional impairment, i. e. sub-clinical social phobia. Social phobia is comorbid with both depressive disorders and other anxiety disorders in roughly 40 % of cases, causes functional and educational impairment, and is associated with peer victimization in two thirds of the cases. It is associated with parental psychiatric treatment contacts and depression or anxiety in parents. Despite the functional harm it causes, only one fifth (22%) of adolescents with non-comorbid social phobia have sought help from a mental health professional. These results suggest that social phobia probably goes undetected among adolescents.

The third main finding of this study was that the associations reported by previous studies between being victimized by peers and depression may be due to frequent comorbidity between social phobia and depression, because when controlling for comorbidity between depression and social phobia, associations of depression non-comorbid with social phobia to peer victimization did not hold, while those of social phobia and most robustly comorbid social phobia and depression were clear and strong.

8.2 Reliability and factor structure of the SPIN-FIN

Test-retest and internal consistency reliability for the SPIN-FIN were good among Finnish adolescents. The test-retest reliability of the SPIN-FIN (full scale $r=0.81$ over five weeks) was comparable with data using SPIN among English (Johnson et al. 2006) and Portuguese-speaking adolescent (Vilete et al. 2004) samples, and also comparable to test-retest reliabilities found for adults (Connor et al. 2000; Antony et al. 2006). The test-retest reliability of the SPIN-FIN was also comparable to test-retest reliabilities reported for other available self-report measures of social anxiety or social phobia: to SAS-A subscales (La Greca 1998; García-López et al. 2001; Storch et al. 2004), to SPAI-C (Beidel et al. 1995; Storch et al. 2004), and SPAI (García-López et al. 2001).

The internal consistency coefficients for SPIN-FIN (full scale 0.89, sub-scales 0.65-0.80) are also comparable to those reported for the SAS-A three subscales (La Greca 1998; Inderbitzen-Nolan and Walters 2000), to SPAI-C (Beidel et al. 1995), and to SPAI (Clark et al. 1994; Olivares et al. 1999). Acceptable internal consistencies were found across all age groups studied (7th, 8th, and 9th graders) and gender, suggesting good applicability for use among 12 to 16-year olds. Thus, the reliability of SPIN-FIN is comparable to that reported for other established measures of adolescent social anxiety

or social phobia, and comparable also to different language versions of the SPIN, used in different cultures and age groups. A potential and inherent limitation of the SPIN-FIN as used among adolescents is that it assesses symptoms over one week. This may in some cases be too brief a period to reflect the actual avoidance of several types of social or performance situations in adolescents' lives as these situations may happen more rarely to adolescents than they do for adults.

The present study was, to the best of the author's knowledge, the first to explore the factor structure of the SPIN in an adolescent community population sample in any cultural area. Previous research has used the original SPIN among adults with SP, with a high mean total score of 41.1 points, and yielding five factors (Connor et al. 2000). Using CFA, a large population sample was divided into two random halves, aiming to examine the fit of the possible factorial structures emerging in the first half to the second half of the data. The results suggested either a one-factor or alternatively a three-factor factor structure for the SPIN-FIN, with fit indices for both in the acceptable range. The simplicity criterion (Tabachnik and Fidell 2001) favors the one-factor model. The emergence of a one-factorial structure also justifies using the SPIN total score as a single measure of social anxiety among adolescents.

While the alternative three-factor structure found in this adolescent population sample differs from that found by Connor et al. (2000) among adults, some similarities can be noted (In the following Roman numerals refer to factors reported by Connor et al. (2000), while Arabic numerals refer to our factors). Factor I - social inadequacy - with items measuring fear and avoidance of talking to strangers and of social gatherings; and Factor V - avoidance of attention to oneself - with items measuring avoidance of being the center of attention and of public speaking, were maintained (our Factors 2 and 3 respectively) in the present adolescent sample. Factors II - threat to self-esteem - with items measuring fear and avoidance of criticism and embarrassment, and III - physiological

symptoms - were merged into our Factor 1. The items from Factor IV - social inferiority - cross-loaded with medium-sized loadings across Factors 1 and 2: fear of authority (item 1) loading higher on Factor 1, and avoidance of authority figures (item 16) loading higher on Factor 2. Item 13 (palpitations) also loaded with medium-sized weights on both Factors 1 and 2. The developmental stage may modify adolescents' feelings towards an authority figure; this may partially explain the cross-loadings of authority items in the whole population.

8.3 Validity and screening properties of the SPIN-FIN

Use of the SPIN-FIN as a valid measure for measuring adolescent SP was supported by the results of the present study. The SPIN-FIN scores were clearly higher among those with DSM-IV social phobia in comparison with those without it. In adolescents with social phobia symptoms without functional impairment, i.e. sub-clinical social phobia, the SPIN-FIN scores fell between those of adolescents with SP and adolescents with normal level of social anxiety. The discriminative validity of the SPIN-FIN was fairly good relative to other anxiety disorders and disruptive disorders.

Relative to depressive disorders it was not established. These findings extend and replicate recent findings by Antony et al. (2006), demonstrating discriminative validity for SPIN in relation to other anxiety disorders among adults; and by Johnson et al. (2006) finding some differences, yet not reaching statistical significance, between SPIN scores of adolescents with social phobia and those with generalized anxiety disorder. It should be noted that self-report instrument such as SPIN-FIN are not intended to yield clinical diagnoses.

The finding that SPIN-FIN scores for adolescents with pure depressive disorder were also elevated may reflect lack of statistical power because the DEP group remained small. Depression may also

lower adolescents' self-esteem, leading to heightened social anxiety, but not in the full clinical presentation of SP. Indeed, SPIN-FIN scores for adolescents with comorbid SP and depression were even higher than those for adolescents with SP only.

The SPIN-FIN demonstrated good properties for use as a screening method for social phobia in this population sample. 24 points can be used as a cut-point in screening for SP, while 19 points can be used to screen for both sub-clinical and clinical SP. ROC analyses showed that using 21 points as a cut-off could also yield an acceptable tradeoff between sensitivity and specificity when screening for SP, which is the same cut-off as that found in the study by Johnson et al. (2006) examining the screening properties of the SPIN in their volunteer adolescent sample.

Epidemiological studies suggest that the onset of clinical SP occurs in adolescence and proceeds on a waxing and waning course rarely with full remission (Wittchen and Fehm 2001). Considering this, a screening measure of adolescent SP should be sufficiently sensitive. At the same time, it is likely that milder symptoms of social anxiety also fluctuate in severity over time in adolescents. This is probably reflected both in the high rates of adolescents exceeding the clinical cut-offs on self-report measures of social anxiety, and the moderate test-retest reliabilities of these measures over longer periods e.g. 12 months (Storch et al. 2004). Epidemiological interview studies have confirmed that the prevalence of social fears among adolescents is indeed high (Essau et al. 1999; Wittchen et al. 1999). Therefore, the predictive value of a positive result of a SP screen as used among adolescents should also be reasonable.

The sensitivity and specificity of a measure are unaffected by sample size, but the PPV of a test is dependent on the prevalence of the disorder in the sample. If the base rate of the disorder is low, efficient screening instruments may also have low PPVs (Grimes and Schultz 2002). When the cut-

off score for SPIN-FIN was set at 24 points, good diagnostic efficiency indicators for SP were achieved. Both sensitivity and specificity exceeded 80 %, and the PPV can be regarded as good (26.9 %) considering the relatively low frequency of SP in general adolescent population. While the majority of adolescents exceeding this cutpoint will not have DSM-IV SP, they are still likely to suffer from high degrees of social anxiety, as is evidenced by the fact that 54 per cent have either SP or SSP.

8.4 Age and gender differences in social anxiety symptoms

Adolescent girls reported higher degrees of social anxiety than boys as measured by the SPIN-FIN total score. This finding is consistent with most earlier studies (La Greca and Lopez 1998; Essau et al. 1999; Olivares et al. 1999; Wittchen et al. 1999; Inderbitzen-Nolan and Walters 2000; Storch et al. 2004). Eighth graders reported highest levels of social anxiety symptoms: mean total scores were 12.6, 13.7, and 11.8 (7th, 8th, and 9th grades respectively; $p < 0.01$). Thus, an intensification of social phobia symptoms was seen in adolescents aged 14-15 years of age. Such peaking of symptoms in mid-adolescence was also found by Essau et al. (1999), who reported a significant rise in prevalence of both social phobia, and significant social fears between age groups 12-13 and 14-15. Other studies also seem to point to a rise in adolescents' self-reported social anxiety towards mid-adolescence, around fourteen years of age (Inderbitzen-Nolan and Walters 2000; Storch et al. 2004).

However, when analysing the data separately by sex, a statistically significant difference emerged only among boys. While Olivares et al. (1999) found that adolescent boys' and girls' symptoms of social anxiety may follow a different pattern between the ages of 14 and 17 years, the results of the present study suggest that boys may be more susceptible than girls to a rise in social anxiety at 14 to

15 years of age. One reason may be pubertal maturation, occurring earlier in girls than in boys, and causing body shape alterations that may temporarily arouse feelings of shame and insecurity and thus social anxiety.

8.5 Prevalence, gender ratio, and comorbidity of social phobia

This study found a 3.2 % prevalence rate for 12-month DSM-IV social phobia among 12 to 17-year-old Finnish adolescents. This rate is consistent with findings from earlier European adolescent population studies using the DSM-IV (Essau et al. 1999; Wittchen et al. 1999) and the DSM-III-R (Verhulst et al. 1997) criteria, but higher than in an American study (Costello et al. 2003), finding 0.2 – 1.2 % prevalence for DSM-IV SP among adolescents aged 12 to 16 years. Methodological differences in the screening methods used in the study by Costello et al. (2003) and in the present study (CBCL behavioural problems subscale vs. SPIN) and the time frames for prevalence estimates (3-month vs. 12-month) likely explain the differences.

Compared to earlier Finnish epidemiological studies among 8 to 9-year-old children (Almqvist et al. 1999) and young adults (Aalto-Setälä et al. 2001), higher prevalence estimates for SP were found in this adolescent sample. Again, methodological differences and age difference likely explain the difference from the study by Almqvist et al., which used parental interview and DSM-III-R criteria in a preadolescent sample. The study by Aalto-Setälä et al. (2001) in turn reported an 1-month prevalence, which most probably is lower than the 12-month prevalence reported by us, given the “waxing and waning” course of SP in adolescence and early adulthood (Wittchen and Fehm 2003). Furthermore, the confidence intervals calculated for the prevalence estimates in our study (95 % CI

1.8 to 4.6) and in the study by Aalto-Setälä et al. (96 % CI from 0.2 to 2.1) do overlap, which means that we cannot wholly rely that the differences between the two studies are significant.

Earlier studies have found an increase in SP rates with age during the adolescent years (Essau et al. 1999; Wittchen et al. 1999). The results of the present study are in line with these findings, as a higher prevalence of SP was found among 15 to 17-year-olds than among 12 to 14-year-olds. The somewhat higher prevalence of SSP among 12 to 14-year-olds than among 15 to 17-year-olds may be due to factors such as transition to secondary school between the 6th and 7th grades in Finland. Furthermore, the need to mentally adjust to pubertal body changes may cause temporary feelings of shame and social anxiety, possibly more so among early than middle adolescents. Studies assessing self-reported symptoms of social anxiety instead of clinical SP have not identified a similar straightforward age effect for social anxiety than that found for clinical SP. Instead, a pattern of increase in symptoms of social anxiety in early adolescence (11-14 years of age), and a decrease in middle adolescence (15-17 years of age) has been found (Essau et al. 1999; Inderbitzen-Nolan and Walters 2000; Storch et al. 2004), and in Study I of this work. Early adolescents with SSP may also represent the group who will go on to develop SP in subsequent adolescent years.

An equal prevalence was found among females and males for both SP and SSP among Finnish adolescents throughout the age range of 12 to 17 years. This finding differs from European and American studies showing a female preponderance with a female to male ratio of approximately 2:1 among adolescents (Essau et al. 1999; Wittchen et al. 1999; Costello et al. 2003). The finding may reflect the fact that a greater number of 12 to 14-year-olds than 15 to 17-year-olds were included in this sample, given that in some studies among early adolescent age groups a more equal gender ratio has been found (Costello et al. 2003; Canino et al. 2004). However, possible societal differences contributing to this finding cannot be ruled out. An interesting observation is that

Pirkola et al. (2005) also found an equal gender ratio for SP among Finnish adults in a large-scale and representative Finnish epidemiological study. Taken together, this study and study by Pirkola et al. (2005) indicate that the gender ratio of SP in Finland may indeed differ from that found in most European and North American countries, and that cultural influences may have a role in the gender distribution of SP. With regard to differences between total prevalence rates of SP found by us in Finland and those found in the USA the possibility of true cultural variation should also be considered. For example findings of cross-cultural differences found in such temperament dimension as harm avoidance (Miettunen et al. 2006), likely to be associated with SP (Marteinsdottir et al. 2003), may non-directly support the notion of possible true cultural differences in the prevalence of SP. Clearly, more international studies on the epidemiology of SP are needed among adolescent samples.

The comorbidity patterns found between SP, other anxiety disorders and depression in this study are consistent with findings from the adolescent studies available (Essau et al. 1999; Wittchen et al. 1999). However, disruptive disorders and alcohol and substance abuse have previously been reported to a greater degree (Essau et al. 1999; Wittchen et al. 1999). That almost two thirds in the present sample were 12 to 14-year-olds, residents of a small town probably accounts for why alcohol and substance use disorders were not observed, as alcohol use is rare among Finnish adolescents under 14 years of age (Lintonen et al. 2000). Furthermore, the adult epidemiological study by Pirkola et al. (2005) found that alcohol use disorders in adults were more prevalent in the metropolitan area of Helsinki than they were in other urban areas of Finland (Pirkola et al. 2005). As whole, one must be cautious in generalizing the prevalence and comorbidity findings of the present study to other areas of Finland.

8.6 Individual and familial correlates of social phobia

This study found a clear association between being bullied by peers and SP / SSP. That nearly 70 % of adolescents in the SP group reported having been bullied substantiates and extends earlier findings on the association between peer victimization and self-reported social anxiety among adolescents (Juvonen et al. 2003; Storch and Masia-Warner 2004). Longitudinal survey studies have suggested that peer victimization may lead to heightened levels of social anxiety at a later phase, and that the type of victimization (overt / relational victimization) may have a role in how victimization and social anxiety temporally relate to each other (Vernberg et al. 1992; Storch et al. 2005).

Some adult studies, using retrospective assessment (Öst and Hugdahl 1981; Stemberger et al. 1995), have found that subjects with clinical SP report early adverse social experiences, thus a question has been raised regarding their possible role as risk factors for the emergence of SP. An association between clinical SP and adverse social experiences among adolescents was found in this sample. This finding may be more reliable than findings based on retrospective reports by adults whose accounts of their early social experiences may include recall bias. Longitudinal studies are needed to ascertain the possible causal relationship between being bullied and early SP.

Support was found for earlier findings suggesting impaired educational functioning among subjects with SP/SSP during adolescence (Davidson et al. 1993; Wittchen et al. 1999; Essau et al. 2000; Chartier et al. 2001). Global psychosocial functioning was also substantially compromised in adolescents with SP / SSP. Adolescents with SSP suffered from frequent sub-clinical symptoms of other anxiety disorders, and sought consultation more frequently when compared to adolescents

without diagnosis. These results suggest that symptoms of SSP also have an effect on many levels of functioning of adolescents, and should probably be targeted for an intervention.

Adolescents with SP / SSP reported excess of parental psychiatric treatment contacts due to anxiety, depression or suicidal behaviour. Although the reliability and specificity of adolescents' reports of their parents' treatment contacts is moderate at best, these results suggest an aggregation of anxiety and depressive disorders among their parents, thus supporting findings in adult clinical (Bandelow et al. 2004) and community studies (Merikangas et al. 1998; Lieb et al. 2000; Chartier et al. 2001). In agreement with certain more recent studies, no association between SP and birth order was found in this study (Bögels et al. 2001; Chartier et al. 2001; Bandelow et al. 2004), or frequency of divorce in the family (Bögels et al. 2001; Bandelow et al. 2004), nor was family caregiver occupational level related to SP in offspring (Davidson et al. 1993; Chartier et al. 2001).

8.7 Treatment seeking in social phobia

The vast majority of adolescents with non-comorbid SP had not been in contact with a counsellor or a mental health professional (only 22% had had a contact), indicating that SP is not recognized in school health care or in families. Comorbid disorders, such as depression, may be primary reasons for outside referral in adolescents with comorbid SP. These results are consistent with earlier research (Essau et al. 1999; Wittchen et al. 1999) reporting that about one fifth of adolescents with SP have used mental health services. Adolescents with sub-clinical SP symptoms seem very rarely to seek treatment from mental health professionals.

8.8 Social phobia, depression, and peer victimization

That social phobia comorbid with depression was associated with significantly higher rates of victimization than depression without SP in three out of four comparisons (among boys victimized both ways, and among covertly victimized girls) indicates a prominent role for social phobia as a correlate to victimization. The logistic regression analyses altogether dropped associations of depression non-comorbid with SP to victimization, but maintained those of SP, and SP comorbid with depression among both boys and girls and across both types of victimization. This held true even when other confounding psychopathology and socio-demographic covariates were also controlled for.

Symptoms such as prominent social fears, and social avoidance - both core symptoms of SP (APA 1994) - and lack of social skills (Spence et al. 1999) associated with SP may leave young people with SP especially vulnerable to victimization, unable to fight back against the bullies, but further avoiding and withdrawing from contacts (Fox and Boulton 2005). The withdrawal and self-focused coping style may single out especially boys with high levels of social anxiety as targets of bullying (Erath et al. 2007). With only few close friends (Beidel et al. 1999) adolescents with SP may lose the shield close friends could offer against victimization (Cowie 2000).

That social fears and SP tend to run a chronic course during adolescence (Wittchen and Fehm 2003) indicates that the effect on friendships may be long-lasting, possibly leading to impairment of psychosocial status. Being avoidant may even act as a stigma among adolescents, who strive for the acceptance of others: connecting with a peer who is avoidant may raise fears among others of being seen themselves as unpopular in the eyes of peers (Hartup 1996). As adolescents with SP are likely

reluctant to seek help (Wittchen et al. 1999), they may also become trapped in a sustained victimized position.

The finding that self-reported depression not comorbid with SP did not emerge as an independent correlate of victimization clearly differs from the result of the meta-analysis by Hawker and Boulton (2000) citing a number of studies reporting an association between self-reported depression and peer victimization among adolescents. This finding may be explained by the fact that earlier research has not controlled for the substantial comorbidity between depression, anxiety, and externalizing symptoms.

The finding that victimization was more common in the SP+DEP than in the SP group suggests that depressive symptoms, however, may have an effect that exacerbate the effect of SP in increasing the risk of victimization. Of depressive symptoms, such self-directed negative cognitions as being a failure, being worthless, of being disappointed with oneself, or regarding oneself as ugly or repulsive (all included in the BDI), may reflect victimized adolescents' "characterological tendency of self-blame" (Graham and Juvonen 1998). Harboring global and negative causal attributions about oneself such as: "I can't succeed in friendships because I as a person can't be liked" may add to the more situation-specific cognitive biases of adolescents with high levels of social anxiety or SP - such as inflated perception of threat, high expectation of a negative outcome, or expectation of the worst possible outcome in social situations (Spence et al. 1999; Muris et al. 2000; Weems et al. 2001), or attribution of the reason for a social failure to oneself (Epkins 1996; Weems et al. 2001). As a result, even more avoidant interpersonal behaviour may develop.

Unlike research on children (Deater-Deckard 2001; Storch and Ledley 2005), no association of either aggressiveness or delinquent behaviour with either type of victimization in either sex was

found. This may reflect the developmental shift to adolescence; the association between externalizing symptoms and peer rejection may diminish in middle childhood, and aggressive and delinquent behaviour may be better tolerated, even linked to popularity among adolescents (Sandstrom and Coie 1999). Also, this finding may relate to perspective: aggressive adolescents may not themselves experience problems in their peer relationships, but on peer nomination they are less popular, and seen as having problems. Furthermore, the finding that general anxiety was not generally associated with victimization also supports a specific role for social anxiety / SP as a correlate to peer victimization.

In the present study the gender differences in associations between self-reported SP, depression, and victimization were minor. However, among girls, comorbid SP + depression was not associated with a greater risk of overt victimization than for SP without depression. Further, general anxiety emerged as a correlate of overt victimization among girls. As defined in this study, general anxiety relates to an acute state-like experience, and demonstrates that being overtly victimized may be very disturbing to girls. Earlier studies have reported conflicting findings about the gender differences in psychological correlates to overt bullying: some have found depression to be associated with overt bullying in boys, but *not* in girls (Prinstein et al. 2001), others in girls, but *not* in boys (van der Wal et al. 2003), and still others equally in both genders (Kaltiala-Heino et al. 1999a). The qualitative aspects of being overtly victimized may differ between girls and boys (Björkqvist 1992), with girls being more vulnerable to verbal acts of aggression, such as teasing about appearance (Agliata et al. 2007). Clearly, further research addressing gender-specific correlates of overt victimization is needed. It may be that lack of controlling for social anxiety and methodological differences account for the discrepancies in earlier studies.

The association of low family socioeconomic status and victimization found in the present study has also been observed previously (Kim et al. 2004). However, clearly the strongest odds ratio was found for both parents being unemployed and overt victimization among girls. May overtly victimized girls be bullied partly because family low socioeconomic status may be reflected in the appearance – e.g. poor clothing - and diminished opportunity to attend popular gatherings, which may be more central to adolescent girls than to adolescent boys?

It is to be remembered when interpreting results from Study IV that when using the SPIN-FIN with a cutpoint of 24, a group of adolescents who experience a number of SP symptoms is identified. This is not a group consisting solely of adolescents with clinical social phobia. Studies using thorough diagnostic evaluation are needed to confirm the findings on role of the comorbidity between SP and depression as a correlate of peer victimization.

8.9 Methodological considerations

This study has a number of strengths in light of earlier research. The samples in both of the psychometric studies were relatively large. The age and gender distribution and factor analytic findings (Study I) were based on data from a representative sample of Finnish adolescent population, while reliability findings (The SPIN-FIN Test-Retest Study) and validity findings (The Adolescent Well-Being Study) were based on data collected from a smaller geographical region, and thus possibly limiting the generalisability of the findings. As a whole, reliability and validity estimates can still be considered as relatively robust, based on larger samples than most earlier studies assessing the psychometrics of various measures of child and adolescent anxiety disorders (Myers and Winters 2002). The large number of adolescents interviewed in Study II also made it

possible to assess the discriminative validity of the SPIN-FIN over a wide range of child and adolescent psychiatric disorders. This, too, has not been accomplished in most earlier psychometric studies on measures of child and adolescent anxiety disorders. The sample size in Study I allowed the use of CFA, which is considered superior to exploratory factor analysis in terms of the reliability and stability of the factorial solutions found (Tabachnik and Fidell 2001). The findings on age and gender trends in social anxiety symptoms may also be considered credible, given the sample size and sampling sites from three major urban areas in Finland.

The absence rate in the screening phase of Studies II and III, and in the AMHCS Study, was low compared to that (10-15 %) found in earlier large Finnish school surveys such as the Finnish School Health Promotion Study (see for example: Kaltiala-Heino et al. 1999a; Härmä et al. 2003). Studies II and III utilized a rigorous diagnostic evaluation of symptoms by an experienced clinician supplemented by a review by a senior consultant clinician. Thus, the assessment of whether the symptoms caused clinically relevant functional impairment was judged by professionals familiar with clinical symptoms, not by lay interviewers. The response rate in the screening phase was good, and in the interview phase excellent. Taken as a whole, measures (SPIN, K-SADS-PL, YSR, BDI) demonstrated as psychometrically sound in international studies were used. The rest of the measures used in the AMHCS were based on previous use of the items in large survey studies of adolescent mental health and health behaviour in Finland.

However, several limitations of the study need to be taken into account. A general limitation of all studies utilising school-based samples is that adolescents with severe impairment due to psychopathology (disruptive disorders, substance use, depressive or anxiety disorders), may be unavailable for the study, being absent from school. The same may apply to adolescents who are victimized by peers. The diagnostic groups in Studies II and III remained small. Therefore observed

differences between the groups, although statistically significant, may be susceptible to errors caused by chance variation. For example, the treatment histories of adolescents and their parents may be uniquely affected by individual factors. The results must be therefore interpreted with caution, and replication with using larger samples is needed.

A general limitation of the self-report measures among adolescents is that they capture only one perspective to psychiatric symptoms. For example, adolescents may underreport disruptive symptoms, which may also happen even though adolescents are interviewed (Werry 1997). In a similar vein, basing studies on victimization and aggression on self-report may be too narrow a view, since peer-based sociometric analyses may often identify other subjects as victimized or aggressive, compared to self-reports (Brendgen et al. 2002). Overt and covert victimization were both measured with a single question – the former used in a previous WHO international study (King et al. 1996) and the latter used in a large-scale Finnish School Health Promotion study (Kaltiala-Heino et al. 1999a). The validity and reliability of these two questions as measures of victimization needs to be further evaluated.

Limitations of Studies I and IV include relying on self-report data only. Self-reported symptoms of depression and SP do not qualify for a clinical diagnosis of these disorders. Social phobia may also lead to overreporting of victimization experiences via biased perceptions of inflated threat in social interactions (Spence et al. 1999). In studies II and III the population of Ylöjärvi, even though representing Finnish urban general population with respect to socio-economic composition (Statistics Finland 2003), may differ from populations in rural areas of Finland with regard to the prevalence of SP. Therefore these prevalence estimates of SP may be generalised only to urban areas of Finland. However, supporting the generalisability of the results, the rates of high social anxiety (SPIN 19 points or more) in the Ylöjärvi sample (Studies II, III) are comparable (16 % vs.

18 %) to those reported in a representative sample of three major urban areas (Pori, Tampere and Vantaa) in Study I.

8.10 Clinical implications

The results suggest that the SPIN-FIN is an appropriate tool for screening for adolescent social phobia in general populations, for example, as in school health care. Even though the majority of adolescents exceeding the cut-off of 24 points will not have DSM-IV SP, over 50 % still have either social phobia or sub-clinical social phobia. This group of adolescents should be offered a thorough assessment, and when appropriate, intervention. By encouraging co-operation between mental health professionals, teachers, and researchers, SP interventions including social skills training and exposure to social interaction / performance situations with same aged peers could possibly be implemented in schools (Masia-Warner et al. 2005). Such treatment packages have been briefly introduced to Finnish audience too (Ranta 2008).

Because the impairment in psychosocial functioning of adolescents with SP may be particularly evident in school, the identification of SP and referring these adolescents for effective treatment is a challenge for the personnel working in school health care. Given the equal gender ratio we found for both social phobia and sub-clinical social phobia, professionals working with adolescents should not forget to assess boys' social anxiety and social phobia.

Given the pronounced comorbidity associated with adolescent SP, attention should also be paid to assessing adolescents' SP symptoms in primary health care, and in other clinical settings where the reason for referral may be some other disorder. The strong association between self-reported social

phobia and victimization implies that professionals working e.g., in schools should be aware of possible symptoms of social anxiety when encountering bullied adolescents. Also, clinicians working with avoidant young people should routinely ask about experiences of being victimized.

8.11 Research implications

The main psychometric research implications resulting from the present study include the need to replicate the factor structure of the SPIN-FIN found in this study in other population samples, and to further examine the screening abilities of the SPIN in general adolescent population samples in other countries. In the future the SPIN-FIN can be used in studies examining the frequency of social phobia symptoms in different areas of Finland. Given the acceptable discriminative validity of the scale it can probably also be used as a measure of social phobia symptoms in future adolescent clinical studies of SP in Finland. However, the replication of the validation results with larger group sizes is important. The discriminative validity of the SPIN-FIN relative to depressive disorders remains to be shown.

The main epidemiological research implications of the present study include studying further gender differences in social phobia during early and middle adolescence. There may be true cultural and age-related variation in gender trends of social phobia. As found in this study and in an adult study by Pirkola et al. (2005), the gender ratio of SP in Finland may be more equal than in other Western countries. Future epidemiological studies in Finland need to investigate samples of adolescents from different areas of the country. Thus, the epidemiological findings of this study need to be replicated in larger and nation-wide studies. Follow-up studies in particular should be conducted to examine issues such as temporal stability and age-related correlates of social phobia.

The finding that adolescent social phobia rather than depression is associated with peer victimization calls for further studies on mental health correlates of peer victimization, rigorously controlling for comorbidity between social phobia and depression, and using diagnostic interview methods to confirm the associations found here with self-report measures.

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Age and gender differences in social anxiety symptoms during adolescence: The Social Phobia Inventory (SPIN) as a measure

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Abstract

The aim of the present study was to examine age and gender differences in social anxiety symptoms during adolescence, and to investigate the psychometrics of the Social Phobia Inventory (SPIN) among adolescents. The SPIN was administered to a large general population sample ($n=5252$) of Finnish adolescents aged 12–16 years. Age and gender trends in scores and internal consistency and factorial composition of the SPIN were examined in this sample. The test–retest reliability of the SPIN was examined in a smaller sample of adolescents ($n=802$). Results showed that girls scored higher than boys on the SPIN full scale and three subscales across the whole age range. Eighth graders (14- to 15-year-olds) scored higher than seventh and ninth graders on the full scale, for boys the differences were significant. Good test–retest reliability ($r=0.81$), and internal consistency ($\alpha=0.89$) were found for the SPIN. An exploratory factor analysis (EFA) performed on a random half ($n=2625$) of the population sample yielded a one-factor model accounting for 38% of the variance between items. This one-factor model, plus an alternative three-factor model, were examined in the holdout half of the population sample ($n=2627$) by means of a confirmatory factor analysis (CFA). Some support was gained for both factor structures. Our results indicate that symptoms of social phobia may increase in mid-adolescence. The SPIN appears to be a reliable self-report instrument among adolescents.

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1. Introduction

Social phobia (SP) is a common anxiety disorder causing significant impairment. In epidemiological samples the onset of SP has been found to occur in

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early to mid-adolescence, the mean age of onset being 10 to 16 years of age (Wittchen and Fehm, 2001). In European adolescent samples from general population the prevalence of DSM-IV social phobia is 2–3% (Essau et al., 1999; Wittchen et al., 1999). In addition to SP as a clinical disorder, a significant percentage of adolescents, 27–47%, reports at least one social fear, the most common being fear of speaking in public (Essau et al., 1999; Wittchen et al., 1999).

In adolescence social anxiety may cause significant impairment in both educational activities and in making friendships (La Greca and Lopez, 1998; Beidel et al., 1999). Longitudinal studies suggest that adolescent anxiety disorders may be risk factors for affective or anxiety disorders in adulthood (Pine et al., 1998), and that SP, specifically, is associated with an elevated risk for major depression or development of hazardous alcohol use in subsequent years (Stein et al., 2001; Zimmermann et al., 2003).

Gender differences in SP showing a preponderance of females over males of as much as 2 to 1 have been found among adolescents (Essau et al., 1999; Wittchen et al., 1999). The rise in the prevalence of SP has been reported to be twofold between ages 12–13 and 14–15 (Essau et al., 1999).

In the case of social fears or heightened social anxiety, mixed developmental patterns have been reported. Essau et al. (1999) reported a peak in social fears among 14- to 15-year-olds in comparison to 12- to 13-, and 16- to 17-year-olds in Germany. Olivares et al. (1999) found different patterns for boys and girls in symptoms of social anxiety in the age range of 14–17 years in a Spanish sample; for boys a continuous decrease from 14 to 17 years, for girls a decrease from 14 to 15 years, and again a rise at 16 or 17 years. Community surveys from the U.S.A. suggest that early to mid-adolescence (approximately 11 to 14 years of age) is associated with higher levels of self-reported social anxiety than later adolescent years for both genders (Inderbitzen-Nolan and Walters, 2000; Storch et al., 2004).

With the increasing options to treat SP in adolescence (Kendall, 1994; Beidel et al., 2000; Spence et al., 2000; Masia et al., 2001), the development of effective, easy-to-use, and age-sensitive screening instruments and diagnostic tools for the assessment of adolescent SP has become all the more important.

In the past research two self-report questionnaires have been developed to assess specifically social anxiety or SP among children and adolescents: the *Social Anxiety Scale for Adolescents* (SAS-A) (La Greca and Lopez, 1998) – an adaptation of the Social Anxiety Scale for Children-Revised (SASC-R) (La Greca and Stone,

1993) for use among adolescents – and the *Social Phobia and Anxiety Inventory for Children* (SPAI-C) (Beidel et al., 1995). Besides these, the *Social Worries Questionnaire-Pupil* (SWQ-PU) (Spence, 1995), a 13-item instrument, is available for measuring social anxiety among children and adolescents. Support has also been found for the validity of the *Social Phobia and Anxiety Inventory* (SPAI) (Turner et al., 1989) as used with adolescents (Clark et al., 1994).

Item domains assessing social anxiety among children and adolescents are also included in the multi-dimensional self-report instruments covering a broader range of anxiety symptoms such as the *Screen for Child Anxiety Related Emotional Disorders* (SCARED), the *Screen for Child Anxiety Related Emotional Disorders-revised version* (SCARED-R) (Birmaher et al., 1999; Muris et al., 1999), and the *Multidimensional Anxiety Scale for Children* (MASC) (March et al., 1997).

While reliable and valid, the usefulness of the SPAI and the SPAI-C for purposes of screening for SP may be limited because of the requirement for multiple scoring on several items and the time required in completing the scales. The SAS-A may be better suited to the assessment of cognitive components of SP because it contains no items measuring physiological arousal.

The *Social Phobia Inventory* (SPIN) (Connor et al., 2000), a brief 17-item measure of generalized SP, assesses a range of avoidance behaviors, physical symptoms and social fears. The SPIN has demonstrated solid psychometric properties when used with healthy adult volunteers and psychiatric patients. It is capable of distinguishing between subjects with and without SP, and of measuring treatment response. Items assessing fear, avoidance, and physiological distress make up the three subscales (fear, avoidance, and physiological subscales) (Connor et al., 2000).

In a clinical sample of adults with SP, a principal components analysis (PCA) of the SPIN yielded five main factors loading on items measuring fear and avoidance of talking to strangers and in social gatherings (factor I), fear and avoidance of criticism and embarrassment (factor II), physiological symptoms (factor III), fear and avoidance of people in authority (factor IV), and avoidance of being the center of attention and public speaking (factor V) (Connor et al., 2000).

Due to its brevity and simple design, the SPIN appears suitable for use both in epidemiological research and as a clinical screening instrument, also indicating its potential applicability among adolescents. However, further evidence for the usefulness of the SPIN in adolescent population samples is needed.

Table 1
Sample characteristics

	Sample size	Age range	Mean age	Gender ratio (boys/girls %)	Social composition
Test–retest study Tampere Region	<i>n</i> =802	13.0–16.8	14.7	52.7/47.3	Urban & semi-urban general population
7th grade	272 (33.9%)		13.7		
8th grade	256 (31.9%)		14.7		
9th grade	274 (34.2%)		15.7		
Population study Pori, Vantaa, Tampere	<i>n</i> =5252	12.8–16.9	15.3	49.4/50.6	Urban general population
7th grade	612 (11.7%)		13.9		
8th grade	641 (12.2%)		14.8		
9th grade	3859 (73.5%)		15.6		

Johnson et al. (2002) studied the sensitivity and specificity of the SPIN in a group of 85 adolescents, of whom 26 had SP. A sum score of 15 used as the cut-off point produced 77% sensitivity, and 69% specificity in relation to an SP diagnosis based on the Anxiety Disorders Interview Schedule for DSM-IV: Child Version (ADIS-IV: C; Albano and Silverman, 1996) diagnostic interview.

To our knowledge, only one study examining the psychometrics of the SPIN in other cultural areas than the United States has so far been published. Vilete et al. (2004) reported a good internal consistency (Cronbach's $\alpha=0.88$), and test–retest reliability (intra-class correlation coefficient=0.78 for total score) for the Portuguese-language version of the SPIN among 190 Brazilian adolescents from general population. As far as we know, the factorial structure of the SPIN has not been examined among adolescent samples.

The main aims of this study were as follows: (1) to study age and gender differences in social anxiety symptoms in a large sample of Finnish adolescents aged 12 to 16 years; and (2) to examine the reliability and factorial structure of the SPIN when used with adolescents.

2. Methods

2.1. Procedure

The SPIN was translated into Finnish using the translation-back-translation procedure. The original version of the SPIN was translated into Finnish by the first author (M.D. and professional psychologist). The translated scale was translated back into English by an authorized translator. Differences between the original version of the SPIN and the back-translated version of the scale were discussed with the authors of the original scale (Drs Davidson and Connor). No alterations in the meaning of items were found between the SPIN and the translated version of the scale.

2.1.1. Test–retest study

Two secondary schools in the Tampere Region in Southern Finland were contacted in spring 2000. In the municipality of Kangasala (approximately 20,000 inhabitants) students in grades 7–9 (aged 12–16 years) at the only secondary school in the municipality participated in the study. In the city of Tampere (approximately 200,000 inhabitants) several secondary schools were contacted and the first school to offer its co-operation was selected. Adolescents completed the questionnaire in class on two occasions (measurements A and B) separated by a 5-week interval. The questionnaire contained questions on age, grade, hobbies, and the SPIN. The instructions for completing the instrument were also read aloud by the teacher. To reduce the effect of social desirability, participants were identified by numbers only.

2.1.2. Population study

In the Finnish cities of Pori (approximately 80,000 inhabitants), Vantaa and Tampere (both approximately 200,000 inhabitants), students from all secondary schools participated in the study as a part of a more extensive epidemiological mental health survey, Mental Health in Adolescence. The SPIN was administered to the students as a part of a larger questionnaire containing mental health related questions. Adolescents completed the questionnaire in class. Instructions for completing the questionnaire were written in a covering letter and also read aloud by the teacher. The responses were anonymous. The study was approved by the Ethics Committee of Tampere University Hospital.

2.2. Participants

2.2.1. Test–retest study

In all, 1075 adolescents were listed as students in the 7th to 9th grades of the two selected secondary schools. Of the adolescents, 901 (83.8%) completed the first and

Table 2

Test–retest reliability: Spearman's r coefficients for SPIN total scale and fear, avoidance and physiological sub-scales among Finnish adolescents aged 12–16

Group	SPIN total scale	Fear subscale	Avoidance subscale	Physiological subscale
All	0.81	0.75	0.78	0.70
Boys	0.77	0.69	0.76	0.63
Girls	0.84	0.79	0.80	0.71
7th grade	0.76	0.70	0.71	0.66
8th grade	0.81	0.76	0.77	0.73
9th grade	0.83	0.75	0.81	0.69

Measurement A vs. B ($n=802$).

866 (80.6%) the second SPIN response form. Twenty-seven responses were excluded from the study: 10 (0.9%) due to insufficient or missing identification data and 17 (1.6%) due to poor data quality. Altogether 802 (74.6%) adolescents completed both SPIN response forms. The population of the municipality of Kangasala is semi-urban, with 4% of the population working in primary production; the population of Tampere is urban (City of Tampere, 2003). As a whole, the test–retest study sample represents both urban and semi-urban components of the Finnish general population.

2.2.2. Population study

In all, 6325 students were registered as students in the cities of Pori (7th to 9th grades), Vantaa and Tampere (9th grade). Of the adolescents, 0.4% were aged 17 years or more and thus excluded. Answers from 6% were not available due to either absence from school

or not participating in the study. Poor data quality resulted in the exclusion of 0.5% of answers were excluded because of poor data quality. Of the remaining adolescents, 5252 (83.4%) answered all SPIN items. The mean age (S.D.) of the participants in this study was 15.3 (0.68) years; the age range was 12.8–16.9 years. Of the respondents 49.4% were boys, 50.6% were girls. The populations of Pori, Vantaa, and Tampere are representative of the Finnish urban general population by socio-economic composition (Statistics Finland, 2003). In Finland, the students in grades 1–9 (7–16 years of age) represent the total age cohort except for young people with serious handicaps or intellectual disabilities.

The ethnic composition of both samples is almost solely (>99%) of European origin — no exact figure is available because the registration of ethnic origin is not customary in Finland. The demographic characteristics of both samples are presented in Table 1.

2.3. Measures

The Social Phobia Inventory (SPIN; Connor et al., 2000) is a 17-item self-report questionnaire for measuring a wide range of symptoms of SP. It consists of items that measure (a) fear in social situations (6 items), (b) avoidance of performance or social situations (7 items), and (c) physiological discomfort in social situations (4 items). Subjects are asked to rate the frequency of each symptom 0 (not at all), 1 (a little bit), 2 (somewhat), 3 (very much), or 4 (extremely) during the past week. The

Table 3

Mean (S.D.), median and range of scores and Cronbach's alpha values (α) for the SPIN total scale and fear, avoidance, and physiological sub-scales in a Finnish population sample of adolescents aged 12–16 ($n=5252$)

	SPIN total scale:	Fear subscale:	Avoidance subscale:	Physiological subscale:
	Mean (S.D.)/median/range/ α	Mean (SD)/median/range/ α	Mean (SD)/median/range/ α	Mean (SD)/median/range/ α
All ($n=5252$)	12.2 (8.7)/11/0–68/0.89	3.9 (3.3)/3/0–24/0.80	6.1 (4.2)/5/0–28/0.78	2.2 (2.2)/2/0–16/0.65
Boys ($n=2592$)	11.4 (8.4)/10/0–68/0.89	3.6 (3.2)/3/0–24/0.79	5.9 (4.1)/5/0–28/0.78	1.9 (2.1)/1/0–16/0.65
Girls ($n=2650$)	13.0 (8.8)/11/0–62 (a)***/0.90	4.2 (3.3)/4/0–23 (a)***/0.81	6.2 (4.2)/5/0–28(a)*/0.79	2.6 (2.3)/2/0–16 (a)***/0.63
7th grade ($n=612$)	12.6 (8.5)/11/0–53/0.88	4.1 (3.1)/4/0–18/0.76	6.3 (4.2)/6/0–25/0.78	2.3 (2.2)/2/0–14/0.63
Boys ($n=273$)	11.6 (8.2)/10/0–45/0.88	3.8 (3.0)/3/0–18/0.73	6.0 (4.1)/5/0–21/0.73	1.8 (2.0)/1/0–11/0.73
Girls ($n=338$)	13.5 (8.6)/12/0–53/0.89	4.3 (3.2)/4/0–17/0.78	6.5 (4.3)/6/0–25/0.73	2.7 (2.4)/2/0–14/0.73
8th grade ($n=641$)	13.7 (8.6)/12/0–46/0.88	4.4 (3.2)/4/0–16/0.75	6.8 (4.2)/6/0–21/0.77	2.6 (2.3)/2/0–12/0.59
Boys ($n=320$)	12.9 (8.1)/12/0–42/0.87	4.2 (3.0)/4/0–16/0.72	6.7 (4.1)/6/0–21/0.73	2.0 (2.0)/2/0–11/0.73
Girls ($n=317$)	14.6 (9.0)/13/0–46/0.89	4.6 (3.3)/4/0–15/0.78	6.9 (4.3)/6/0–20/0.73	3.1 (2.4)/3/0–12/0.73
9th grade ($n=3859$)	11.8 (8.6)/10/0–68 (b)**/0.90	3.8 (3.3)/3/0–24 (b)**/0.81	5.9 (4.1)/5/0–28 (b)**/0.78	2.1 (2.2)/2/0–16 (b)**/0.66
Boys ($n=1932$)	11.1 (8.4)/10/0–68/0.90	3.5 (3.2)/3/0–24/0.80	5.8 (4.1)/5/0–28/0.73	1.8 (2.1)/1/0–16/0.73
Girls ($n=1922$)	12.6 (8.8)/11/0–62/0.90	4.1 (3.3)/3/0–23/0.81	6.0 (4.1)/5/0–28/0.73	2.5 (2.3)/2/0–16/0.73

10 (0.2%) participants gave no gender information, and 140 (2.7%) participants gave no grade information. Since answers were otherwise complete, they are included in total sample analyses.

(*** $P<0.001$; ** $P<0.01$; * $P<0.05$; $n.s.$ statistically non-significant).

(a) Comparison between boys and girls: Mann–Whitney test.

(b) Comparisons between 7/8/9 grades: Kruskal–Wallis test.

range of the sum score is thus 0–68. Items assessing fear, avoidance, and physiological discomfort comprise, respectively, the fear, avoidance, and physiological discomfort subscales.

2.4. Statistical analysis

Test–retest reliability of the SPIN was assessed by Spearman's correlation coefficient (r) between measurements A and B in the test–retest sample. The internal consistency of the scale was assessed using Cronbach's coefficient alpha (Cronbach, 1951) for the scale and subscales. Besides means, median scores are also presented as descriptive statistics due to a skewed distribution of SPIN scores in a large population sample. Non-parametric methods were used in comparisons between subgroups: Kruskal–Wallis test in comparing scores between 7th, 8th and 9th grades, and Mann–Whitney U -test in comparisons of scores between boys and girls.

The factorial structure was examined in two stages. First, the population sample was divided into random halves. An exploratory factor analysis (EFA) using the principal axis factoring method was performed to explore the potential factorial structure of the SPIN in the first half ($n=2625$). Because the factors were not assumed to be uncorrelated with one another, oblimin rotation was used in the interpretation of factors. The decision of how many factors to retain was guided by the use of the scree method (Cattell, 1966), and the Kaiser rule (factors with an eigenvalue greater than 1.0 to be retained).

Secondly, a confirmatory factor analysis (CFA) using maximum likelihood estimation (Olsson et al., 2000) was conducted on the holdout half of the sample ($n=2627$) to evaluate the fit of the alternative models yielded by the EFA to the data. The following indices, with the following recommendations as cutoffs, were examined: the goodness of fit index (GFI); and the goodness of fit index adjusted for degrees of freedom (AGFI) — with values of ≥ 0.90 , and ≥ 0.80 , respectively, indicating reasonable fit to the data (Cole, 1987); the root mean square residual (RMR); and the root mean squared error of approximation (RMSEA) with values of ≤ 0.10 , and ≤ 0.08 respectively, indicating reasonable fit (Kline, 1998; Browne and Cudeck, 1993). The Akaike's Information Criterion (AIC) was examined to compare alternative solutions, with smaller values indicating better fit. The chi-square index was not used, because it is unreliable when the sample size is large (Ullman, 2001).

The data were analyzed using SPSS 13.0 for Windows. CFA was performed using the PROC CALIS (Covariance Analysis of Linear Structural Equations) procedure for SAS 9.1 for Windows.

3. Results

3.1. Test–retest reliability

The Spearman's correlation coefficient for SPIN total scores between measurements A and B in the test–retest sample ($n=802$) was 0.81 ($P<0.001$). Correlations for subgroups and subscales are presented in Table 2.

Table 4
SPIN item mean scores and frequencies (%) in a Finnish population sample of adolescents aged 12–16 ($n=5252$)

Item	Mean score (S.D.)	Frequency of ratings by score				
		Not at all	A little bit	Somewhat	Very much	Extremely
1. Fear of people in authority	0.41 (0.63)	65.5	29.3	4.3	0.6	0.3
2. Bothered by blushing	0.83 (0.93)	42.5	41.4	9.5	4.4	2.3
3. Fear of parties and social events	0.37 (0.66)	70.3	24.4	3.6	1.4	0.5
4. Avoids talking to strangers	0.91 (0.86)	33.8	48.3	12.3	4.3	1.3
5. Fear of criticism	0.96 (0.87)	31.0	49.9	12.9	4.7	1.5
6. Avoids embarrassment	0.93 (0.91)	34.7	45.5	13.2	4.6	2.0
7. Distressed by sweating	0.65 (0.87)	53.9	33.1	8.4	3.1	1.5
8. Avoids parties	0.29 (0.64)	78.2	16.9	3.3	1.1	0.6
9. Avoids being the center of attention	0.95 (0.95)	35.7	43.7	13.0	5.3	2.2
10. Fear of talking to strangers	0.57 (0.70)	52.1	40.9	5.0	1.4	0.6
11. Avoids speeches	1.75 (1.24)	15.3	34.6	21.8	16.1	12.3
12. Avoids criticism	0.86 (0.94)	40.9	41.0	11.6	4.3	2.3
13. Distressed by palpitations	0.26 (0.60)	79.9	16.2	2.6	0.8	0.5
14. Fear of others watching	0.72 (0.77)	43.2	46.0	7.5	2.5	0.8
15. Fear of embarrassment	0.86 (0.94)	40.9	41.0	11.3	4.7	2.1
16. Avoids talking to authority	0.37 (0.65)	70.2	24.7	3.8	0.8	0.5
17. Distressed by trembling or shaking	0.48 (0.77)	64.7	26.2	6.3	1.9	0.9

3.2. Internal consistency

In the population sample ($n=5252$), Cronbach's alpha, showing the internal consistency for the full SPIN scale, was 0.89. Subscale alphas were 0.65, 0.78, and 0.80, respectively, for the physiological discomfort, avoidance, and fear sub-scales. For alphas in subgroups, see Table 3.

3.3. Descriptive statistics

In the population sample ($n=5252$), the SPIN total score mean (S.D.)/median was 12.2 (8.7)/11; boys 11.4 (8.5)/10, girls 13.0 (8.8)/11 ($Z=-7.187$; $P<0.001$). Girls scored significantly higher than boys in each grade (7th grade: $Z=-3.249$; $P<0.01$; 8th grade: $Z=-2.264$; $P<0.05$; 9th grade: $Z=-5.871$; $P<0.001$). Girls scored significantly higher than boys on the fear ($Z=-6.780$; $P<0.001$), avoidance ($Z=-2.497$; $P<0.05$), and physiological ($Z=-13.408$; $P<0.001$) subscales (Table 3).

Statistically significant differences in SPIN total scores between grades were found (Kruskal–Wallis test: chi-square=41.740; $P<0.001$, see also Table 3): subjects in the 8th grade had higher SPIN total scores than 7th and 9th graders. When grade analyses were performed separately for boys and girls, differences between grades were only significant for boys (chi-square=9.711; $P<0.01$; for girls, the differences were not significant (chi-square=3.734; $P=0.16$).

Of the respondents 17.9% had a SPIN total score of 19 or more, the adult cutoff score for social phobia

Table 6

Fit indices for the one-factor and three-factor models of the SPIN among Finnish adolescents aged 12–16

Model	Fit Indices			
	GFI	AGFI	RMR	RMSEA
One-factor model	0.90	0.88	0.05	0.08
Three-factor model	0.93	0.91	0.03	0.07

suggested by Connor et al. (2000). A sizeable proportion of the sample, 30.8%, scored 15 points or more, a cutoff score used by Johnson et al. in a small adolescent volunteer sample (Johnson et al., 2002).

The distribution of responses to each SPIN item is presented in Table 4. Responses indicating frequent symptoms (symptoms reported as having bothered the subject very much/extremely during the previous week) were given most frequently to items 11 (avoidance of making speeches) — by 28.4% of subjects; and 9 (avoidance of being the center of attention) — by 8.5% of subjects. Of all participants, 12.3% reported at least one social fear, 11.5% at least one physiological symptom, and 34.3% at least one avoidance behavior (17.6% an avoidance item other than item 11), being frequent during the past week.

Girls scored significantly higher than boys on the majority of items (Mann–Whitney test, all P 's<0.001; with the exception of item 16 ($P<0.05$); items 11, 9, and 3 (no difference between genders); and items 4, and 8 (boys scored higher; $P<0.001$).

3.4. Factor structure

The results of the EFA performed on the first half of the population sample ($n=2625$) suggested either a one-factor or a three-factor solution, depending on the method used for deciding the number of factors to be retained. The eigenvalues of the first five factors were in descending order: 6.44, 1.18, 1.03, 0.92, and 0.83; these factors accounted, respectively, for 38, 7, 6, 5, and 5% of the variance between items. The examination of the scree plot suggested a one-factor solution. Loadings for SPIN items on this single factor were 0.48–0.70.

Following the Kaiser rule of maintaining all factors with eigenvalues over 1.0, an alternative three-factor solution was retained. The three-factor solution comprised factor 1 — items 5, 6, 12, 15, and 2, 7, 13, 17 (fear and avoidance of embarrassment and criticism, and physiological symptoms) plus items 1 and 14; factor 2 — items 3, 4, 8, and 10 (fear and avoidance of strangers and social gatherings) plus item 16; and factor 3 — items 9 and 11 (avoidance of making speeches or

Table 5

Loadings of SPIN items on factors of the three-factor model among Finnish adolescents aged 12–16 ($n=2625$)

Item	Factor		
	1	2	3
1. Fear of people in authority	0.34	−0.29	0.20
2. Bothered by blushing	0.40	−0.09	−0.14
3. Fear of parties and social events	0.11	−0.63	0.03
4. Avoids talking to strangers	−0.12	−0.68	−0.18
5. Fear of criticism	0.41	−0.24	−0.21
6. Avoids embarrassment	0.80	0.10	0.00
7. Distressed by sweating	0.34	−0.03	0.06
8. Avoids parties	0.03	−0.53	−0.02
9. Avoids being the center of attention	0.20	−0.33	−0.39
10. Fear of talking to strangers	0.03	−0.64	−0.01
11. Avoids speeches	0.24	−0.13	−0.51
12. Avoids criticism	0.70	0.10	−0.07
13. Distressed by palpitations	0.34	−0.31	0.13
14. Fear of others watching	0.50	−0.19	−0.15
15. Fear of embarrassment	0.58	−0.07	−0.13
16. Avoids talking to authority	0.31	−0.37	0.08
17. Distressed by trembling or shaking	0.44	−0.17	0.03

being the center of attention). Items relating to fear and avoidance of authority figures were divided between factors 1 and 2. (Table 5)

The CFA was performed on the holdout half of the sample ($n=2627$) using both the one-factor and the three-factor solutions. The results indicate an acceptable fit for both models (Table 6). The AIC indices for the one-factor and the three-factor models were 1962.33 and 1336.91, respectively.

4. Discussion

The present study indicates that symptoms of social anxiety, especially among boys, appear to peak in mid-adolescence. The SPIN proved to be a reliable self-report instrument for the measurement of SP symptoms among adolescents. In the confirmatory factor analysis both a one-factor and an alternative three-factor model gained some support. These models need to be examined in other adolescent populations for replication.

Our finding that 8th graders (aged 14 to 15 years) had significantly higher SPIN total scores than 7th or 9th graders concurs with the results of the study by Essau et al. (1999), who found a significant rise in prevalence of SP between age groups 12–13 and 14–15. It also supports the findings from studies reporting a rise in adolescents' social fears/social anxiety towards mid-adolescence, around 14 years of age (Essau et al., 1999; Inderbitzen-Nolan and Walters, 2000; Storch et al., 2004).

However, our study suggests that a more pronounced intensification of social anxiety at mid-adolescence may take place among boys. While the findings of Olivares et al. (1999) suggested that adolescent boys' and girls' symptoms of social anxiety follow a different pattern during ages 14–17, our results suggest that boys may be more susceptible than girls to a rise in social anxiety at 14 to 15 years of age. Further research is needed to ascertain if susceptibility to symptoms of social anxiety differs between genders at different developmental stages. Factors like pubertal maturation, occurring earlier in girls than in boys, and causing body shape alterations, may partially mediate the more pronounced rise in social anxiety symptoms in boys at mid-adolescence.

Our results concur with earlier research in Western European and U.S. adolescent population samples with girls reporting overall higher levels of social anxiety symptoms and SP than boys (La Greca and Lopez, 1998; Essau et al., 1999; Olivares et al., 1999; Wittchen et al., 1999; Inderbitzen-Nolan and Walters, 2000; Storch et al., 2004). While girls scored higher than boys

on most SPIN items, avoidance of making speeches and being the center of attention were reported equally by both genders. This finding, paralleling German findings of no gender difference for fears of speaking in public and performance situations among adolescent girls and boys (Essau et al., 1999; Wittchen et al., 1999), suggests that anxiety related to such situations may be a more universal, stage-dependent, symptom of adolescents' social anxiety (Albano and Hayward, 2004), occurring in situations that become unavoidable as adolescents grow older. The evidence for gender differences in symptoms of social anxiety related to public speaking/performance situations is limited. In a study by Stein et al. (1996), adult females reported severe public speaking fears more frequently than males. Our study, consistent with the German studies, seems to suggest that anxiety related to public speaking/performance situations may be more equally distributed between the genders during adolescence than in adulthood.

Of Finnish adolescents, 28% reported that they frequently avoided making speeches, and 8% avoided being the center of attention. Although SPIN items 11 and 9, measure avoidance, not fear, of such situations, this finding probably also reflects underlying fears. German studies have reported fears of speaking in public in 13–20%, and fears of performance situations in 18–31% of adolescents in the general population (Essau et al., 1999; Wittchen et al., 1999). Methodological differences make it difficult to compare these results, but it does seem that a considerable portion of Finnish adolescents avoid public speaking and performance situations.

The proportion of adolescents scoring higher than the previously suggested SPIN cut-points for social phobia was high, with 18% and 31% of participants scoring, respectively, at or above the cut-points for SP in adults (Connor et al., 2000) and adolescents (Johnson et al., 2002). Clearly, research using the SPIN in adolescent general population samples and across various cultural areas is needed to evaluate this finding.

The test–retest reliability (full scale $r=0.81$) of the SPIN over 5 weeks in adolescents is comparable to the $r=0.89$ for the SPIN over 2 weeks in adults (Connor et al., 2000). Due to the 5-week interval between the two measurements, the memory effects of answers in the first round on the answers in the second round were probably slight. Given the possible information variance during the 5 weeks between the two measurements, the correlation can be regarded as good.

The test–retest reliability obtained for the SPIN in our sample is comparable to that reported by Vilete et al. (2004) for the Portuguese version of the SPIN in a small

Brazilian adolescent sample. It is also comparable to the test–retest reliabilities reported for other available self-report measures of SP or social anxiety in adolescent samples: test–retest correlations have ranged between 0.54 and 0.83 for SAS-A subscales (La Greca, 1998; García-López et al., 2001; Storch et al., 2004), and between 0.47 and 0.86 for the SPAI-C total score (Beidel et al., 1995; Storch et al., 2004). Finally, García-López et al. (2001) found the test–retest reliability of 0.86 for the SPAI Social Phobia subscale among Spanish adolescents.

The internal consistency coefficients for SPIN in our large population sample (full scale 0.89, sub-scales 0.65–0.80) are also comparable to those reported for the SAS-A three subscales varying between 0.76 and 0.91 (La Greca and Lopez, 1998; Inderbitzen-Nolan and Walters, 2000), 0.95 reported for the SPAI-C full scale (Beidel et al., 1995), and with 0.96–0.97 reported for the SPAI full scale (Clark et al., 1994; Olivares et al., 1999).

Our study explored the factorial structure of the SPIN in an adolescent community population. Previous research on the factorial structure of the SPIN has been conducted among adults with SP, with a high mean total score of 41.1 points (Connor et al., 2000). Given the paucity of research on the factorial structure of the SPIN when used among adolescents, and the large population sample at hand, a confirmatory approach to factor analysis was adopted.

The use of the scree plot method suggested retaining one factor. An alternative three-factor model resulting from the use of the Kaiser rule was also examined with the CFA. Fit indices for both models were acceptable. In comparison with the one-factor model, examination of the AIC value seems to favor the three-factor model. Which model is then to be preferred? The simplicity criterion (Tabachnik and Fidell, 2001) favors the one-factor model. The emergence of a one-factorial structure also justifies using the SPIN total score as a single measure of social anxiety among adolescents.

While the alternative three-factor structure found in this adolescent population sample differs from that found by Connor et al. (2000) among adults, some similarities can be noted (in the following Roman numerals refer to factors reported by Connor et al. (2000), while Arabic numerals refer to our factors). Factor I – social inadequacy – with items measuring fear and avoidance of talking to strangers and of social gatherings; and factor V – avoidance of attention to oneself – with items measuring avoidance of being the center of attention and of public speaking, were maintained (our factors 2 and 3 respectively) in the present adolescent sample. Factors II – threat to self-

esteem – with items measuring fear and avoidance of criticism and embarrassment, and III – physiological symptoms – were merged into our factor 1. The items from factor IV – social inferiority – cross-loaded with medium-sized loadings across factors 1 and 2: fear of authority (item 1) loading higher on factor 1, and avoidance of authority figures (item 16) loading higher on factor 2. Item 13 (palpitations) also loaded with medium-sized weights on both factors 1 and 2. The developmental stage may modify adolescents' feelings towards an authority figure; this may partially explain the cross-loadings of authority items in the whole population.

The large general population adolescent sample comprising subjects from different regions, the test–retest design, and the use of the SPIN in a natural screening setting are among the strengths of the present study. Lack of cross-validation against other validated instruments measuring SP in this age group, and the use of self-report data only are obvious limitations.

In conclusion, we found that there is a temporary rise in symptoms of social anxiety in 14- to 15-year-olds, notably in boys. The SPIN showed good test–retest reliability and internal consistency in a Finnish adolescent community sample. The one-factor structure of the SPIN found here justifies the use of the SPIN total score as a measure of social anxiety among adolescents. Our findings lend support to further development of the SPIN as a measure of social anxiety in adolescents.

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Associations between peer victimization, self-reported depression and social phobia among adolescents: The role of comorbidity

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Abstract

Associations of peer victimization with adolescent depression and social phobia (SP), while controlling for comorbidity between them, have not been sufficiently explored in earlier research. A total of 3156 Finnish adolescents aged 15–16 years participated in a survey study. Self-reported peer victimization, as well as self-reported depression (Beck Depression Inventory), SP (Social Phobia Inventory), and selected background variables were assessed. Frequency of overt and covert peer victimization was examined among four groups: (1) adolescents with depression non-comorbid with SP (DEP), (2) those with SP non-comorbid with depression (SP), (3) those with both SP and depression (SP + DEP), and (4) controls, with neither. A logistic regression analysis controlling for confounding familial (family moving, parental unemployment), and psychopathology (delinquency, aggressiveness, general anxiety) covariates was conducted to confirm the associations between peer victimization and the four groups. Among boys the comorbid SP + DEP group reported the highest rates of both overt and covert victimization, these being significantly higher than among both DEP and SP groups. Among girls covert victimization was again most

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frequent in the SP + DEP group, but overt victimization was not more frequent in the comorbid group than it was in the DEP and SP groups. In the logistic regression analysis depression without SP did not maintain an independent association with either type of victimization. Instead, SP without depression with ORs from 2.8 to 4.3, and SP comorbid with depression, with ORs between 3.2 and 11.4 had independent associations with peer victimization. In conclusion, overt and covert peer victimization seem to be associated with SP, rather than depression, among adolescents.

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Keywords: Depression; Social anxiety disorder; Comorbidity; Peer victimization; Adolescents

Introduction

Theoretical and empirical research indicate that adolescents spend much of their leisure time with peers (Parker, Rubin, Erath, Wojlawowicz, & Buskirk, 2006), rely on peers as an important source of social support (Hartup, 1996), and as a base for social comparison (Harter, 1999). The gradual establishment of personal autonomy from parents is gained through peer relationships. Thus, victimization to overt or covert forms of aggression from peers, such as bullying, is likely to interfere with important developmental processes, and cause emotional adjustment problems (Prinstein, Boergers, & Vernberg, 2001).

Adolescents' self-reported depressive symptoms have been found to be associated with interference in various domains of peer relationships: adolescents who report depressive symptoms also report having few friends (Sund, Larsson, & Wichstrom, 2003), low support from friends (Schraedley, Gotlib, & Hayward, 1999), and of falling victim to overt or covert bullying (Kaltiala-Heino, Rimpelä, Marttunen, Rimpelä, & Rantanen, 1999; Prinstein et al., 2001). Likewise, adolescents with a diagnosis of a depressive disorder are more impaired in their social functioning than non-depressed adolescents: they are less popular, their friendships are of shorter duration, they are more often bullied; and they report low peer support and changes in peer acceptance (Birmaher et al., 2004; Lewinsohn, Gotlib, & Seeley, 1997; Olsson, Nordström, Arinell, & von Knorring, 1999).

Adolescents with high levels of social anxiety also report problems in their peer relationships: low involvement in close friendships, feeling less competent, and receiving poor support from friendships (La Greca & Lopez, 1998); and being victims of overt and covert bullying (Juvonen, Graham, & Schuster, 2003; La Greca & Harrison, 2005; Storch & Masia-Warner, 2004). Children and adolescents with social phobia (SP), the clinical manifestation of persistent and intense social anxiety, have few or no peer relationships, poorer social skills than controls, and, as judged by peers, tend to perform worse than others in social-evaluative situations (Beidel, Turner, & Morris, 1999; Spence, Donovan, & Brechman-Toussaint, 1999).

First, prospective studies examining the temporal relationship between victimization and psychosocial adjustment suggested that rejection experiences may precede heightened levels of social anxiety among adolescents (Vernberg, Abwender, Ewell, & Beery, 1992). Larger population studies have also found that peer victimization tends to precede symptoms of anxiety and depression among adolescents, independently of other possible covariates in adolescents'

social relationships such as poor availability of attachment, and conflictual relationships (Bond, Carlin, Thomas, Rubin, & Patton, 2001). In a more recent prospective study it was found that relational, but not overt, peer victimization predicted symptoms of SP among adolescent boys and girls one year later (Storch, Masia-Warner, Crisp, & Klein, 2005). However, the same temporal sequence did not apply to later symptoms of general social anxiety or distress.

Both clinical and epidemiological studies suggest considerable comorbidity between adolescent depression and SP: between 30% and 40% of adolescents with SP also suffer from depression (Essau, Conradt, & Petermann, 1999; Wittchen, Stein, & Kessler, 1999).

Any comorbidity associated with SP has been shown to associate with more impairment in social contacts and partner relationships relative to pure SP among adolescents (Wittchen et al., 1999). Moreover, adolescents with SP comorbid with depression tend to have more severe depressive symptoms and suicidal ideation than adolescents with depression only (Stein et al., 2001). Despite these findings, we could not identify studies examining associations between peer victimization, depression, and SP controlling for the role of comorbidity between SP and depression.

Associations have also been found between peer victimization and aggressive or delinquent behavior among children and adolescents. However, in a broader view research seems to indicate that in adolescence the association of peer victimization to aggressive and delinquent behavior seems to be less pronounced than in childhood, and that association to internalizing symptoms—depression and anxiety—becomes stronger (Deater-Deckard, 2001; Hawker & Boulton, 2000; Prinstein et al., 2001; Storch & Ledley, 2005). Nevertheless, it seems important to control for the role of externalizing psychopathology (aggressive and delinquent behavior) because of these associations, and also because of the substantial comorbidity between depression and externalizing behavior in adolescence (Karlsson et al., 2006; Sanford et al., 1995).

The aim of the present study was to examine associations between being victimized to overt and covert/relational bullying (see Crick & Grotpeter, 1995), and self-reported: (1) depression without SP, (2) self-reported SP without depression, and (3) self-reported SP comorbid with depression among 15–16-year-old adolescents. Firstly, we examined if being subjected to overt or covert bullying is differentially associated with self-reported SP/depression with or without comorbidity. Specifically, we were interested in whether comorbidity between self-reported SP and depression is associated with higher rates of victimization than seen in self-reported SP/depression without comorbidity.

Secondly, we tested the specificity of the associations between peer victimization, self-reported SP, and self-reported depression in a multivariate analysis that allowed the estimation of the relative risks for victimization by self-reported SP and depression, controlling for possible confounding variables. These confounding variables come from two broad categories: (1) other psychopathology associated with both peer victimization and depression—delinquency and aggressiveness, and general level of anxiety (Grills & Ollendick, 2002; Salmon, James, & Smith, 1998) and (2) family covariates such as family moving, and parental unemployment (Sund et al., 2003), that have been shown to associate with adolescent depression, and may have a disruptive effect on adolescents' social networks.

Materials and methods

Procedure and participants

Students from the ninth grades (aged 15–16 years) of all secondary schools in two major Finnish cities (Tampere and Vantaa, approximate population 200 000 each) participated in a mental health survey, Mental Health in Adolescence. Subjects were identified in the school registers of the participating cities. Respondents' parents were sent an information letter prior to data collection, but parental consent was not required because the Finnish legislation on participation in medical research allows a 15-year-old subject to decide alone. Participants signed written informed consent forms before completing the questionnaires in the classroom. Instructions for its completion were written in a covering letter and also read aloud by the teacher. The questionnaire contained questions relating to mental and physical health, family, school work, and leisure time, and took approximately 40 min to complete. For those absent from school at the first round, a second opportunity to participate was offered in the school within a couple of weeks of the original data collection; for those not present on either occasion, the questionnaires were sent by post. If there was no response after a second reminder, it was concluded that the subject was not willing to participate.

A total of 3809 students were listed as pupils in the ninth grades of the participating schools. Of these, 3597 responded, giving a response rate of 96.5%. Since it is possible for a person under 15 years to be attending ninth grade, we later excluded participants who were not yet 15 ($n = 313$). Six questionnaires had to be excluded due to obvious facetiousness. Adolescents with incomplete responses to measures of social anxiety or depression ($n = 122$) were excluded. The final sample size was 3156 adolescents, of whom 1602 (50.8%) were boys and 1554 (49.2%) were girls. Characteristics of the final sample and adolescents excluded due to incomplete responses with respect to age, gender, family structure, and parental educational level are given in Table 1.

The study was approved by the ethics committee of Tampere University Hospital.

Measures

Peer victimization

The question assessing subjection to bullying was derived from a WHO youth health study (King, Wold, Tudor-Smith, & Harel, 1996) and subsequently translated into Finnish (Kaltiala-Heino, Rimpelä, Marttunen, et al., 1999). The introduction to the bullying section was: "We say a pupil is being bullied when another pupil, or a group of pupils, says or does nasty and unpleasant things to him or her. It is also bullying when a pupil is teased repeatedly in a way he or she does not like. But it is not bullying when two pupils of about the same strength quarrel or fight." Thereafter the adolescents were asked about overt and covert victimization. Overt victimization was assessed with a question: *How frequently have you been bullied during the ongoing school term?* Covert victimization was defined as purposefully excluding the adolescent from the company of others (Crick & Grotpeter, 1995) and it was assessed with a question: *How frequently have other pupils not wanted to be with you and you had to be by yourself during the ongoing school term?* Response alternatives to both questions were: "Not at all ($= 0$); one or two times ($= 1$); two to three times a month ($= 2$); about once a week ($= 3$); several times a week ($= 4$). In both types,

Table 1

Final sample and adolescents excluded due to incomplete responses in social phobia and depression scales: comparison of sociodemographic factors

	Final study sample	Adolescents with incomplete responses	Differences between groups (χ^2 , t -test), p
Total n	3156	122	
Boys, n (%)	1602 (50.8)	70 (54.9)	ns
Girls, n (%)	1554 (49.2)	52 (45.1)	
Age range (years)	15–19	15–17	
Mean age (years) (SD)	15.5 (0.39)	15.6 (0.45)	ns
Family structure (%)			
Two parents	69.9	63.1	ns
One parent	16	12.3	ns
Parent and step-parent	13.3	16.4	ns
Other legal guardian	1	3.3	$p < 0.05^a$
Paternal educational level (%)			
University degree	23.4	23	ns
Other	76.6	77	
Maternal educational level (%)			
University degree	22.6	23	ns
Other	77.4	77	

^aFisher's exact test.

we set the cutpoint to identify adolescents who had been victimized repeatedly and frequently (two to three times a month or more frequently).

Self-reported depression

The Finnish modification of the 13-item *Beck Depression Inventory—Short version (R-BDI; Beck & Beck, 1972; Raitasalo, 1995)* was used as a measure of self-reported depression. The BDI has been widely used among adolescent samples (Bennett et al., 1997). A cut-off score of 8 points for moderate to severe depression (Beck, Rial, & Rickels, 1974) was adopted to identify adolescents with self-reported depression. The psychometrics of the R-BDI has been demonstrated among Finnish adolescents (Kaltiala-Heino, Rimpelä, Rantanen, & Laippala, 1999).

Self-reported SP

The *Social Phobia Inventory (SPIN; Connor et al., 2000)*, a 17-item questionnaire for measuring a wide range of symptoms of SP, was used as a measure of self-reported SP. The SPIN measures: (a) fear in social situations (6 items; e.g., “Talking to strangers scares me”), (b) avoidance of performance or social situations (7 items; e.g., “I avoid having to give speeches”), and (c) physiological discomfort in social situations (4 items; e.g., “Heart palpitations bother me when I am around people”). Subjects are asked to rate the frequency of each symptom on a five-point

Likert-type scale: not at all (= 0), a little bit (= 1), somewhat (= 2), very much (= 3), or extremely (= 4) during the past week. The range of sum score is, thus, 0–68.

The SPIN has previously shown good reliability (Ranta et al., 2007; Vilete, Coutinho, & Figueira, 2004), and construct validity (Johnson, Merritt, Anderson, & Inderbitzen-Nolan, 2004) for use among adolescents. For the Finnish translation of the SPIN, a cut-off score of 24 points has resulted in good sensitivity and specificity (81.8% and 85.1%, respectively) in relation to a clinician-administered diagnosis of SP (Ranta, Kaltiala-Heino, Rantanen, Tuomisto, & Marttunen, 2007), and was used to identify participants with self-reported SP.

Psychopathology covariates

Participants' externalizing symptoms were assessed with the *Delinquent Behavior* and *Aggressive Behavior* subscales from the *Youth-Self-Report* (YSR; Achenbach, 1991). The *Delinquent Behavior* subscale comprises 11 items measuring rule-violating behavior (e.g., "I steal at home"), and the *Aggressive Behavior* subscale comprises 19 items measuring different types of aggressive behavior (e.g., "I am mean to others"). The reliability and screening properties of the Finnish version of the YSR have been demonstrated among 15–16-year-old Finnish adolescents (Helstelä & Sourander, 2001). Both YSR scales were dichotomized at the cut-off of the 90th percentile separately for boys and girls to indicate problems in the clinical range (Achenbach, 1991; Helstelä & Sourander, 2001; Zoccolillo, 1993).

General anxiety was assessed by asking participants to rate the alternative that best describes them today: I do not easily lose my nerve or get anxious (= 0)/I do not feel anxious or nervous (= 0); I get anxious and nervous rather easily (= 1); I get very easily distressed, anxious or nervous (= 2), I am constantly anxious and distressed, my nerves are always on edge (= 3). This item is analogous to the 13 items of the R-BDI, and has been designed as an additional item to the R-BDI scale to detect the cognitive symptoms of general anxiety (Raitasalo, 1995). This study, like an earlier Finnish adolescent study, used scores 2–3 as indicators of significant general anxiety (Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000).

Family covariates

The residential stability of the adolescents during the past five years was assessed with the alternatives: not moved at all (= 0); once (= 1); two times (= 2); three times or more (= 3). Parental unemployment was assessed by asking if one or both parents had been unemployed during the past year with response alternatives: neither of the parents (= 0); one parent (= 1); both parents (= 2). These variables were selected because of the disrupting effect on social networks of adolescents they present, and because they have been shown to be associated with adolescent depression (Sund et al., 2003).

Statistical analysis

Simple frequencies (%) were calculated for overt and covert bullying, self-reported depression, and self-reported SP for both sexes. In order to compare symptom groups, four mutually exclusive groups were formed: the DEP group scored ≥ 8 points on the R-BDI, and < 24 points on the SPIN; the SP group scored < 8 points on the R-BDI and ≥ 24 points on the SPIN; the SP + DEP group scored ≥ 8 points on the R-BDI and ≥ 24 points on the SPIN, and the control

group <8 points on the R-BDI and <24 points on the SPIN. Associations between group membership and reported overt and covert victimization were estimated by class frequencies and tested with the Pearson χ^2 test or Fisher's Exact test where appropriate. Post hoc comparisons between SP+DEP, and DEP and SP groups each were made with Pearson χ^2 test, with Bonferroni adjusted p -values.

The specificity of the associations between non-comorbid/comorbid self-reported depression/SP and victimization was examined in a logistic regression analysis performed separately among boys and girls, given the different presentation of psychopathology, and particularly aggressive behavior among adolescent boys and girls (Zoccolillo, 1993). Overt and covert victimization were each treated in turn as the dependent variable. The independent variables: self-reported disorder (control/DEP/SP/SP+DEP), psychopathology covariates (delinquency [yes/no], aggressiveness [yes/no], general anxiety [yes/no]), family covariates (number of adolescents' moves within the last five years [no/one/two/three times or more], and parental unemployment during the last year [no/one parent/both parents]) were all entered simultaneously in the model.

Results

Frequency of victimization, self-reported depression, and self-reported SP

Of the adolescents, 5.1% reported being overtly victimized at least two or three times a month, with boys reporting this twice as frequently as girls. Covert victimization was reported by 3.5% of respondents, slightly more frequently by girls than by boys (Table 2).

Of all adolescents 9.9% suffered from self-reported depression, 8.7% from self-reported SP, and 3.7% from self-reported SP and depression. Each self-reported condition was more common among girls. The frequency of self-reported depression non-comorbid with SP was twice as high among girls than among boys; in contrast no gender difference was observed in frequency of self-reported SP non-comorbid with depression (Table 2). Of all adolescents with self-reported depression, 37.8% had comorbid self-reported SP; this was slightly more common among girls than among boys (39.9% vs. 33.7%; χ^2 test: ns). Of all adolescents with self-reported SP, 43.2% had comorbid self-reported depression; this was nearly twice as common among girls as among boys (52.2% vs. 30.7%; χ^2 test: $p < 0.001$).

Victimization across SP, DEP, SP+DEP, and control groups

Overt victimization

Boys: Over one-third (35.3%) of boys in the SP+DEP group reported having been overtly victimized, a rate seven times higher than among controls. Rates of overt victimization among the boys' SP and DEP groups were also higher compared with controls. The χ^2 test indicated that difference between the four groups was significant ($p < 0.001$). The post hoc comparisons showed that boys in the comorbid group were more often overtly victimized than boys in the DEP group, and marginally more so than boys in the SP group, although this difference did not reach statistical significance (Fig. 1).

Table 2

Frequency of self-reported peer victimization, psychopathology, and family socioeconomic hardships among Finnish 15–16-year-old girls and boys *n*/(%)

	Boys, <i>n</i> = 1602 (50.8)	Girls, <i>n</i> = 1554 (49.2)	Difference (χ^2), <i>p</i>
Peer victimization			
Victimized overtly	106 (6.6)	54 (3.5)	<0.001
Victimized covertly	46 (2.9)	63 (4.1)	ns
Victimized overtly and covertly	28 (1.8)	11 (0.7)	<0.01
Depression (DEP)			
All with depression	104 (6.5)	208 (13.4)	<0.001
Depression without social phobia	69 (4.3)	125 (8.0)	<0.001
Social phobia (SP)			
All with social phobia	114 (7.1)	159 (10.2)	<0.005
Social phobia without depression	79 (4.9)	76 (4.9)	ns
Social phobia comorbid with depression (SP + DEP)	35 (2.2)	83 (5.3)	<0.001
General anxiety	58 (3.6)	105 (6.8)	<0.001
Family socioeconomic hardships			
Family moved within last five years			
Once	354 (22.1)	359 (23.1)	ns
Two times	101 (6.3)	138 (8.9)	<0.01
Three times	61 (3.8)	94 (6.0)	<0.005
Parental unemployment during last year			
One parent	319 (19.9)	366 (23.6)	<0.05
Two parents	40 (2.5)	40 (2.6)	ns

Girls: Girls in the SP + DEP group reported overt victimization six times more frequently than controls; while the girls in the DEP and SP groups fell in between these two groups. The difference between the four groups was significant (χ^2 test: $p < 0.001$). Unlike boys, no statistical difference on the frequency of overt victimization in the SP + DEP group over either DEP or SP groups was observed among girls (Fig. 2).

Covert victimization

Boys: Over one-fourth (26.5%) of the boys in the SP + DEP group reported covert victimization, this being 10 times more frequent than in the control group. Of the boys in both DEP and SP groups, around 5% reported covert victimization. The difference between the four groups was significant among boys (χ^2 test: $p < 0.001$). Post hoc comparisons showed that the boys in the SP + DEP group suffered from covert victimization more than respondents in both DEP and SP groups (Fig. 1).

Girls: Nearly one-fourth (22.9%) of the girls in the SP + DEP group reported being covertly victimized, this percentage being 10 times higher than in the control group. Around 7% of the

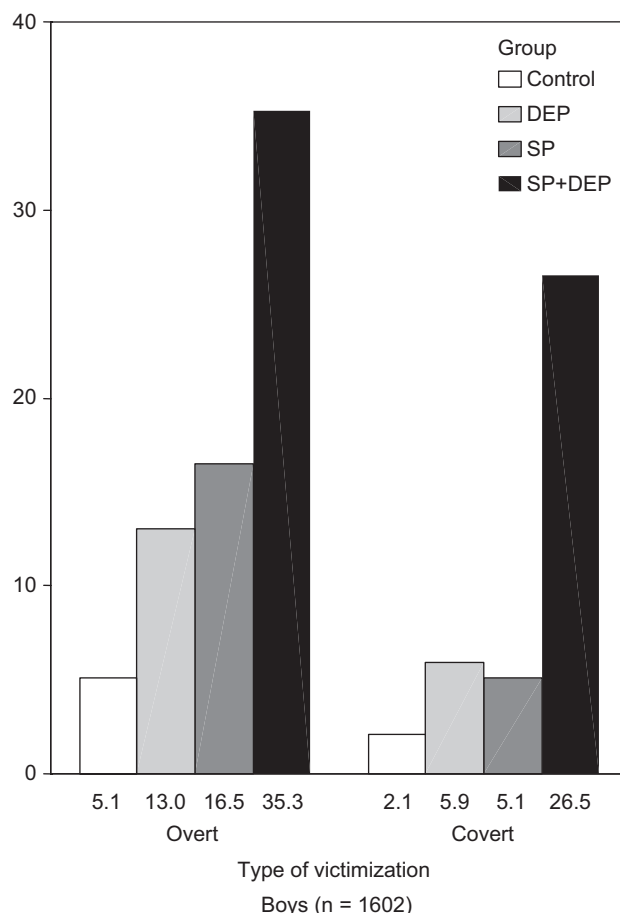


Fig. 1. Frequency (%) of overt and covert victimization among Finnish 15–16-year-old boys in four groups with: no self-reported depression/social phobia (control), self-reported depression without social phobia (DEP), self-reported social phobia without depression (SP), and self-reported SP comorbid with depression (SP+DEP). Post hoc comparisons between SP+DEP, and DEP and SP groups: (1) Overt victimization: SP+DEP > DEP ($p < 0.05$); SP+DEP vs. SP: ($p = 0.05$). (2) Covert victimization: SP+DEP > DEP ($p < 0.05$); SP+DEP > SP ($p < 0.005$). Statistical test: χ^2 test/Fisher's exact test where appropriate.

girls in both DEP and SP groups reported covert victimization. The difference between the four girl groups was significant (χ^2 test: $p < 0.001$), while the post hoc comparisons indicated that comorbidity was associated with higher rates of covert victimization than that seen in both DEP and SP groups (Fig. 2).

Specificity of associations: logistic regression

Boys: The results from the logistic regression analysis among boys indicated that relative to the risk of the control group, belonging either to the SP, or the SP+DEP group—but not to the DEP group—was associated with an increased risk of being overtly or covertly victimized. Of the other

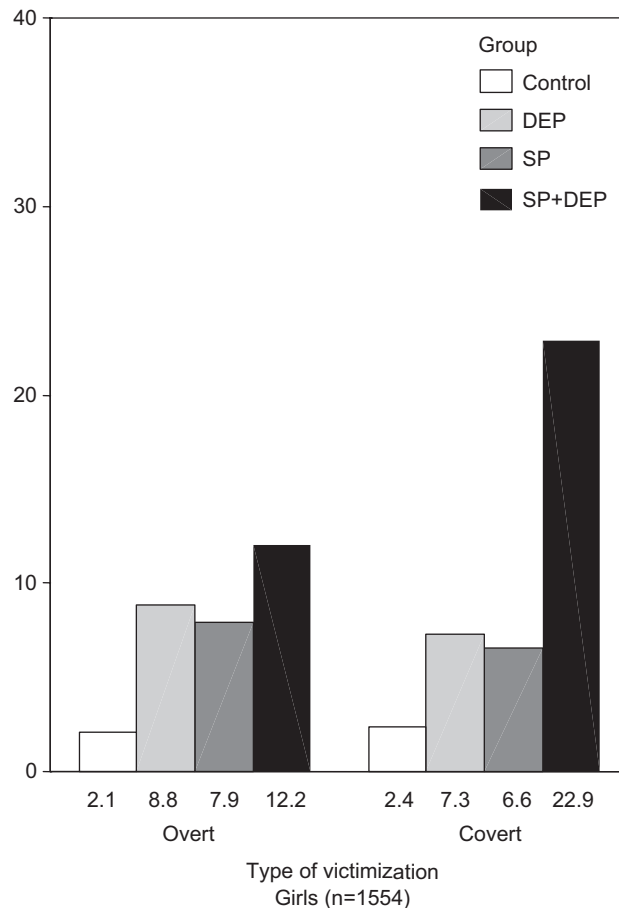


Fig. 2. Frequency (%) of overt and covert victimization among Finnish 15–16-year-old girls in four groups with: no self-reported depression/social phobia (control), self-reported depression without social phobia (DEP), self-reported social phobia without depression (SP), and self-reported SP comorbid with depression (SP+DEP). Post hoc comparisons between SP+DEP, DEP, and SP groups: (1) Overt victimization: SP+DEP vs. DEP; SP+DEP vs. SP: both ns. (2) Covert victimization: SP+DEP > DEP ($p < 0.005$); SP+DEP > SP ($p < 0.01$). Statistical test: χ^2 test/Fisher's exact test where appropriate.

covariates, parental unemployment (one parent) was associated with a slightly increased risk of being overtly victimized. No other significant associations were found (Table 3).

Girls: Among girls, covariates associating with overt and covert victimization differed from each other. Among covertly victimized girls the pattern was similar to that among victimized boys: again belonging either to the SP or the SP+DEP—but not to the DEP group—was associated with increased risks relative to the controls. Parental unemployment (one parent) was associated with a slight increase in the risk of being covertly victimized among girls. With regard to overt victimization, belonging to the SP, and the SP+DEP groups, but also significant general anxiety and parental unemployment (both parents) were associated with an increased risk of being victimized relative to controls (Table 3).

Table 3

Risk of overt/covert victimization by sex (Odds ratio (OR), 95% confidence interval (CI)) according to having non-comorbid or comorbid depression/social phobia among 15–16-year-old Finnish adolescents by sex when confounding psychopathology and family covariates are controlled for

	Odds ratio (95% CI)			
	Boys		Girls	
	Overt victimization	Covert victimization	Overt victimization	Covert victimization
Group				
No depression, no SP (ref.)	1.0	1.0	1.0	1.0
Depression without SP (DEP)	1.8 (0.8–4.3)	1.1 (0.2–5.5)	2.0 (0.8–4.8)	1.9 (0.8–4.7)
Social phobia without depression (SP)	3.5 (1.8–7.0)	3.1 (1.0–9.5)	4.3 (1.7–11.0)	2.8 (1.1–7.7)
Comorbid social phobia and depression (SP + DEP)	6.7 (2.8–16.0)	11.4 (3.9–33.2)	3.2 (1.3–7.9)	9.6 (4.7–19.4)
Psychopathology covariates				
Delinquent behavior	1.5 (0.7–3.2)	1.3 (0.5–4.0)	1.8 (0.8–3.9)	1.7 (0.8–3.6)
Aggressive behavior	1.1 (0.6–2.3)	1.6 (0.6–4.4)	2.0 (0.9–4.4)	0.9 (0.4–2.1)
General anxiety	1.8 (0.8–4.2)	1.9 (0.6–6.4)	3.0 (1.4–6.4)	1.4 (0.6–3.0)
Family covariates				
Family moved within last five years				
Once	1.2 (0.7–2.0)	1.2 (0.5–2.9)	1.0 (0.5–2.1)	1.0 (0.5–2.0)
Two times	1.4 (0.6–3.1)	2.2 (0.7–6.4)	1.0 (0.4–2.7)	0.6 (0.2–1.8)
Three times	1.2 (0.4–3.2)	2.0 (0.5–7.6)	0.8 (0.2–3.0)	1.8 (0.7–4.4)
Parental unemployment during last year				
One parent	1.6 (1.0–2.7)	1.2 (0.6–2.7)	1.1 (0.6–2.2)	1.8 (1.0–3.2)
Both parents	1.3 (0.4–4.1)	0.8 (0.1–4.8)	4.5 (1.5–13.5)	2.1 (0.6–8.0)

Statistically significant associations are shown in bold.

Discussion

The main finding of this study was that self-reported SP, rather than depression, is associated with peer victimization among adolescents. That self-reported SP comorbid with depression was associated with significantly higher rates of victimization than self-reported depression without SP in three out of four comparisons (among boys victimized both ways, and among covertly victimized girls) speaks clearly for the prominent role of SP as a correlate to victimization. More robustly, the logistic regression analyses among both boys and girls and across both types of victimization altogether dropped associations of self-reported depression non-comorbid with SP to victimization, but maintained those of self-reported SP, and self-reported SP comorbid with depression. This held true even when other psychopathology and socio-demographic covariates were also controlled for.

Symptoms such as prominent social fears, and social avoidance—both core symptoms of SP (American Psychiatric Association, 1994)—and lack of social skills (Spence et al., 1999) associated with SP may leave young people with SP especially vulnerable to victimization, unable to fight

back against the bullies, but further avoiding and withdrawing from contacts (Fox & Boulton, 2005). With only few close friends (Beidel et al., 1999) adolescents with SP may lose the shield close friends could offer against victimization (Cowie, 2000). That social fears and SP tend to run a chronic course during adolescence (Wittchen & Fehm, 2003), indicates that the effect on friendships may be long-acting, leading possibly to impairing of the psychosocial status. Being avoidant may even act as a stigma among adolescents, who strive for the acceptance of others: connecting with a peer who is avoidant may raise fears among others of being seen themselves as unpopular in the eyes of peers—the concept of reputational salience (Hartup, 1996). Finally, adolescents with SP are reluctant to seek help (Wittchen et al., 1999), and this may also be the case when they are victimized—this probably sustaining the victimization.

Our finding that self-reported depression not comorbid with SP did not emerge as an independent correlate of victimization clearly differs from the result of the meta-analysis by Hawker and Boulton (2000), citing a number of studies finding an association between self-reported depression and peer victimization among adolescents. We believe that our finding may be explained by the fact that earlier research has not controlled for the substantial comorbidity between depression, anxiety, and externalizing symptoms. Thus, it is possible that previous studies have identified those victimized and depressed adolescents who also suffer from high levels of SP symptoms. For adolescent depressive disorders, comorbidity is rather the rule than exception, as over 70% of adolescents with a depressive disorder have a comorbid axis I DSM-IV disorder (Karlsson et al., 2006). What clinical and psychosocial features may characterize adolescents suffering from depression with no comorbidity? These adolescents may be better globally psychosocially adjusted (Karlsson et al., 2006), and perhaps suffer from reactive, shorter depressive episodes—possibly caused by factors such as losses or other adverse life events. Further research is obviously needed to better characterize adolescents with both depression and anxiety, and those with depression only, and the psychosocial correlates of these groups.

The finding that victimization was more common in the SP+DEP than in the SP group suggests depressive symptoms may have an effect that adds to the effect of SP, causing a closer association with victimization than in SP alone. Of depressive symptoms, such self-directed negative cognitions as being a failure, being worthless, of being disappointed with oneself, or regarding oneself as ugly or repulsive (all included in the BDI), may reflect victimized adolescents' "characterological tendency of self-blame" (Graham & Juvonen, 1998). Such an attributional style has also been demonstrated to predict future depressive symptoms among victimized adolescents (Prinstein & Atkins, 2004). Hosting global and negative causal attributions about oneself such as: "I cannot succeed in friendships because I as a person cannot be liked" may add to the more situation-specific cognitive biases of adolescents with high levels of social anxiety or SP such as inflated perception of threat, high expectation of a negative outcome, or expectation of the worst possible outcome in social situations (Muris, Merckelbach, & Damsma, 2000; Spence et al., 1999; Weems, Berman, Silverman, & Saavedra, 2001), or attribution of the reason for a social failure to oneself (Epkins, 1996; Weems et al., 2001). As a result, even more avoidant interpersonal behavior may develop.

In contrast to research on children (Deater-Deckard, 2001; Storch & Ledley, 2005), we did not find an association of either aggressiveness or delinquent behavior with either type of victimization in either sex. This may reflect the developmental shift to adolescence; the association between externalizing symptoms and peer rejection may diminish over middle childhood, and

aggressive and delinquent behavior may be better tolerated, even linked to popularity among adolescents (Sandstrom & Coie, 1999). Also, this finding may relate to perspective: aggressive adolescents may not themselves experience problems in their peer relationships, but on peer nomination they are less popular, and seen as having problems (Brendgen, Vitaro, Turgeon, & Poulin, 2002). Furthermore, the finding that general anxiety was not generally associated with victimization also supports a specific role for social anxiety/SP as a correlate to peer victimization.

The gender differences in associations between self-reported SP, depression, and victimization were minor in the present study. However, among girls, comorbid SP + depression was not associated with a greater risk to overt victimization than what was seen for SP without depression. Further, general anxiety emerged as a correlate of overt victimization among girls. As defined in this study, general anxiety relates to an acute state-like experience, and demonstrates that being overtly victimized may be very disturbing to girls. Earlier studies have reported conflicting findings about the gender differences in psychological correlates to overt bullying: some have found depression to be associated with overt bullying in boys, but *not* in girls (Prinstein et al., 2001), others in girls, but *not* in boys (van der Wal, de Wit, & Hirasing, 2003), and still others equally in both genders (Kaltiala-Heino, Rimpelä, Marttunen, et al., 1999). The qualitative aspects of being overtly victimized may differ between girls and boys (Björkqvist, 1994), with girls being more vulnerable to verbal acts of aggression, such as teasing about appearance (Agliata, Tantleff-Dunn, & Renk, 2007). Clearly, further study addressing the gender-specific correlates of overt victimization is needed—we propose that lack of controlling for social anxiety and methodological differences are potential reasons for the discrepancies in earlier studies.

Of the family covariates, parental unemployment was associated with being overtly victimized among both boys and girls, and girls victimized covertly. The association of low family socioeconomic status and victimization has also been observed elsewhere (Kim, Koh, & Leventhal, 2004). However, clearly the strongest OR was found for both parents being unemployed and overt victimization among girls. Overtly victimized girls may be bullied partly because low family socioeconomic status could be reflected in appearance—e.g., poor clothing—and diminished opportunity to attend popular gatherings, which may be more central to adolescent girls than to adolescent boys.

The strengths of the present study include the use of a large and representative population sample and the assessment of several areas of psychopathology. We found rates consistent with comparable earlier community surveys for victimization (Kaltiala-Heino, Rimpelä, Marttunen, et al., 1999; Nansel et al., 2001). The pattern of victimization between sexes—boys reporting being overtly victimized more often, girls being covertly victimized slightly more often, also replicated earlier findings (Prinstein et al., 2001). The comorbidity rates between self-reported SP and depression observed here do seem plausible when compared to rates observed in interview studies between SP/other anxiety disorders and depression among adolescents (Essau et al., 1999; Wittchen et al., 1999).

The limitations of the study include relying on self-report data only, and eliciting only one perspective on victimization. Self-reported symptoms of SP or depression do not qualify for a diagnosis of SP/depression. SP may lead to overreporting of victimization experiences via biased perceptions of inflated threat in social interactions (Spence et al., 1999). Moreover, depressive symptoms may be associated with overestimation of victimization (De Los Reyes & Prinstein, 2004). It is clear that cross-sectional studies such as this cannot reveal which causes which: does

victimization cause internalizing symptoms or vice versa. Indeed, reciprocal interaction between victimization and internalizing symptoms may take place (Vernberg, 1990; Ollendick & Hirshfeld-Becker, 2002). Longitudinal studies (Prinstein & Aikins, 2004; Storch et al., 2005) following children to adolescence, and assessing both victimization and level of depressive and SP symptoms repeatedly, are needed to reveal the developmental causal pathways between internalizing symptoms and victimization experiences.

The strong association between self-reported SP and victimization implies that professionals working in schools and youth groups should assess symptoms of social anxiety when encountering bullied adolescents. Also, clinicians working with avoidant young people should routinely ask about experiences of being victimized. Since depression is frequently comorbid with self-reported SP, and a large part of these adolescents are bullied, the interventions undertaken by the professionals should not be limited to targeting depression alone. Social skills training modules integrated into the treatments for adolescents with SP (Spence, Donovan, & Brechman-Toussaint, 2000) and depression (Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999) may be especially beneficial to victimized adolescents suffering from these disorders.

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