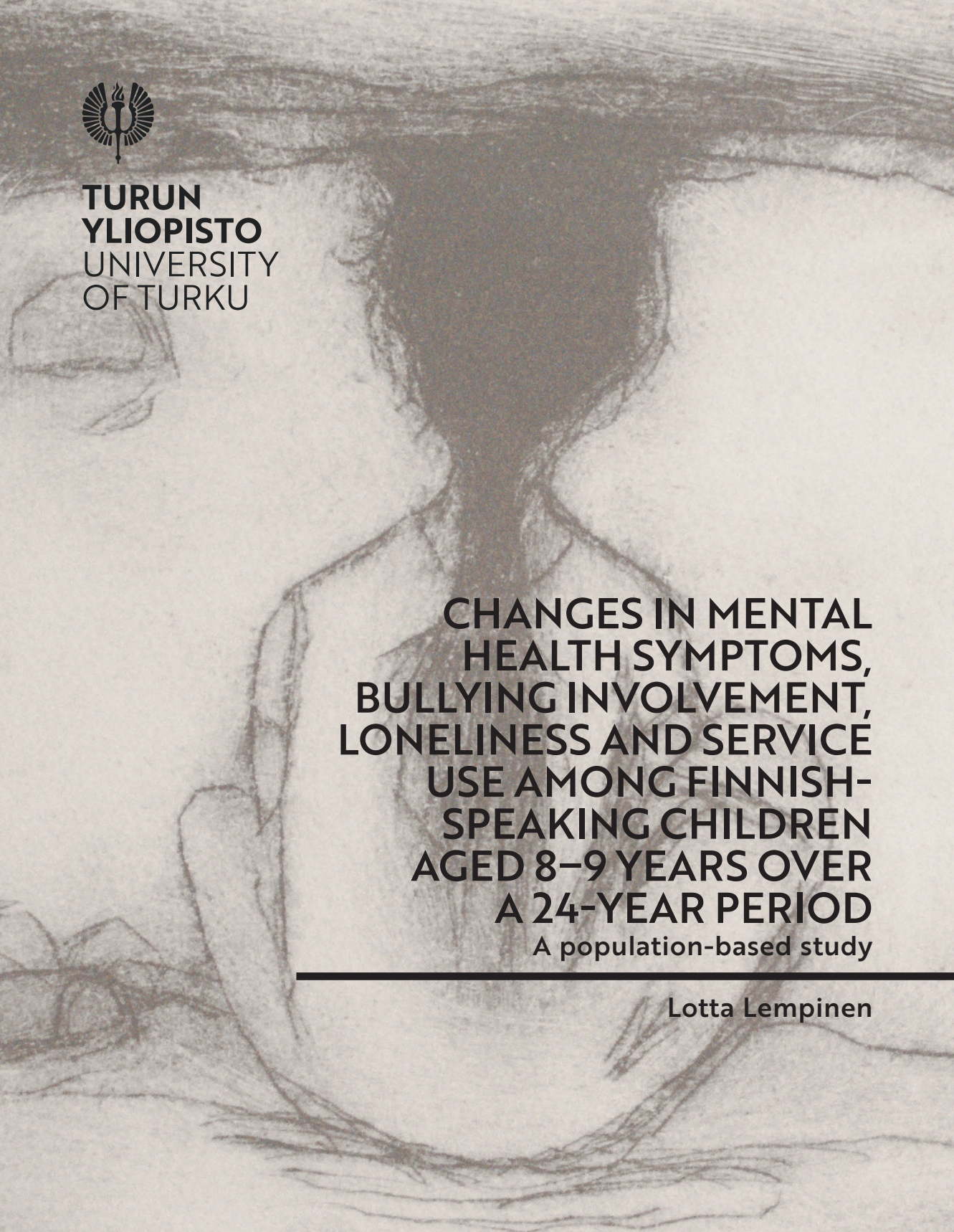

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UNIVERSITY OF TURKU

CHANGES IN MENTAL HEALTH SYMPTOMS, BULLYING INVOLVEMENT, LONELINESS AND SERVICE USE AMONG FINNISH-SPEAKING CHILDREN AGED 8–9 YEARS OVER A 24-YEAR PERIOD

A population-based study

Lotta Lempinen

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To my godchildren Juho, Venla, Aaron, Levi, Emmi and Valo.

UNIVERSITY OF TURKU
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Department of Clinical Medicine
Child Psychiatry
LOTTA LEMPINEN: Changes in mental health symptoms, bullying involvement, loneliness and service use among Finnish-speaking children aged 8-9 years over a 24-year period: A population-based study
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ABSTRACT

Cross-sectional studies, which have been collected using similar study design and measures at different time points can provide important and reliable information on changes in children's mental health and related problems in a population level. The aim of this thesis was to study changes in children's psychiatric problems, in bullying perpetration and victimization, in loneliness and friendships, and in mental health service use during 24 years with four cross-sectional population-based studies.

The research data was collected in 1989, 1999, 2005 and 2013 from the area of Turku University Hospital in South-West Finland. The target population was about 1000 8-9 years old Finnish-speaking children at every time point. The response rates were high varying from 86% to 95%. In the study, children and their parents and teachers filled out questionnaires concerning child's psychiatric symptoms and background information. The questionnaires were Rutter A2 for parents, Rutter B2 for teachers and Children's Depression Inventory (CDI) for children.

Only minor prevalence changes were seen, parent reported conduct and emotional problems among boys and emotional problems among girls decreased during 24 years. However, mental health service use increased constantly, almost four times among boys and six times among girls, but still many children with problems were not in contact with services. Parent reported bullying perpetration and victimization decreased in 24 years time, but there were no decreases between the two last assessment points even though a national KiVa anti-bullying program was launched in between times. Children's loneliness was stable resulting about 20% of children being lonely at every time point and 25% of children wishing to have more friends.

Study results are important for policy-makers to develop services that are needed. Low-threshold help for children and families should be available both in school, health care and social care as early as possible. When developing bullying and loneliness interventions, the mental health aspects should be included.

KEYWORDS: bullying, change, cross-sectional, friendships, loneliness, mental health, population-based, prevalence, psychiatric symptom, service use, time-trend, victimization

TURUN YLIOPISTO
Lääketieteellinen tiedekunta
Kliininen laitos
Lastenpsykiatria
LOTTA LEMPINEN: Muutokset mielenterveyden ongelmissa, kiusaamisessa, yksinäisyydessä ja palveluiden käytössä suomenkielisten 8-9-vuotiaiden lasten joukossa 24 vuoden aikana: Väestöpohjainen tutkimus
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TIIVISTELMÄ

Poikkileikkaustutkimukset, jotka on kerätty samanlaisia tutkimusasetelmia ja mittareita käyttäen eri ajankohtina, voivat tarjota tärkeää ja luotettavaa tietoa lasten mielenterveyden ja niihin liittyvien ongelmien muutoksista väestötasolla. Tämän väitöskirjatutkimuksen tarkoituksena oli tutkia lasten psyykkisten ongelmien, kiusaamisen ja kiusatuksi tulemisen, yksinäisyyden ja ystävyyssuhteiden sekä palveluiden käytön muutosta 24 vuoden aikana neljän väestöpohjaisen poikkileikkaustutkimuksen avulla.

Tutkimusaineisto kerättiin vuosina 1989, 1999, 2005 ja 2013 Varsinais-Suomen sairaanhoitopiirin alueelta. Tutkimuksen kohderyhmänä oli noin 1000 8–9-vuotiasta suomenkielistä lasta jokaisena ajankohtana. Vastausprosentit olivat korkeita vaihdellen 86% ja 95% välillä. Tutkimuksessa lapset ja lasten vanhemmat ja opettajat täyttivät lapsen psyykkisiä oireita ja taustatietoja kartoittavat kyselylomakkeet. Lomakkeet olivat Rutter A2 –lomake vanhemmille, Rutter B2 –lomake opettajille ja Lasten masennusseula (CDI) lapsille.

Esiintyvyydessä tapahtui vain pieniä muutoksia, vanhempien raportoimat käyttäytymisen ja tunne-elämän ongelmat pojilla ja tunne-elämän ongelmat tytöillä vähenivät 24 vuoden aikana. Mielenterveyspalveluiden käyttö kasvoi kuitenkin jatkuvasti, noin nelinkertaiseksi pojilla ja kuusinkertaiseksi tytöillä, mutta silti moni ongelmia omaava lapsi ei ollut palveluiden piirissä. Vanhempien raportoima kiusaaminen ja kiusatuksi tuleminen vähenivät 24 vuoden aikana, mutta vähenemistä ei tapahtunut kahden viimeisimmän arviointiajankohdan välillä, jossa kansallinen kiusaamisen vastainen KiVa-ohjelma otettiin käyttöön. Lasten yksinäisyys oli pysyvää, noin 20% lapsista oli yksinäisiä kaikkina ajankohtina ja 25% lapsista toivoi, että heillä olisi enemmän ystäviä.

Tutkimustulokset ovat tärkeitä päätöksentekijöille, jotta tarvittavia palveluita voitaisiin kehittää. Matalan kynnyksen apua pitäisi olla tarjolla lapsille ja perheille koulussa, terveydenhuollossa ja sosiaalihuollossa mahdollisimman varhaisessa vaiheessa. Kehitettäessä interventioita kiusaamiseen ja yksinäisyyteen, mielenterveyden näkökulma tulisi sisällyttää mukaan.

AVAINSANAT: ajallinen trendi, esiintyvyys, kiusaaminen, kiusatuksi tuleminen, mielenterveys, muutos, palveluiden käyttö, poikkileikkaus, psyykkinen ongelma, väestöpohjainen, yksinäisyys, ystävyys

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Abbreviations

ADD	attention deficit disorder
ADHD	attention deficit hyperactivity disorder
ASD	autism spectrum disorder
CAMHS	Child and Adolescent Mental Health Services
CAPI	Computer Assisted Personal Interviewing
CBCL	Child Behavior Checklist
CD	conduct disorder
CDI	Children's Depression Inventory
CI	confidence interval
COR	cumulative odds ratio
DISC-IV	Diagnostic Interview Schedule for Children Version IV
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th Edition
GSHS	Global School-based Health Survey
HBSC	Health Behaviour in School-aged Children
JVQ	Juvenile Victimization Questionnaire
MDD	major depressive disorder
NSCH	National Survey of Children's Health
OR	odds ratio
RCT	randomized controlled trial
ROC	receiver operating characteristic
SD	standard deviation
SDQ	Strengths and Difficulties Questionnaire
SES	socioeconomic status
THL	The National Institute for Health and Welfare
TRF	Teacher's Report Form
WHO	World Health Organization
YSR	Youth Self-Report

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Sourander A, **Lempinen L**, Brunstein Klomek A. Changes in mental health, bullying behavior and service use among eight-year-old children over 24 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, 2016; 55(8):717–725.

II **Lempinen L**, Luntamo T, Sourander A. Changes in mental health service use among 8-year-old children: a 24-year time-trend study. *European Child and Adolescent Psychiatry*, 2018; 28(4):521-530.

III **Lempinen L**, Junttila N, Sourander A. Loneliness and friendships among eight-year-old children: time-trends over a 24-year period. *Journal of Child Psychology and Psychiatry*, 2018; 59(2):171-179.

1 Introduction

Mental health problems are common in children and adolescents and general population estimates suggest that approximately 10% to 25% of children (Polanczyk et al. 2015; Nanninga et al., 2015; Kieling et al. 2011; Merikangas et al., 2010; Patel et al. 2007) experience these in countries with high, low and middle incomes (Kieling et al., 2011). The more severe problems, which cause impairment, occur in about 5-10% of children, but rates as high as 15% have been reported (Huikko et al., 2017; Polanczyk et al., 2015; Merikangas et al., 2010; Costello et al., 2005). The most common childhood psychiatric problems are emotional problems, such as anxiety and depression, conduct problems and neurodevelopmental problems like attention-deficit/hyperactivity disorder (ADHD) and autism. Bullying perpetration and victimization, and loneliness, are also common in children and closely related to mental health problems. The prevalence of bullying involvement varies approximately from 10% to over 50% (Demaray et al., 2013; Molcho et al., 2009; Naylor et al., 2006; Alsaker & Valkanover, 2001) and about 10% to 20% of children experience loneliness (Lyyra et al., 2018; Bartels et al., 2008; Asher & Paquette, 2003).

Mental health problems are frequently associated with somatic symptoms and these problems can often continue into adulthood, causing substantial burdens for both the child and their family, as well as an economic burden for society. Childhood mental health problems, as well as being a bully or a victim of bullying, have also been associated with many other unfavorable outcomes and behavior later in life, such as poor educational achievement (Goodman et al., 2011; Richards et al., 2009; Nordhagen et al., 2005) and shorter education, which can have a negative impact on future job prospects and economic wellbeing (Mannuzza et al., 1997), smoking, substance abuse, criminality (Farrington & Ttofi, 2011), obesity, teenage parenthood and future psychiatric disorders (Duarte et al., 2010; Gyllenberg et al., 2010; Sourander et al., 2009b & 2007a & 2007b, Hofstra et al., 2002). In some cases, these problems can also risk the well-being of the next generation. Being involved in bullying, either as a victim or a perpetrator has also been linked to how safe children feel at school (Bowser et al., 2018; Varjas et al., 2009; Glew et al., 2008). These associations have also been verified in our Finnish population-based 1981 birth cohort study, which comprised almost 6000 children born in that year and who were

followed from childhood until their thirties. The study showed that early childhood disruptive behavior problems were strongly associated with all major psychiatric disorders, including depression, anxiety and psychotic disorders (Sourander et al., 2005). They were also strongly associated with antipsychotic and antidepressant use (Gyllenberg et al., 2012; Gyllenberg et al., 2011), psychiatric hospital treatment (Gyllenberg et al., 2010), substance use (Niemelä et al., 2006; Sourander et al., 2005), smoking (Niemelä et al., 2009), teenage pregnancies (Lehti et al., 2012a), young fatherhood (Lehti et al., 2012b), death and suicidality (Sourander et al., 2009a), crime (Sourander et al., 2006), poor general health and physical fitness (Goodwin et al., 2009), obesity (Duarte et al., 2010) and poor resilience (Ristkari et al., 2009) in adolescence and adulthood. These findings emphasize that early childhood onset disruptive behavior problems are not just associated with lifelong psychosocial problems. They can also lead to the kind of risky behavior that has been associated with major general health and social problems.

Epidemiology is the cornerstone of studying public health issues (Carneiro & Howard, 2011). The history of epidemiological research in the child psychiatric field developed in the second half of the 20th century, along with diagnostic criteria and standardized psychiatric interviews (Polanczyk et al., 2015; Earls, 1979). The Isle of Wight Studies done in mid 1960's were the first epidemiological studies which amongst other things investigated the prevalence of children's psychiatric problems using representative community sample and standardized measures among 9-11 year old children (Rutter, 1989; Rutter et al., 1976). In addition to the prevalence studies of problems, it is important to study the changes, and current contexts, in relation to the frequent incidence of children's mental health problems, bullying and loneliness and the burdens that they cause. We also need to examine the factors that are associated with these phenomena. In early 1990 a study group, which consisted of key researchers in the field of psychiatry, was established to find out if the prevalence of psychosocial disorders among young people, aged from 12-26 years of age, had increased or decreased during the past 50 years. The group also wanted to define how the causal explanations for the perceived changes could be tested. The results of the study group were published in a book and this has been the guideline for time-trend studies in the psychiatric field (Rutter & Smith, 1995). Since that report was published, many researchers have studied secular changes in children's mental health and related problems.

To understand current contexts, and changes in child mental health, we also need to look at the changes that have taken place in societies. Over the last 50 years, many things have affected the wellbeing of children and this has included dramatic changes in Finnish society and other societies around the world. Two economic recessions, in the 1990s and 2000s have influenced families' economic and employment status and people's lives have been affected by high levels of technological changes (Bell

et al., 2015; Bottino et al., 2015). The economic recession in 2008 has also studied to have detrimental effect on children's mental health (Hiilamo et al., 2021). In addition, the number of single-parent families and reconstituted families have increased, as well as the number of immigrants and refugees. School systems and education levels have changed and a particular change has been the increasing educational levels of mothers. The academic world, and the need for enhanced school performance, have placed increasing demands on children, at all the time younger age (Lessof et al., 2016). All these changes have influenced children's everyday lives in positive or negative ways, such as going to school, friendships, hobbies and their wellbeing (Hagquist, 2010).

Concerns have been expressed in the media, and by healthcare and education professionals around the world, that children are experiencing increasing levels of mental health problems. Numerous studies and registers have also shown that use of mental health services, mental health diagnoses and medication use have increased among children and adolescents (Atladottir et al., 2015; Kosidou et al., 2010; Sourander et al., 2008). Many studies showed that children's behavioral problems increased constantly during the half century after the end of the Second World War (Fombonne, 1998). However, more recent studies on changes in mental health problems have produced contradictory results and have shown decreasing, increasing and stable trends in children's behavioral and emotional problems (Collishaw 2015; Bor et al., 2014). The varying trends between these studies have been explained by differences in assessment methods and time, variations in research samples and by cultural and developmental differences.

This thesis focuses on changes in the trends in childhood mental health problems, bullying involvement and loneliness. It also examines changes in the use of mental health services by Finnish children aged 8-9 years of age, during the 24-year period from 1989 to 2013. Changes in bullying involvement between 2005 and 2013, before and after national KiVa anti-bullying program, are studied as a separate study question. The explanatory factors associated with children's loneliness and use of mental health services are also investigated, and the levels of agreement between different informants, namely children, parents and teachers, are discussed. The population-based data, used in this thesis, provide information on almost 3800 children, who were assessed in 1989, 1999, 2005 or 2013. This study is unique compared to the other time-trend studies, as it uses three different informants, four different time points and identical study designs. It also provides information on time-trend changes in loneliness, which has not previously been studied in young children. Studying trends in children's mental health problems, and the reasons behind those changes, it is possible to provide valuable information for healthcare providers on children's wellbeing and needs. This information can then be used to develop suitable services for children.

2 Review of the Literature

2.1 The time-trend design and its purpose and importance in psychiatric epidemiology

Time-trend studies, cross-sectional studies and longitudinal studies are methods that are used to study changes in development and generations (Twenge, 2012). Time-trend studies, which are also known as time-lag studies, are used to describe studies that have collected data from particular populations of a similar age at different time points and from different individuals. They look at trends and changes in the prevalence, or development, of a phenomena over selected time periods (Sigmund et al., 2017; Twenge, 2012; Health Knowledge, 2009). This design enables researchers to process the data longitudinally and use analysis methods for cross-sectional data (Sigmund et al., 2017). By using comparable populations in relation to demographic factors, identical measures and study designs at different time points, this research method produces data that can be compared between assessment points and is not affected by methodological variations. Time-trend studies can also be used to study the efficiency of some interventions and to provide information on previous trends that can be used to make practical decisions, to predict and make future plans and to develop interventions and care needed at that particular moment (Sigmund et al., 2017; Health Knowledge, 2009).

Time-trend studies can be used in a number of ways in psychiatric epidemiology, for example to study changes in the prevalence of mental health problems. They also provide researchers with the opportunity to study how changes in society are associated with the phenomena. It is possible that a number of social and economic changes have affected the mental health of children and adolescents during 20th century and that this has also led to changes in psychiatric symptoms. Rutter and Smith defined these factors in their 1995 book: increased life expectancy, changes in the population's age distribution, economic growth and improvements, substantial improvements in health, changes in housing and other living conditions, increased leisure, changing patterns of adolescence, the increasing instability of family units, changes in family structure and functioning, increases in female employment, fluctuations in unemployment levels, the growth of mass media, fluctuations in international migration and complex changes in moral concepts and values. One

further influencing factor could be added to that list and that is the rapid development and increased use of technology, such as the Internet and different kinds of smart devices.

There are also other ways to study changes in psychiatric symptoms, such as obtaining data from official statistics, service use and medicine prescription registers. However, the limitations of these are that official statistics only provide information on some difficulties related to mental health and these may be affected by changes in recording systems (Maughan et al., 2008). Service use and prescription registers can be affected by changes in awareness, in recognition of problems and in the availability of services and medication (Maughan et al., 2008). Registers are useful and comprehensive when studying serious mental health problems such as autism, schizophrenia or severe suicide attempts which all require hospital treatment. However, in the case of more common mental health problems like anxiety, depression and behavioral problems, which are affecting more children, only minority of cases reaches specialized services. Thus, the register info concerning these problems is biased and population-based questionnaires incomparable to that. So, it is possible that population-based time-trend data provide the best evidence on trend changes in common psychiatric symptoms, but also these can be affected by changes in factors such as awareness. However, studying changes in psychiatric symptoms by using time-trend composition, plus population-based questionnaire data, can reduce the impact of changes in diagnostic criteria on perceived prevalence. This combined approach reaches the target population, regardless of whether the person has been in contact with services or not.

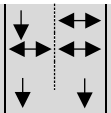
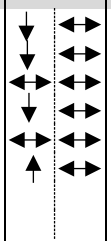
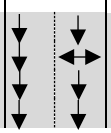
2.2 Time-trend changes in children's mental health problems

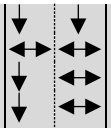
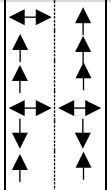
Two reviews have reported the results of different articles concerning changes in children's and adolescents' mental health problems (Collishaw, 2015; Bor et al., 2014). The inclusion criteria for studies were quite similar for these reviews i.e. cross-sectional population-based or community samples using equivalent measures and sample selection at different time points. There were no restrictions for the appearance time of studies in the review by Collishaw, as the review by Bor et al. required assessment points from different decades (one from 20th and one from 21st century) and at least 10 years time frame for change. Table 1 summarizes the results of the time-trend studies covered by these two reviews. It also includes some other time-trend studies that focus on the mean symptom scores or prevalence changes in the most common childhood psychiatric symptoms over the past 40 years, namely conduct problems, emotional problems, attention and hyperactivity problems. Only population-based, cross-sectional studies that used identical assessment methods and

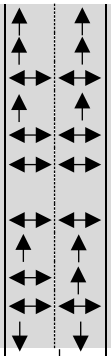
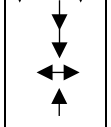
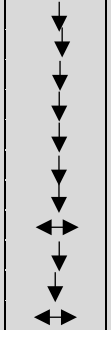
mainly structured questionnaires or interviews at every assessment point were included in the Table 1. Studies that focused on specific group of children, for example clinical populations in hospitals, were excluded. The studies that were included focused on two different age ranges: those including only children aged 0-12, and those including both children at least some of them under the age of 10 and adolescents aged 13-18. If the studies contained both children and adolescents, just the results for children were presented in the Table 1 if they were separately reported.

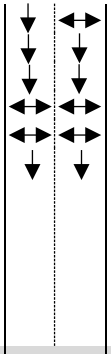
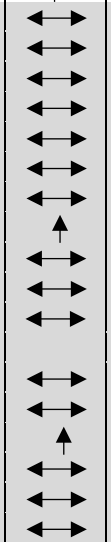
Table 1. Changes in children's psychiatric symptoms in cross-sectional, population based samples, using multiple assessment points.

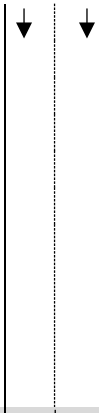
Author, publication year, country	Study design and years	Length of study period in years	Sample size (response rate)	Age of partic-ipants	Informant(s) (length of assessment) and measures	Results[a]: change in mean scores or high scores between the first and last assessment years for boys and girls or for both sexes			Additional notes
Pitchforth et al., 2019, UK: England (Eng), Scotland (Scot), Wales.	20 population-based samples in England between **1995-2014**, eight in Scotland between **2003-2014** and eight in Wales between **2007-2014**.	Eng:19, Scot:11, Wales:7.	Eng n=92422 (n/a) Scot n=16862 (n/a) Wales n=31546 (n/a). Sample size indicates total number of participants aged 4-24 pooling different assessment years together. Response rates were quite consistent between countries and over the time points.	4–12	Parent-reported (six months) SDQq mean and high scores for total and emotional scales, and parent reported (lifetime) long-standing mental health conditions (long-s mhc)q: yes/no.	Total_Eng Total_Scot Total_Wales Emotional_Eng Emotional_Scot Emotional_Wales Long-s mhc_Eng Long-s mhc_Scot	↓ ↔ ↔ ↓ ↔ ↔ ↑ ↑	↓ ↓ ↔ ↓ ↓ ↔ ↑ ↔	Quadratic time function was used as covariate when it was significant. Presented results are for unweighted data. Results for mean and high scores of the SDQ total and emotional scales were the same except for boys' total problem score in Wales. Presented results are for high scores.
Rydell et al., 2018, Sweden.	11 population-based samples between **2004**–2014.	10	2004: n=1034 (n/a) 2005: n=1939 (n/a) 2006: n=2047 (n/a) 2007: n=1856 (n/a) 2008: n=1993 (n/a) 2009: n=1835 (n/a) 2010: n=1873 (n/a) 2011: n=1927 (n/a) 2012: n=1976 (n/a) 2013: n=1429 (n/a) 2014: n=1362 (n/a). Total response rate was 69.3%.	9	Parent-reported (lifetime) A-TAC[i] mean scores and high scores.	ADHD diagnostic ADHD sub-threshold ADHD mean	↔ ↑ ↑	↔ ↑ ↑	When only one child was randomly selected from family no significant differences for diagnostic and sub-threshold levels and fluctuating year effect on mean were seen.

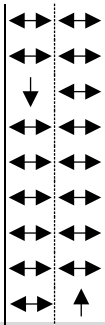
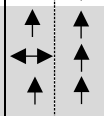
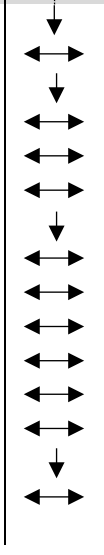
Sawyer et al., 2018, Australia.	Two randomly selected population-based samples in **1998** and in **2013-2014**, which both proportionally represented geographic areas across Australia.	16	1998: n=1796 (n/a) 2013-2014: n=2383 (n/a). Response rates for total data including 4 to 17 years olds were 70% in 1998 and 55% in 2013-2014.	6–11	Parent-reported (12 months) DISC-IV[i], prevalence of disorders.	CD MDD ADHD		Decrease in ADHD in two-parent families in boys and girls and decrease in CD in two-parent families in boys.
Langley et al., 2018, Wales, UK.	Two nationally representative cross-sectional samples in **2007-2008** and **2012-2013**. Maximum of two children were randomly selected from each household.	5	2007-2008: n=2904 (77%) 2012-2013: n=3262 (77%).	4–12 (4-7 = younger, 8-12 = older)	Parent-reported (n/a) SDQ[q] mean scores.	Total Conduct Emotional Hyper Peer Prosocial		The results for boys remained significant when controlled for family size, SES, housing tenure and the child's age. Same results for younger and older boys. No significant differences for younger girls. Significant decreases in total, conduct and hyperactivity scores and increase in prosocial scores for older girls.
Sellers et al., 2015, UK.	Three nationally representative population-based samples in **1999**,	9	1999: n=1033 (n/a) 2004: n=648 (n/a) 2008: n=13857 (n/a).	7	Parent- and teacher-reported (n/a) SDQ[i] mean	Total_parents Total_teachers Conduct_parents Conduct_teachers		Decreased changes between cohorts in total scores reported

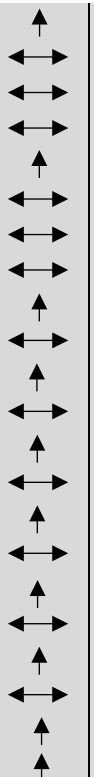
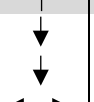
	2004 and **2008**.		For the participated children answers of parents were available of 99% of cases in 1999, 99% in 2004 and 97% in 2008, and answers of teachers were available of 81%, 79% and 63% of cases respectively.		scores and percentage of children in the abnormal range.	Emotional_parents Emotional_teachers Hyper_parents Hyper_teachers		by parents and teachers for total data were still significant when adjusted for sociodemographic disadvantages. Reduction in percentages of children scoring abnormal ranges in parent reported total scale and every subscale and in teacher reported conduct and total scale for total data.
Hölling et al., 2014, Germany.	Two population-based samples in **2003-2006** and **2009-2012.**	6	2003-2006: 14477 (n/a) 2009-2012: 10353 (n/a) Response rates for total data including 0 to 17 years olds were 67% in 2003-2006 and 39-73% in 2009-2012.	3-17	Guardian-reported (n/a) SDQ[q baseline/i wave 1] mean scores and high scores.	Total Conduct Emotional Hyper Peer Prosocial		Presented results are for mean scores.

Matijasevich et al., 2014, Brazil.	Two population-based samples in **1993** (subsample of a birth cohort) and **2004**.	11	1993: n=634 (87%) 2004: n=3750 (91%).	4	Mother-reported (n/a) CBCL[i] mean scores.	Total Externalizing Internalizing Aggressive Rule-Breaking Anxious/Depressed Withdrawn Somatic Thought Social Attention		Almost same results when data for both sexes was used. Observed changes not explained by the changes in family, maternal and child characteristics. Similar results when dichotomized variables were used.
McMartin et al., 2014, Canada.	Six population-based samples in **1994-1995**, **1996-1997**, **1998-1999**, **2000-2001**, **2002-2003** and **2004-2005**.	10	1994-1995: n=n/a 1996-1997: n=n/a 1998-1999: n=n/a 2000-2001: n=n/a 2002-2003: n=n/a 2004-2005: n=n/a. Total number of participants of children aged 10-11 was 11725.	10–11	Self-reported (past week) items[q] with their mean scores and high scores from the National Longitudinal Survey of Children and Youth.	Conduct Indirect aggression Depression/anxiety Hyper		Same results when dichotomized variables based on high scores were used.
Nøvik & Jozefiak, 2014, Norway.	Two population-based samples in **1991** and **2007.** The first sample was drawn from the Central Population Register and the second sample was school-based.	16	1991: n=306 (51%) 2007: n=1196 (66%).	7–9	Parent-reported (six months) CBCL[q] mean scores.	Total Externalizing Internalizing Aggressive Rule-Breaking Anxious/Depressed Withdrawn/Depressed Somatic Thought Social Attention		Age and sex were used as factors in analysis.

Henriksen et al., 2012, Denmark.	Two population-based samples in **1996** and **2010**. The first sample was drawn from the Danish Civil Registration System and the second sample was school-based.	14	1996: n=303 (60.6%) 2010: n~425 (n/a).	6–10	Parent-reported (n/a) CBCL[q] and teacher-reported (n/a) TRF[q] mean scores. Some differences in both questionnaires because of update in 2001.	Total_parent Total_teacher Externalizing_parent Externalizing_teacher Internalizing_parent Internalizing_teacher		
Eimecke et al., 2011, German.	Two population-based cross-sectional samples in **1987** and **2008.** Samples were matched for sex, age and SES.	21	1987: n=212 (n/a) 2008: n=212 (n/a). Response rates for total study samples were 57% and 55%.	8–11	Parent-reported (six months) CBCL[q] mean scores and high scores.	Total Externalizing Internalizing Aggressive Delinquent Anxious/Depressed Withdrawn Somatic Thought Social Attention **DSM-oriented scales:** Affective Anxiety Somatic AD/H Oppositional-Def. Conduct		No significant changes when dichotomized total, externalizing and internalizing problem variables were used.

Hagquist, 2010, Sweden.	Five population-based cross-sectional samples in **1985-1986**, **1993-1994**, **1997-1998**, **2001-2002** and **2005-2006**.	20	1985-1986: n=754 (n/a) 1993-1994: n=1226 (n/a) 1997-1998: n=1293 (n/a) 2001-2002: n=1500 (n/a) 2005-2006: n=1519 (n/a). Attrition rates varied between 10%-15% during investigation years.	11	Self-reported (six months) mean scores and high scores of four questions[q] concerning mental health used in HBSC study.	Total		The proportions of students with mental health complaints was about the same in 1985-1986 and 2005-2006. No differences between years when high scores were compared.
Maughan et al., 2008, UK/(partly same data set as Green et al., 2005, Great Britain).	Two nationally representative population-based samples in **1999** and **2004**.	5	1999: n=10438 (parent: 83%, teacher: 81%) 2004: n=7977 (parent: 76%, teacher: 77%). Numbers in 2004 are from data including children aged 5-16.	5–15	Parent- and teacher-reported (n/a)[i] SDQ mean scores.	Total_parent Total_teacher Conduct_parent Conduct_teacher Emotional_parent Emotional_teacher Hyperactivity_parent Hyperactivity_teacher Peer_parent Peer_teacher Prosocial_parent Prosocial_teacher		Decrease in parent reported total difficulties when adjusted with socio-demographic factors.

Sourander et al., 2008, Finland/ (previous study: Sourander et al., 2004, Finland).	Three population-based cross-sectional samples in **1989**, **1999** and **2005**.	16	1989: n=986 (96%) 1999: n=831 (86%) 2005: n=870 (84%).	8-9	Parent-reported (12 months) Rutter A2[q], teacher-reported (n/a) Rutter B2[q], child's self-reported (2 weeks) CDI[q] mean and high scores.	Total_parent Total_teacher Conduct_parent Conduct_teacher Emotional_parent Emotional_teacher Hyper_parent Hyper_teacher CDI		Similar results when categorical variables were used. Decrease in screen positives boys reported by parents and increase in depressive girls reported by child.
Lin & Wang, 2007, China.	Two population-based samples in **1993** and **2003**.	10	1993: 1960 (n/a) 2003: 3711 (n/a).	6-14	Parent-reported (n/a) Rutter mean scores.	Total Externalizing Internalizing		
Tick et al., 2007a, Netherlands.	Two population-based cross-sectional samples in **1989** and **2003**.	14	1989: n=394 (~90%) 2003: n=279 (80%).	2-3	Parent-reported (two months) CBCL[i] mean scores and high scores.	Total Externalizing Internalizing Attention Aggressive Emotional Anxious/Depressed Somatic Withdrawn Sleep Affective Anxiety Pervasive Develop. ADHD Opposite Defiant		Same results when categorical analyses were carried out.

Tick et al., 2007b, Netherlands/ (previous study: Verhulst et al., 1997b, Netherlands).	Three population-based cross-sectional samples in **1983**, **1993**, and **2003**.	20	1983: parent: n= 1735 (n/a) teacher: n= 902 (n/a) 1993: parent: n= 1715 (n/a) teacher: n= 897 (n/a) 2003: parent: n= 1417 (n/a) teacher: n= 719 (91%). Numbers of the participants are from data including children aged 6-16 and 6-12.	parent: 6-16 teacher: 6-12	Parent-reported (six months) CBCL and teacher-reported (two months) TRF mean scores.	Total_parent Total_teacher Externalizing_parent Externalizing_teacher Internalizing_parent Internalizing_teacher Aggressive_parent Aggressive_teacher Rule-Breaking_parent Rule-Breaking_teacher Anxious/Depressed_parent Anxious/Depressed_teacher Somatic_parent Somatic_teacher Withdrawn_parent Withdrawn_teacher Social_parent Social_teacher Thought_parent Thought_teacher Attention_parent Attention_teacher		SES, ethnicity and informant were used as covariates. Similar results when dichotomized variables were used.
McArdle et al., 2003, England.	Two population-based cross-sectional samples in **1973** and **1994**.	21	1973: n=515 (n/a) 1994: n=1044 (n/a)	7-9	Teacher-reported (n/a) Rutter B2 high scores.	Total Screen positive Hyper		

Achenbach et al., 2003, USA/ (previous study: Achenbach & Howell., 1993, USA).	Three samples in **1976**, **1989** and **1999**. The sample in 1976 did not include referred children and thus two comparisons with two different data set were made: 1) with all assessment years without referred children and 2) assessment years of 1989 and 1999 including referred children.	10 and 23	1976: n=670 (n/a) 1989: n=670 (n/a) 1999: n=670 (n/a). Response rates for total data were 82% in 1976, 90% in 1989 and 93% in 1999.	7-16	Parent-reported (n/a) CBCL[i] mean scores and high scores.	Total Externalizing Aggressive Rule-Breaking Internalizing Anxious/Depressed Somatic Withdrawn Social Thought Attention **DSM-oriented scales:** Affective Anxiety Somatic AD/H Oppositional-Def Conduct		Samples were matched with sex, age, ethnicity and SES. SES, ethnicity and respondent were used as covariates. Increase in parent reported problems 1976-1989 and then decrease in 1999, but levels stayed higher than in 1976. Scores were least favorable on 16 out of 17 problem scales in 1989.
Achenbach et al., 2002, USA.	Three samples in **1981**, **1989** and **1999**. The first was a regional sample and the second and third were population-based national samples.	18	1981: n=696 (n/a) 1989: n=696 (n/a) 1999: n=696 (n/a)	7-16	Teacher-reported (two months) TRF mean scores.	Total Externalizing Internalizing Aggressive Rule-Breaking Anxious/Depressed Somatic	↔ ↔ ↔ ↔ ↔ ↔	SES and ethnicity were used as covariates. Significant year effect for Anxious/Depressed, Affective and for both Inattention

					Withdrawn/ Depressed	↔	subscales. For these scales there were higher problem scores in 1989 than in 1981 and 1999.
					Social	↔	
					Thought	↔	
					Attention	↔	
					Inattention		
					Hyper-Impulsivity	↔	
					DSM-oriented scales:		
					Affective		
					Anxiety	↔	
					Somatic	↔	
					AD/H	↔	
					Inattention		
					Hyper-Impulsivity	↔	
					Oppositional-Def	↔	
					Conduct	↔	

AD/H = Attention Deficit/Hyperactivity symptoms; ADHD = Attention-Deficit/ Hyperactivity Disorder; A-TAC = Autism-Tics, ADHD and other Comorbidities; CBCL = Child Behavior Checklist; CD = Conduct Disorder; CDI = Children's Depression Inventory; DISC-IV = Diagnostic Interview Schedule for Children Version IV; HBSC = Health Behavior in School-aged Children; MDD = Major Depressive Disorder; n/a = not available; p = parent; SDQ = Strengths and Difficulties Questionnaire; SES = Socioeconomic Status; TRF = Teacher's Report Form.

[a] Two parallel arrows in the row represent boys (first arrow) and girls (second arrow), one arrow in the row represents total data.

[i] interview, [q] questionnaire (written)

Significant decrease = ↓ , Significant increase = ↑ , No significant changes = ↔

If results were reported separately for children and adolescents in studies including both age groups, only results concerning children are presented in this table.

2.2.1 Total problems

Trends have changed in total problem scores for mental health issues and the prevalence has varied between 6-23%. The prevalence rates and mean total problems scores have been higher for boys than girls, with the exception of one study, which showed higher self-reported rates for girls (Hagquist, 2010). The trends for total problem scores have been stable (Pitchforth et al., 2019; Langley et al., 2017; Sellers et al., 2015; Hölling et al., 2014; Henriksen et al., 2012; Eimecke et al., 2011; Maughan et al., 2008; Sourander et al., 2008; Achenbach et al., 2002) or have shown decreasing (Pitchforth et al., 2019, Langley et al., 2018; Sellers et al., 2015; Nøvik & Jozefiak, 2014; Henriksen et al., 2012; Hagquist, 2010; Maughan et al., 2008; Tick et al., 2007a; McArdle et al., 2003) or increasing trends (Hölling et al., 2014; Matijasevich et al., 2014; Lin & Wang, 2007; Tick et al., 2007b). A study by Achenbach et al. (2003) showed first increasing trend in total problem scores between the first and second assessment points in 1976 and 1989 and after that a decrease between 1989 and 1999. Levels of problems were however still higher in 1999 compared to 1976.

2.2.2 Externalizing problems

Time-trend studies have reported prevalence rates of 2-16% for conduct problems (Sawyer et al., 2018; Matijasevich et al., 2014; McMartin et al., 2014; Tick et al., 2007b). When they were measured more widely, with pooled externalizing problem scores, the prevalence has varied between 2-30% (Matijasevich et al., 2014; Lin & Wang, 2007). Most time-trend studies have measured the changes in problems using mean values, instead of, or in addition to, the prevalence rate. Both prevalence and mean value studies have reported higher scores for boys, with mainly decreasing trends in conduct problems, aggressive behavior and pooled externalizing problems. The trends among girls have decreased or been stable (Sawyer et al., 2018; Langley et al., 2018; Sellers et al., 2015; Henriksen et al., 2012; Sourander et al., 2008). However, studies from Brazil (Matijasevich et al., 2014) and Germany (Hölling et al., 2014) have reported increasing rates for aggressive symptoms, conduct problems and pooled externalizing symptoms for both boys and girls. In addition, a Chinese study reported increasing externalizing symptoms for girls (Lin & Wang, 2007). When time changes have been presented for data that combines boys and girls, the trends for conduct problems and pooled externalizing problem scores have been mainly stable (Eimecke et al., 2011; Maughan et al., 2008; Tick et al., 2007a, Tick et al., 2007b; Achenbach et al., 2002) or decreasing (McMartin et al., 2014; Nøvik & Jozefiak, 2014; Maughan et al., 2008). In study by Achenbach et al. (2003) aggressive, rule-breaking and pooled externalizing problems first increased from

1976 to 1989, but after that there was a decrease in problems to the next assessment point in 1999.

2.2.3 Internalizing problems

In contrast to conduct problems, the prevalence of emotional problems, such as depression, anxiety, feeling withdrawn and experiencing associated somatic symptoms, and of pooled internalizing problem scores have varied between the sexes. The levels have been higher among boys in some studies and higher in girls in other studies. The prevalence of emotional problems in time-trend studies has varied between 0.5-17%. For pooled internalizing problems, the prevalence has been between 2-27%. However, the trend changes in prevalence rates and mean scores have been contradictory in different studies covering boys, girls and both sexes combined. Some studies have shown stable trends (Pitchforth et al., 2019; Sawyer et al., 2018; Langley et al., 2018; Sellers et al., 2015; Matijasevich et al., 2014; McMartin et al., 2014; Henriksen et al., 2012; Eimecke et al., 2011; Maughan et al., 2008; Sourander et al., 2008; Tick et al., 2007a; Tick et al., 2007b; Achenbach et al., 2002). In some studies trends have decreased (Pitchforth et al., 2019; Sellers et al., 2015; Nøvik & Jozefiak, 2014; Henriksen et al., 2012; Sourander et al., 2008; Tick et al., 2007a) and in others they have increased (Hölling et al., 2014; Matijasevich et al., 2014; Eimecke et al., 2011; Henriksen et al., 2012; Maughan et al., 2008; Lin & Wang, 2007; Tick et al., 2007b). Like in case of externalizing problems, a study by Achenbach et al. (2003) showed first increasing and then decreasing trend in internalizing problems.

2.2.4 ADHD related problems

The prevalence rates for ADHD, hyperactivity and attention problems has studied to be about 5-7% in population (Polanczyk et al., 2014 & 2007; Willcutt, 2012) and in time-trend studies presented in Table 1 it has varied between 1-17%. The prevalence rates and mean scores have been higher for boys than for girls. Similarly with emotional problems, studies have reported contradictory trends. In some studies the trends have been stable (Nøvik & Jozefiak, 2014; Sourander et al., 2008; Mc Ardle et al., 2003) and in others they have been decreasing (Sawyer et al., 2018; Langley et al., 2018, Seller et al., 2015; Matijasevich et al., 2014; Maughan et al., 2008; Tick et al., 2007a) or increasing (Rydell et al., 2018; McMartin et al., 2014; Tick et al., 2007b) for boys and girls and both sexes. Like in the case of externalizing and internalizing problems, the study by Achenbach et al. (2003) showed first increasing then decreasing trend in attention and AD/H problems.

2.2.5 Consensus of time trend results of different psychiatric symptoms

As consensus, most of the previous population-based time-trend studies have investigated changes in children's psychiatric symptoms from 1990 to 2010 and the assessment periods have varied from about 5-20 years and typically used two or three assessment points. The studies on changes in children's mental health problems have shown varying results, namely stable, declining and increasing trends in conduct and emotional problems and hyperactivity. However, a higher number of studies have found declining or stable trends than increasing trends. A review by Collishaw (2015) found that there had been some evidence of increased ADHD and some substantial increases and decreases in emotional and antisocial behavior among children and adolescents. In contrast, a review by Bor et al. (2014) reported that mental health symptoms had not got any worse among toddlers and children.

There can be a number of explanations for the different results found by these time-trend studies. They may reflect real changes in the prevalence of children's mental health problems over time and in different areas. Alternatively, these variations may be caused by differences in the length of the assessment periods and the gaps between different assessments and the differences in the study methods used, like the questionnaires and the informants. The age of the children studied and the sample sizes and their representativeness may also lead to differences (Sawyer et al., 2018; Collishaw, 2015). Variations in results from different parts of the world can also be explained by cultural and developmental differences between countries (Lin & Wang, 2007). Most of the studies presented in Table 1 used the parent-reported Child Behavior Checklist (CBCL) or Strength and Difficulties Questionnaire (SDQ) as a measurement and reported the mean scores for the problem scales. Other instruments used in these time-trend studies were the Children's Depression Inventory (CDI), the Diagnostic Interview Schedule for Children (DISC-IV), the Rutter questionnaire for parents and teachers and Teacher's Report Form (TRF), which is related to the SDQ. All of these scales have been assessed and have been found to be valid and reliable measurements of psychiatric symptoms in many countries (Stevanovic et al., 2017). Most of the studies came from high-income countries in Europe and North America and there was a lack of studies carried out in low-income and middle-income countries. The high or low baseline level of prevalences in the different studies did not appear to have an effect on whether there was a decrease or increase in prevalence and how large the potential change was.

2.2.6 Summary of the results of the Finnish studies on changes in mental health problems

Previous Finnish time-trend studies have shown some significant changes in children's mental health problems (Sourander et al., 2008; Sourander et al., 2004). Parental reports of trend in boys' conduct problems showed an overall decrease between 1989 and 2005. The decrease took place between 1989 and 1999 and stayed the same between 1999 and 2005. Emotional problem reported by parents and hyperactivity and conduct problems reported by teachers also decreased significantly among boys between 1989 and 1999. However, no significant changes were seen in these when 1989 and 2005 were compared. Girls' self-reported depressive symptoms increased between 1989 and 2005. Parent-reported hyperactivity increased between 1989 and 1999 among girls, but then they leveled off until 2005. There have not been any changes in teacher reported specific symptom scales for girls.

Key points of time trend studies on children's mental health problems

- Mainly decreasing trends in conduct problems, aggressive behavior and pooled externalizing problem scores among boys, and decreasing or stable trends for girls
- Contradictory results in emotional problems and in ADHD and related problems, showing stable, decreasing and increasing trends among boys, girls and for both sexes combined
- Higher problem rates among boys than girls

2.3 Time-trend changes in children's bullying involvement

2.3.1 Changes in population-based studies

The definition of bullying devised by Olweus is widely used in many studies. According to him: "Bullying is intentional, repeated, negative (unpleasant or hurtful) behavior by one or more persons directed against a person who has difficulty defending himself or herself" (Olweus & Limber, 2010). Bullying can be direct or indirect and the different types of bullying are physical (for example hitting, kicking and pushing), verbal (for example calling names, making sexual jokes or gestures), relational bullying (for example ignoring someone, excluding them and spreading rumors) and damaging of property (Gladden et al., 2014). Bullying can also be divided into traditional bullying, cyberbullying and sibling bullying (Gladden et al.,

2014; Wolke et al., 2015). Being a bully or a victim in childhood has studied to predict many problems later in adolescence and adulthood such as later psychiatric problems (Sourander et al., 2009b), substance use (Niemelä et al., 2011), criminality (Sourander et al., 2007b) and teenage motherhood (Lehti et al., 2011). Table 2 presents the studies that focused on changes in bullying involvement, namely bullying perpetration and bullying victimization during years from 1984 to 2014 in population-based and school-based studies, using identical assessment methods at every assessment points. Because only a few studies have investigated time-trend changes in children's bullying involvement, the Table 2 includes studies concerning both children aged 0-12 and children and adolescents up to 18 years of age.

Table 2. Changes in children's bullying perpetration and victimization in cross-sectional school and population-based samples using multiple assessment points.

Author, publication year, country	Study design and years	Length of study period in years	Sample size (response rate)	Age of partic-ipants	Informant(s) (length of assessment) and measures	Results: Percentages at different assessment points and change in prevalence between the first and last assessment years.	
Cosma et al., 2017, Scotland.	Eight cross-sectional samples in **1994**, **1998**, **2002**, **2006**, **2010** and **2014**. Part of HBSC study.	20	1994: n= 4932 (n/a) 1998: n= 5589 (n/a) 2002: n= 4363 (n/a) 2006: n= 6097 (n/a) 2010: n= 6456 (n/a) 2014: n= 10218 (n/a)	11, 13, 15	Self-reported (two months) victimization with one question[q]. Definition of bullying was included.	Victimization_boys_11y: 11.5-11.9-9.7-10.8-10.7-15.2%	↑
						Victimization_girls_11y: 11.8-11.7-10.3-10.2-13-17.1%	↑
						Victimization_boys_13y: 13.3-10.5-9.6-10.6-10.9-13.5%	↔
						Victimization_girls_13y: 11.3-11.2-9.7-11.8-13.7-18.8%	↑
						Victimization_boys_15y: 7.7-5.6-4.9-6.9-8.2-10.5%	↑
						Victimization_girls_15y: 6.8-5.9-6.3-6.7-4.5-8.9%	↔
Sánchez-Queija et al., 2017, Spain.	Three cross-sectional random school samples in **2006**, **2010** and **2014**. Part of HBSC study.	8	2006: n=21811 (n/a) 2010: n=11230 (n/a) 2014: n=31058 (n/a). N presented above is for data on 11-18 year olds.	11-12[a]	Self-reported (two months) victimization with one question and observed victimization with five items[q]. Definition of bullying was included.	Reported victimization: 5.4-6.1-5.5%	↔
						Observed victimization: 21.7-26.4-23.6%	↑
						Physical: 4.5-6.9-6.4%	↑
						Verbal: 15.8-19.1-17.4%	↑
						Relational: 14.0-17.6-16.9%	↑
Sarková et al., 2017, Czech Republic.	Six cross-sectional samples in **1994**, **1998**,	20	1994: n=1693 (n/a) 1998: n=3020 (n/a) 2002: n=4044 (n/a)	11-12[a]	Self-reported (two months) bullying and victimization at school with one question	Bullying_boys: 46.5-33.7-12.1-11.7-10.3-16.7%	↓
						Bullying_girls: 37.5-23.2-7.6-7.6-8.1-8.3%	↓

	2002, **2006**, **2010** and **2014**. Part of HBSC study.		2006: n=4118 (n/a) 2010: n=3847 (n/a) 2014: n=4357 (n/a). N presented above is for data on 11, 13 and 15 year olds.		each[q]. Definition of bullying was included.	Victimization_boys: 57.9-35.2-17.5-19.5-16.6-20.2%	↓
						Victimization_girls: 49.3-34.1-14.6-14.1-14.7-17.3%	↓
Waasdorp et al., 2017, USA.	Ten population-based samples in **2005**, **2006**, **2007**, **2008**, **2009**, **2010**, **2011**, **2012**, **2013** and **2014**.	9	2005: n=25249 (n/a) 2006: n=24606 (n/a) 2007: n=21146 (n/a) 2008: n=19756 (n/a) 2009: n=21120 (n/a) 2010: n=27894 (n/a) 2011: n=24086 (n/a) 2012: n=18412 (n/a) 2013: n=27270 (n/a) 2014: n=36767 (n/a).	4th to 12th graders.	Self-reported (one month) questions about bullying and victimization[q]. Definition of bullying was included.	Victimization: 28.5-28.2-28.8-28.2-25.5-23.5-22.7-19.4-17.7-13.4%	↓
						Bullying: 21.3-15.9-13.7-11.8-10.2-9.8-8.3-7.0-7.1-7.1%	↓
Peltzer & Pengpid, 2016, Philippines.	Three cross-sectional school samples in **2003**, **2007** and **2011**. Part of GSHS study.	8	2003: n=7338 (84%) 2007: n=5657 (81%) 2011: n=5290 (82%).	11-16	Self-reported (one month) victimization with one question[q].	Victimization_boys: 34.7-44.3-46.0%	↑
						Victimization_girls: 36.1-47.0-49.1%	↑
Chester et al., 2015, Europe and	Three cross-sectional samples in **2001-2002**,	8	Total: n=581838 (n/a).	11, 13, 15	Self-reported (two months) victimization at school with one	Victimization_occasional: 33.5-29.2%	↓
						Victimization_chronic: 12.7-11.3%	↓

North America.	**2005-2006**, **2009-2010** from 33 countries. Part of HBSC study.				question[q]. Definition of bullying was included.	Significant decreasing trends both in occasional and chronic victimization in a third of countries among boys and girls. Some significant increases too.	
Vieno et al., 2015, Italy.	Three cross-sectional random school samples in **2002**, **2006** and **2010**. Part of HBSC study.	8	Total: n=13174 (71.9%). The number of participants was not specified for the different assessment years.	11, 13, 15	Self-reported (two months) bullying and victimization at school with one question each[q]. Definition of bullying was included.	Bullying_occasional_boys: 28.9-26.2-16.1%	↓
						Bullying_occasional_girls: 21.1-16.4-10.4%	↓
						Bullying_frequent_boys: 18.8-14.0-8.4%	↓
						Bullying_frequent_girls: 8.0-6.6-4.1%	↓
						Victimization_occasional_boys: 21.5-17.9-9.4%	↓
						Victimization _occasional_girls: 18.4-12.5-5.7%	↓
						Victimization _ frequent _boys: 12.8-11.4-6.5%	↓
						Victimization _ frequent _girls: 9.2-7.0-4.0%	↓
Perlus et al., 2014, USA.	Four samples in **1998**, **2002**, **2006** and **2010**. Part of HBSC study.	12	1998: n=15686 (n/a) 2002: n=14818 (n/a) 2006: n=9229 (n/a) 2010: n=10926 (n/a).	grades 6 through 10	Self-reported (two months) bullying and victimization at school with five items each[g]. Definition of bullying was included.	Bullying: 16.5-7.5%	↓
						Victimization: 13.7-10.2%	↓

Finkelhor et al., 2014, USA.	Three population-based samples in **2003**, **2008** and **2011**.	8	2003: n=2030 (n/a) 2008: n=4046 (n/a) 2011: n=4107 (n/a).	2-9, 10-17	Parent/caregiver reported (for 2-9 years old) or self-reported (for 10-17 years old) (one year) victimization with JVQ[i].	Emotional victimization	
Clark et al., 2013, New Zealand.	Three cross-sectional samples in **2001**, **2007** and **2012**.	11	2001: n=9567 (74%) 2007: n=9107 (74%) 2012: n=8500 (68%).	12-18	Self-reported (n/a) victimization at school internet [q].	Victimization: 7.1-6.1-6.2%	
Ilola & Sourander, 2013, Finland/ (previous study: Santalahti et al., 2008, Finland).	Three cross-sectional population-based studies in **1989**, **1999** and **2005**.	16	1989: n=986 (96%) 1999: n=831 (86%) 2005: n=870 (84%).	8-9	Parent (12 months), teacher (n/a) and child (two weeks) reported bullying and victimization with one question each[q].	Bullying_parent_boys: 25.0-15.1-13.5% Bullying_teacher_boys: 26.1-20.8-26.0% Bullying_child_boys: 25.9-24.2-18.2% Victimization_parent_boys: 29.1-18.2-17.7% Victimization_teacher_boys: 14.4-7.1-10.6% Victimization_child_boys: 40.4-32.3-35.3% Bullying_parent_girls: 8.9-6.8-5.8% Bullying_teacher_girls: 5.0-6.0-9.1% Bullying_child_girls: 11.3-8.0-9.1% Victimization_parent_girls: 17.0-12.4-11.1%	

						Victimization_teacher_girls: 4.6-4.8-6.0% Victimization_child_girls: 28-20.3-25.4%	↔ ↔
Shetgiri et al., 2013, USA.	Two population-based, cross-sectional samples in **2003** and **2007**. Part of NSCH study	4	2003: n=48639 (n/a) 2007: n=44152 (n/a).	10-17	Parent reported (one month) bullying with one question[i].	Bullying: 23.4-14.8%	↓
Melzer et al., 2012, Germany.	Three samples in **2002**, **2006** and **2010**. Part of HBSC study.	8	2002: n= (n/a) 2006: n= (n/a) 2010: n= (n/a). Total n=17929	11, 13, 15	Self-reported bullying and victimization[q]	Bullying	↓
						Victimization	↓
Granero et al., 2011, Venezuela.	Two cross-sectional samples in **2004** and **2008**. Part of GSHS-study.	4	2004: n= 2070 (n/a) 2008: n= 870 (n/a).	7th-9th graders, (12-14)	Self-reported (one month) victimization and physical victimization with one question each[q].	Victimization_boys: 35.6-46.2%	↑
						Victimization_girls: 31.4-41.1%	↑
						Victimization_physical_boys: 27.8-17.9%	↓
						Victimization_physical_girls: 8.3-11.0%	↑
Finkelhor et al., 2010, USA.	Two cross-sectional samples in **2003** and **2008**.	5	2003: n=2030 (79%) 2008: n=4046 (n/a).	2-9, 10-17	Parent/caregiver reported (for 2-9 years old) or self-reported (for 10-17 years old) victimization with JVQ[i].	Victimization: 21.7-14.8%	↓
						Emotional victimization; 24.9-22.0%	↔

Molcho et al., 2009, Europe and North America.	Four cross-sectional samples in **1993-1994**, **1997-1998**, **2001-2002** and **2005-2006** from 27 countries. Part of HBSC study.	12	1993-1994: n=102799 (n/a) 1997-1998: n=125732 (n/a) 2001-2002: n=129240 (n/a) 2005-2006: n=133981 (n/a).	11-15	Self-reported (present term/two months) bullying and victimization at school with one question each[q]. Definition of bullying was included.	Overall decreasing trend in bullying and victimization. Significant decreases in occasional bullying in 16 countries, in chronic bullying in 19 countries, in occasional victimization in 19 countries and in chronic victimization in 21 countries. Only some significant increases.	(↓)
Schnohr et al., 2006, Greenland.	Three cross-sectional school samples in **1994**, **1998** and **2002**. Part of HBSC study.	8	1994: n=1322 (n/a) 1998: n=1648 (n/a) 2002: n=891 (n/a).	11, 13, 15	Self-reported (present term) bullying and victimization at school with one question each[q]. Definition of bullying was included.	Bullying_boys: 7.1-6.7-9.3%	n/a
						Bullying_girls: 3.6-3.4-4.6%	n/a
						Victimization_boys: 7.2-7.0-10.1%	n/a
						Victimization_girls: 6.2-8.5-12.4%	n/a
						Bully-victimization_boys: 5.9-3.9-7.2%	n/a
						Bully-victimization_girls: 3.4-2.2-8.3%	n/a
						Significant changes in bullying involvement between the surveys, increase in occurence of bullying.	↑
Nordhagen et al., 2005, Denmark, Finland, Iceland,	Two cross-sectional, population-based studies	12	1984: n=10290 (67%) 1996: n=10664 (70%).	2-17	Parent reported (n/a) victimization with one question[q].	Victimized children: 13.7-16.4%.	↑

Norway and Sweden.	in **1984** and **1996**.						
Zaborskis et al., 2005, Lithuania.	Three cross-sectional samples in **1994**, **1998** and **2002**. Part of HBSC study.	8	1994: n=5688 (n/a) 1998: n=4655 (n/a) 2002: n=5761 (n/a). N presented above is for data on 11, 13 and 15 year olds. The response rate was about 96% for all surveys.	11	Self-reported (past two months) bullying and victimization with one question each[q]. Definition of bullying was included.	Bullying_boys: 34.4-33.5-30.1%	n/a
						Bullying_girls: 20.9-22.6-17.8%	n/a
						Victimization_boys: 43.2-42.3-37.5%	n/a
						Victimization_girls: 38.9-41.5-32.6%	n/a
						In total victimization decreased significantly between 1994 and 2002.	↓

GSHS = Global School-based Health Survey; HBSC = Health Behaviour in School-aged Children; JVQ = Juvenile Victimization Questionnaire; n/a = not available; NSCH=National Survey of Children's Health.

[a] Results presented for this age group; [q] questionnaire; [i] interview

Significant decrease = ↓, Significant increase = ↑, No significant changes= ←→

The prevalence of bullying perpetration in time-trend studies has varied from 4% (Vieno et al., 2015) to almost 50% (Sarková et al., 2017) and the prevalence of bullying victimization from 3% (Sánchez-Queija et al., 2017) to over 50% (Sarková et al., 2017). The trends in bullying involvement in these studies show varying trends in both bullying perpetration and bullying victimization, namely increasing (Cosma et al., 2017; Sánchez-Queija et al., 2017; Peltzer & Pengpid, 2016; Granero et al., 2011; Nordhagen et al., 2005), decreasing (Sarková et al., 2017; Waasdorp et al., 2017; Chester et al., 2015; Vieno et al., 2015; Perlus et al., 2014; Ilola & Sourander, 2013; Melzer et al., 2012; Finkelhor et al., 2014) and stable (Clark et al., 2013; Ilola Sourander, 2013; Finkelhor et al., 2010). The trends for bullying involvement have mainly been similar for boys and girls in studies that have reported separate results for the sexes, but the percentages have been higher for boys than girls clearly in bullying perpetration yet not so clearly in bullying victimization.

Most of these time-trend studies have included data from the Health Behaviour in School-aged Children (HBSC) study. This is a cross-national WHO collaborative study that has been conducted in Europe and North America for over 30 years (HBSC, 2020). The HBSC studies have collected information on bullying and victimization from children and adolescents aged 11-15 years with one question on each behavior. Two studies using HBSC data investigated prevalence changes in bullying involvement and compared data in different countries in Europe and North America (Chester et al., 2015; Molcho et al., 2009). According to Chester et al. (2015), there were mostly significant decreases in occasional and chronic victimization of boys and girls, in a third of the 33 countries and regions between 2001/2002, 2005/2006 and 2009/2010. The prevalence for boys varied between 20-50% in most of the countries. The lowest rates for the three time periods were in the Czech Republic (17.2%, 17.0%, 16.0%) and Sweden (15.2%, 15.7%, 12.4%) and the highest rates were in Lithuania (65.0%, 56.4%, 55.2%) and French Belgium (50.5%, 56.2%, 59.7%). The prevalence for girls varied between 8-64% and was also lowest in the Czech Republic (14.9%, 15.5%, 15.1%) and Sweden (14.7%, 13.6%, 12.4%) and highest in Lithuania (63.6%, 56.2%, 52.8%) and Ukraine (48.1%, 50.4%, 45.3%). A study by Molcho et al. (2009) found that the prevalence in bullying perpetration and victimization mainly decreased in most of 27 countries studied between 1993/1994, 1997/1998, 2001/2002 and 2005/2006. Chronic bullying perpetration was committed by 4-47% of boys and 2-30% of girls and chronic victimization was experienced by 5-42% of boys and 4-40% of girls. The rates were highest during the earlier study years. Only some countries reported increasing trends and these were mainly English speaking countries. The following results that are discussed were mainly linked to adolescents, as studies rarely covered just children. Only one study reported changes in bullying involvement among just children (Ilola & Sourander, 2013) and that showed declining or stable trends for

both perpetration and victimization for boys and stable or increasing trends for girls. More recent studies related to GSHS studies among children and adolescents are done by Pengpid & Peltzar (2021; 2020a & b; 2019) in the Middle East and Morocco and they have also shown varying trends between studies.

The detected differences in prevalence rates and trends between different studies can be at least partly explained by a range of factors, including the age and sex of the participants. These also included different measures and whether one or several items were used, the frequency of how the bullying perpetration or victimization was measured, namely occasional or frequent action, and the type of bullying involvement that was studied, such as physical, verbal or relational (Demaray et al., 2013). The results could also be affected by when the study was carried out and cultural and regional aspects, for example if and when bullying interventions were used in different countries and cities (Molcho et al., 2009). The HBSC studies defined bullying in questionnaires and reported school-based data. In most of the countries covered by the HBSC study, the school-based data represented the general population well, as almost every child goes to school in these countries. However, the school enrollment ratio was not necessarily representative of the total population in that age group, at least in some developing countries. In the Philippines, for example, the enrollment percentage was 69%. Studies that included telephone interviews could also affect the study sample and its representativeness.

2.3.2 Changes in bullying involvement after anti-bullying interventions in schools

Many anti-bullying programs have been launched from the 1980s in schools around the world. The effect of these programs have been evaluated with randomized controlled trial (RCT) design (Ttofi & Farrington, 2011), but there are not much studies on effects of anti-bullying programs in real-life setting after implementation of interventions, a phase which is often studied to reduce the effectiveness of a program. KiVa anti-bullying program in Finland is developed in the University of Turku and launched nationwide in 2009 (Kivaprogram, 2020), between two last assessment points of our time-trend study. It is a school intervention, which is based on social-cognitive theory trying to encourage bystanders to support the victims (Salmivalli et al., 2011). It has studied to have positive effects on the prevalence in bullying involvement among Finnish children in RCT studies (Kärnä et al., 2013; Kärnä et al., 2011b). However, the results have been more effective among elementary school children than among adolescents. The program has also studied to have positive effect on internalizing problems reducing the amount of them (Williford et al., 2012). The cohort study by Kärnä et al. (2011a) investigated the effectiveness of the KiVa anti-bullying program in the beginning of the

implementation of that program. Nine months results showed that KiVa program reduced bullying perpetration and victimization among student from grades 1-9, but the effects were somewhat weaker than in RCT studies. No studies on long-term effects of Kiva anti-bullying program in real life after implementation exists.

2.3.3 Summary of the results of the Finnish studies on changes in bullying involvement

Finnish time-trend studies have shown mainly decreasing trends in bullying involvement (Santalahti et al., 2008; Ilola & Sourander, 2013). Being a victim of bullying decreased among boys from 1989 to 2005, according to parental reports, and the trend also decreased according to teacher and self-reports, with significant decreases seen between 1989 and 1999. The number of girls who were bullying victims also significantly decreased between 1989 and 2005, according to parents. Parents and boys reported bullying decreasing between 1989 and 2005 and teachers reported decreasing trends between 1989 and 1999. The only increasing trend in bullying involvement was reported by teachers and was among girls between 1989 and 2005 in bullying perpetration.

Key points of time trend studies on bullying involvement

- Contradictory results for bullying perpetration and victimization, showing stable, decreasing and increasing trends
- Trends in bullying involvement were mainly similar for boys and girls, but the percentages were higher for boys than girls especially in bullying perpetration
- Most studies included both children and adolescents

2.4 Childhood loneliness

Childhood loneliness is a common phenomenon and children can understand the concept and describe feelings of loneliness as early as kindergarten (Berguno et al., 2004; Cassidy & Asher, 1992). Loneliness is defined as an unpleasant and distressing feeling, which results from the qualitative or quantitative lack of a person's needed or desired relationships (Peplau & Perlman, 1982). It is a subjective feeling, which means that people can experience feelings of loneliness even if they are surrounded by people. They can also be alone without being lonely. Two dimensions of loneliness that have often been defined are social and emotional loneliness (Qualter

& Munn, 2002; Weiss, 1973). Social loneliness refers to the absence of feeling that a person belongs to a group. Emotional loneliness refers to the lack of the kind of relationships that offer intimate and close attachments with another person (Qualter & Munn, 2002; Weiss, 1973). It might be very difficult for adults to detect, and differentiate, when a child experiences loneliness or they just want to be alone. That is why lonely children can often go unnoticed (Asher & Gazelle, 1999) and why adults' reports on children's loneliness are more likely to be related to social loneliness.

Loneliness can last a long time and, according to some studies, loneliness in childhood predicts later experiences of loneliness (Bartels et al., 2008). It is also associated with many negative outcomes in childhood (see chapter 2.4.3) and later in adulthood (Junttila et al., manuscript; Caspi et al., 2006). For example there has studied to be an association between boy's feelings of loneliness at the age of eight years and psychiatric symptom such as anxious-depressiveness, withdrawal behavior, somatic complains, attention problems, aggressive behavior and delinquent behavior in adolescence at the age of 18 (Junttila et al., manuscript). Also other studies have shown the association between childhood loneliness and later depression (Qualter et al., 2010), and loneliness has studied to mediate the association between childhood abuse and psychiatric disorders in adulthood (Shevlin et al., 2015). In order to reduce the distressing feelings of loneliness and its harmful consequences, it is important understand the extent and related factors of childhood loneliness.

2.4.1 The prevalence and time trend changes in children's loneliness

According to previous studies, the prevalence of childhood loneliness has varied about from 4-20% among children and adolescents in the general populations (Madsen et al., 2019; Laine et al., 2010; Bartels et al., 2008; Asher & Paquette, 2003; Asher & Gazelle, 1999; Cassidy & Asher, 1992). However, the research on changes in children's loneliness has been scarce. No studies have just focused on young children and only a few time-trend studies exists on changes in loneliness among children and adolescents. The results of time-trend studies on loneliness are presented in Table 3. A Danish study (Madsen et al., 2019) studied loneliness among children and adolescents aged 11-15 years during 1991 to 2014, using the data from the school-based HBSC study with one direct self-reported question on loneliness. According to this study, the prevalence of loneliness increased between 1991 and 2014 from 4.4-7.2%. Increasing trends were particularly seen in children and adolescents whose parents were from middle and high occupational social classes. Another study of children and adolescents aged 11-16 from the Philippines used data

from Global School-based Health Survey (GSHS). It showed that rates of loneliness increased from 2003 to 2011 among both boys (from 9.5-12.7%) and girls (from 11.2-16.9%) when measured with one direct question. However, the prevalence of having no close friends was stable, both among boys (from 4.0-4.4%) and girls (from 2.5-2.8%) (Peltzer & Pengpid, 2016). Two other studies related to GSHS studies showed decreasing trend of loneliness among children and adolescents and stable trend of no close friends (Pengpid & Peltzer, 2020a, 2020b). The fourth GSHS related study showed stable trend both in loneliness and in close friends (Pengpid & Peltzer, 2021). Study by Chen et al. (2014) showed results separately for the age group of children aged 9-11 and showed decreasing trend of loneliness both among boys and girls.

2.4.2 Summary of the results of Finnish studies on changes in loneliness

As mentioned above, there are no time-trend studies concerning children's loneliness, but according to school health survey carried out in Finland, the percentages of 4th and ^{5th} grade children who felt themselves sometimes or often lonely were 32.7% in 2017 and 35.6% in 2019 (THL, 2019). Finnish data based on Health Behavior in School-aged Children survey reported that in 2014 9.6% of 5th grade students felt lonely quite or very often (Lyyra et al., 2018). Another study based on HBSC from Finland showed increasing trend of frequent loneliness from 11% in 2006 to 15% in 2014 (Lyyra et al., manuscript). Extensive health examinations pressed in 2011 for 1st, 5th and 8th grade students include also questions about child's friendships, but there are no reports available to examine changes in this.

Key points of time trend studies on loneliness

- No previous studies have examined changes just in young children's loneliness, as most have focused on adolescents as well
- Increases and decreases in the prevalence of loneliness have been reported by studies of dataset including both children and adolescents

Table 3. Changes in children's loneliness in cross-sectional school and population-based samples using multiple assessment points.

Author, publication year, country	Study design and years	Length of study period in years	Sample size (response rate)	Age of the participants	Informant(s) (length of assessment) and measures	Results: Percentages or mean scores at different assessment points and change in prevalence or mean scores between the first and last assessment years.	
Pengpid & Peltzer, 2021, Marocco.	Three cross-sectional samples in **2006**, **2010** and **2016**, Part of GSHS study.	10	2006: n=2670 (84%) 2010: n=2924 (92%) 2016: n=6745 (91%)	13-16	Self-reported (one year) loneliness[q] and number of close friends[q] ("no" reported in this table) with one question each.	Lonely_girls: 21.7-23.1-25.1%	◄►
						Lonely_boys: 13.5-13.8-15.0%	◄►
						No close friends_girls: 12.9-10.6-11.2%	◄►
						No close friends_boys: 9.6-7.6-9.1%	◄►
Pengpid & Peltzer, 2020, Lebanon.	Three cross-sectional samples in **2005**, **2011** and **2017**. Part of GSHS study	12	2005: n=5115 (88%) 2011: n=2286 (87%) 2017: n=5708 (82%)	13-16	Self-reported (one year) loneliness[q] and number of close friends[q] ("no" reported in this table) with one question each.	Lonely_girls:16.1-16.4-15.2%	↓
						Lonely_boys: 7.7-8.6-8.2%	◄►
						No close friends_girls: 3.3-3.3-4.6%	◄►
						No close friends_boys: 3.7-4.0-3.5%	◄►
Pengpid & Peltzer, 2020, United Arab Emirates.	Three cross-sectional samples in **2005**, **2010** and **2016**. Part of GSHS study	11	2005: n=15790 (89%) 2010: n=2581 (91%) 2016: n=5849 (80%)	11-16 (18)	Self-reported (one year) loneliness[q] and number of close friends[q] ("no" reported in this table) with one question each.	Lonely_girls:17.7-17.9-16.0%	↓
						Lonely_boys: 13.1-15.9-11.6%	↓
						No close friends_girls: 6.2-5.3-6.6%	◄►
						No close friends_boys: 6.6-7.2-7.0%	◄►

Madsen et al., 2019, Denmark.	Five cross-sectional samples in **1991**, **1994**, **1998**, **2006**, **2014**. Part of HBSC study.	23	1991: n[a]=1860 (90.2%) 1994: n[a]=4046 (89.9%) 1998: n[a]=5205 (89.9%) 2006: n[a]=6269 (88.8%) 2014: n[a]=4534 (85.7%)	11, 13, 15	Self-reported (n/a) single item of loneliness[q] ("very often" + "often" reported in this table).	Loneliness in total: 4.4-5.0-6.1-7.2-7.2%	↑
						Loneliness in high OSC: 4.0-3.7-5.6-6.7-7.1%	↑
						Loneliness in middle OSC: 3.8-4.7-5.6-7.0-7.0%	↑
						Loneliness in low OSC: 6.6-8.3-8.0-8.2-8.2%	↔
Peltzer & Pengpid, 2016, Philippines.	Three cross-sectional samples in **2003**, **2007** and **2011**. Part of GSHS study	8	2003: n=7338 (84%) 2007: n=5657 (81%) 2011: n=5290 (82%).	11-16	Self-reported (one year) loneliness[q] ("mostly/always" reported in this table) and number of close friends[q] ("no" reported in this table) with one question each.	Lonely_girls: 11.2-22.2-16.9%	↑
						Lonely_boys: 9.5-14.4-12.7%	↑
						No close friends_girls: 2.5-4.2-2.8%	↔
						No close friends_boys: 4.0-4.7-4.4%	↔
Chen et al., 2014, China.Only part of the study data is included here.	Three cross-sectional samples in **1992**, **1998** and **2002** in Shanghai.	10	1992: n=237 (~95%) 1998: n=399 (~95%) 2002: n=253 (~95%)	9-11	Self-reported (n/a) mean score of 16 items of loneliness.	Loneliness_girls: 30.5-30.2-26.6	↓
						Loneliness_boys: 33.9-33.8-28.9	↓

[a] Number of participated students; [q] questionnaire

GSHS = Global School-based Health Survey; HBSC = Health Behaviour in School-aged Children; JVQ = Juvenile Victimization Questionnaire; n/a = not available; OSC = occupational social class

Significant decrease = ↓, Significant increase = ↑, No significant changes = ↔

2.4.3 Factors associated with loneliness in children and adolescents

Studies from mainly America and Europe have reported many factors associated with loneliness in childhood and adolescence that are related to the individual and their parents and families. These factors are presented below and summarized in Table 4. Only results of final adjusted models were taken into account if those were available. Most of the studies reported factors associated with loneliness among adolescents and studies on associations in children were sparse.

Parent and family factors

Parents' loneliness (Henwood & Solano, 1994), education and employment status have been associated with children's experienced loneliness. Having a lonely parent increased the risk of a child being lonely (Salo et al., 2020; Junttila & Vauras, 2009; Junttila et al., 2007). Studies of adolescents showed higher levels of loneliness if their parents were unemployed or had a low educational level. Madsen et al. (2019) reported that the prevalence of children's and adolescents' loneliness was highest in low occupational social classes than medium and high classes, but this difference diminished in later study years. Also, living in an isolated family increased children's loneliness (Solomon, 2000) and this could also be related to the parents' loneliness.

Child and adolescent related factors

A number of child-related factors have been associated with childhood loneliness. These are the child's sex (Madsen et al., 2019; Junttila & Vauras, 2009; Hoza et al., 2000; Galanaki & Kalantzi-Azizi, 1999; Hymel et al., 1999), age (Madsen et al., 2019), psychiatric problems (Qualter et al., 2013; Coplan et al., 2007; Galanaki & Vassilopoulou, 2007; Qualter & Munn, 2002; McWhirter, 1990), psychosomatic illnesses (McWhirter, 1990), poor sleep (Cacioppo et al., 2002), physical problems (Cacioppo et al., 2002), learning problems (Valås et al., 1999; Laine, 1997), bullying victimization and poor acceptance by peers (Acquah et al., 2016; Catterson & Hunter, 2010; Galanaki & Vassilopoulou, 2007), truancy, dropping out of school and academic failure (Heinrich & Gullone, 2006; Bullock, 1992). The results on the association between the child's sex and loneliness have been contradictory. According to studies by Madsen et al. (2019), Galanaki & Kalantzi-Azizi (1999) and Hymel et al. (1999), girls experienced loneliness more often than boys. However, some other studies have reported increased rates of loneliness for boys (Hoza et al., 2000; Junttila & Vauras, 2009). These differences between sexes are seen especially then when social and emotional loneliness have been studied separately, boys experiencing emotional loneliness more than girls. Koenig & Abrams (1999)

reported that differences between the sexes has speculated to occur in adolescence, but are not evident in childhood. Children's internalizing and externalizing psychiatric symptoms have been shown to increase the effect on loneliness or the other way round. Also, self-harming has been shown to increase among lonely adolescents (Rönkä et al., 2013). Similarly, it has been reported that loneliness was higher among children and adolescents who had psychosomatic and physical problems, learning problems and who were victimized.

Table 4. Summary of factor associated with loneliness.

Parent and family factors	Child and adolescent factors
• parents' loneliness • parents' education • parents' employment status • isolated family	• sex • age • psychiatric problems • psychosomatic illness • poor sleep • physical problems • learning problems • bullying victimization • truancy • dropping out of school • academic failure

2.5 Children's use of mental health services

2.5.1 The Finnish health care system and children's mental health services in Finland

In Finland every citizen has a universal right to receive health services. Public health care is mainly financed by the state and is organized by municipalities, joint municipalities or hospital districts. Every municipality is part of one hospital district. There are 21 hospital districts (including Åland Island) with central hospitals in Finland and five university hospital catchment areas with university teaching hospitals. Each hospital district belongs under one of these university hospitals. In addition to public health care, Finland also has a private health sector and some health and social services are provided by non-governmental organizations. (Health care in Finland, 2013; Teperi et al., 2009). The private sector complements the public sector and its role has increased in the last few decades (Wahlbeck, 2007). Public health care is divided into primary health care and secondary health care, which offers more specialized services. The current system was developed in the 1950s and 1960s and has naturally developed over time. The development of a new social and health care system, called SOTE, got underway in the 2010s, but hasn't been put into practice yet.

In general, mental health care for adults and children is organized at both primary and secondary health care levels, but more severe symptoms and diseases are treated by specialized health care services. Mental health services can be also purchased from the private sector, but they don't provide inpatient care. The mental health service system for Finnish children was developed during 20th century. Child health clinics were established in the 1920s and family counselling clinics in the 1930s (Solantaus & Santalahti, 2013). As one of the purposes of the child health clinics has always been to prevent developmental problems and to recognize them at an early stage, the law of child health clinic action was put in place in 1944 to make sure these services were provided across Finland (Solantaus & Santalahti, 2013). In 1972 a new law stated that family counseling clinics were responsible for providing children and adolescents with mental health outpatient care. Inpatient care was mainly organized via specialized health care (Solantaus & Santalahti, 2013). In the 1980s, child psychiatric clinics were established in central hospitals and also the development of the child psychiatric field, including diagnostics and the knowledge about different mental health disorders was fast (Solantaus & Santalahti, 2013).

These days, child mental health care is regulated by different laws and regulations, such as the Mental Health Act (No. 1116/1990), Health Care Act (No. 1326/2010), Social Welfare Act (No. 1301/2014), Child Welfare Act (No. 417/2007) and Student Welfare Act (No. 1287/2013) (Finnish Legislation, 2020a-e). Mental health services are provided through child health clinics, family counselling clinics, school health care and student welfare, early childhood education, hospital child psychiatry clinics, child welfare and a number of other organizations (Huikko et al., 2017; Child and family policy in Finland, 2013). Child health clinics and school health care are mainly primary health care services that provide health check-ups. Family counselling clinics come under social care services and provide also primary level mental health services. These are supportive, preventive, low-threshold services, which include basic level treatment and rehabilitation (Huikko et al., 2017). Examinations, treatments and rehabilitation of children's severe mental health problems are organized through hospital pediatric psychiatry clinics (Child and family policy in Finland, 2013). Children with mental health problems tend to receive psychosocial treatment, which is targeted at children, their parents, their family and other networks of children (Huikko et al., 2017; Paakkonen, 2012). Also medical treatment of children's mental health problems has increased since the 1990s (Huikko et al., 2017; Puustjärvi et al., 2016; Paakkonen, 2012; Lundström et al., 2006). As the municipalities are responsible for organizing primary health care and family counselling for their residents, there are big differences in the services that are provided by the different municipalities (Huikko et al., 2017; Solantaus & Santalahti, 2013).

Many things have affected health care in Finland and during the past 30 years children's mental health care has gone through some serious changes. There were

two economic recessions, at the beginning of the 1990s and in 2008-2009. During the first recession, preventive health care, primary health care services and low-threshold social services for families were reduced (Solantaus & Santalahti, 2013; Paakkonen, 2012), which affected the mental wellbeing of families and children. There were also cuts in educational resources and health care in schools and daycare centers (Paakkonen, 2012). According to Paananen et al. (2012) these levels have still not recovered to the level they were before the 1990s recession. During the second recession, at the end of the 2000s, the effects on health services were not as dramatic as in 1990s.

However, some positive changes have also happened, including increased resources for child psychiatry. For example there was an increase in the number of child psychiatrists and extra government finance for organizing child and adolescent mental health services and children's psychotherapy (Paakkonen, 2012; Valtiontalouden tarkastuvirasto, 2009; Santalahti et al., 2009; STM, 2004) during the first decade of the 21st century. Since 2011 there has also been a legal requirement for wider health check-ups for children and adolescents, which explore the psychosocial wellbeing of the child and their family (Hakulinen-Viitanen et al., 2012; Finnish Legislation, 2020f). The ratio of child and adolescent psychiatrists to underage population is higher in Finland than in other countries (Tamminen, 2016). Also the range of psychiatric treatments on offer has increased (Huikko et al., 2017; Weisz et al., 2017). For example using help of technology in treatment of children's psychiatric problems (Ristkari et al., 2019; Sourander et al., 2018) and increasing knowledge of these problems via web pages (Lasten mielenterveystalo, 2020) are new possibilities along with digitalization. Legislation has also been passed to limit the time children have to wait to have their mental health problems assessed and treated (Huikko et al., 2017; Health care in Finland, 2013; Teperi et al., 2009). There is also greater freedom to choose the place of treatment than previously.

2.5.2 The prevalence of, and changes in, children's use of mental health services

Table 5 summarizes the results of time-trend, population-based studies on changes in the prevalence of children's use of mental health service over 20 years. Studies were excluded if they were about one specific mental health problem or diagnosis, a specifically selected target group or a specific service provider. In addition, studies that only comprised register-based information were not included in the Table 5. The outcomes of service use varied between studies and focused on primary or specialized services or other kinds of mental health services. Table 5 includes studies that focused on children and mixed age groups of children and adolescents.

Table 5. Changes in children's mental health service use in cross-sectional, population-based samples that used multiple assessment points.

Author, publication year, country	Study design and years	Length of study period in years	Sample size (response rate)	Age of partic-ipants	Informant(s) (length of assessment) and measures	Results: changes in prevalence between most distant assessment years	
Olfson et al., 2015, USA.	Three nationally representative samples in **1996-1998**, **2003-2005** and **2010-2012**.	16	96/98: n=15307 (n/a) 03/05: n=19450 (n/a) 10/12: n=18865 (n/a). The number of participants refers to the total study population of 6-17 year olds.	6-11[a]	Parent-reported (n/a) use of outpatient mental health services[capi].	Service use among more severe mental health impairment 28%-35.8%-44.6%	↑
						Service use among less severe or no mental health impairment 7.2%-6.8%-9.5%	↑
Sourander et al., 2008, Finland/ (previous study: Sourander et al., 2004).	Three cross-sectional population-based studies in **1989**, **1999** and **2005**.	16	1989: n=986 (95%) 1999: n=831 (86%) 2005: n=870 (84%).	8-9	Pooled information of parent and teacher reported (12 months, n/a) consideration or actual reported use of services for child's emotional and behavioral problems[q].	Service use_boys: 4.2%-7.1%-12.5%	↑
						Service use_girls: 0.9%-4.4%-3.9%	↑
						Service need_boys: 9.2%-9.0%-10.9 %	↔
						Service need_girls: 4.1%-5.7%-7.7%	↑
						Pooled use and need_boys: 13%-16%-23%	↑
						Pooled use and need_girls: 5%-10%-12%	↑
						Service_use_screenpositive_boys: 11.6%-23.5%-31.6%	↑
						Service_use_screenpositive_girls: 4.5%-20.9%-14.8%	↑

Tick et al., 2008, Netherlands.	Two population-based samples in **1993** (national sample) and **2003** (sample from province of Zuid-Holland).	10	1993: n=1930 (n/a) 2003: n=1632 (n/a).	6-18	Parent reported (12 months) use of mental health services or professionals because of child's mental health problems[i].	Use_total_sample: 3.5%-5.9%	↑
						Use_children_with_serious_problems: 16.1%-16.5%.	↔
Sourander et al., 2004, Finland	Two cross-sectional population-based studies in **1989** and **1999**.	10	1989: n=936 (95%) 1999: n=831 (86%).	8-9	Parent reported (12 months) consideration of seeking help or actual reported use of services for child's emotional and behavioral problems.	Service use_boys: 3.9%-6.6%	↔
						Service use_girls: 0.9%-4.0%	↑
						Service use among those with high problems according to parent: 15%-25%	n/a
						Service use among those with high problems according to teacher: 13%-25%	n/a
						Pooled use and need: 6.5%-9.3%	↑
						Service need: 4.2%-4.0%	n/a
Achenbach et al., 2003, USA	Two cross-sectional population-based national samples in **1989** and **1999**.	10	1989: n=1885 (n/a) 1999: n=1641 (93%)	7-16	Parent reported (12 months) service use for child from nonprimary mental health care professionals[i].	Service use all children: 13.2%-12.8%	↔
						Service use among children with deviant CBCL total problem scores: 30.5%-26.6%	↔

[a] Results are presented for this age group; capi = Computer assisted personal interviewing; n/a = not available
Significant decrease = ↓ , Significant increase = ↑, No significant changes = ↔

Few population-based studies have investigated changes in children's use of mental health services. However, studies based on parent reported questionnaires or parental interviews have mainly reported an increase in the use of mental health services by children and adolescents in western countries (Olfson et al., 2015; Tick et al., 2008; Sourander et al., 2008). Also, increasing trends have been reported by almost every study that has focused on changes in mental health service use among children with high levels of problems. Only one study by Achenbach et al. (2003) reported just stable trends and none of the studies reported decreases in the use of mental health services. Olfson et al. (2015) reported that in the latest assessment point 2010/2012, 45% of children with more severe mental health impairment were using mental health services. Although the authors reported increases in service use, they pointed out that still the majority of children who were having problems were not in contact with these services. Also some population-based studies with linked health register information have been done. These studies showed increasing trend in service use for different symptoms. For example study by Gandhi et al. (2016) reported relative increase in service use between 2006 and 2011 in psychiatric emergency department visits, hospitalizations and outpatient visits. Also study by Zwaanswijk et al. (2011) reported an increase in primary and secondary mental health care use by children. When studying changes in service use for specific problem, a study by Mojtabai et al. (2016) showed increasing rate for specialized mental health service use and inpatient hospitalization for depressive symptoms from 2005 to 2014.

The results from population-based studies were in line with many register-based studies and statistics from reports on the use of mental health services. They showed increases in the use of services (Olfson et al., 2015; Olfson et al., 2014; Zwaanswijk et al., 2011) and in prescriptions for medication to treat mental health problems (Olfson et al., 2014; Olfson et al., 2006; Zito et al., 2002). However, these studies only provided information about those children who had accessed services and no information about the situation in the general population. These studies have also been affected by changes in registration practices (Tick et al., 2008).

Most of the studies presented in Table 5 only used two measurement points and the time periods that they covered were rarely more than 10 years. Also, the age ranges differed and only a few studies reported results just for children. More studies are needed to provide a better view on changes in mental health service use among general population, both in developed and developing countries.

2.5.3 Summary of the results of the Finnish studies on changes in use of mental health services

Finnish time-trend studies have followed the same pattern seen in other studies and have reported increases in the use of children's mental health services (Sourander et al., 2008; Sourander et al., 2004). According to these studies, the use of these services by boys increased three-fold from 1989 to 2005 and there was a four-fold increase among girls (Sourander et al., 2008). During the same time period the service use has been much higher among screen positive children increasing approximately threefold both among boys and girls.

Key points of time trend studies on the use of mental health services

- Mainly an increasing trend in the use of mental health services by children and adolescents
- Increasing trend in service use by children with high levels of problems
- The majority of children that had problems were not in contact with services

2.5.4 Factors associated with children's use of mental health services

A number of studies, mainly from Europe and North America, have reported many parent, family and child related factors that were associated with the use of mental health services by children and adolescents. However, the study results on these associations were not consistent (Ryan et al., 2015; Ford, 2008; Zwaanswijk et al., 2003). The age of the participants in different studies ranged mainly from 4-18 years of age. The types of mental health care included preventive child health care, primary health care, child and adolescent social care, specialized mental health care and school health care or school based services. These were delivered by a range of professionals, including pediatricians, psychologists, mental health counselors, general practitioners and social workers. The different factors associated with mental health service use are presented below and summarized in Table 6. When the results were adjusted for other factors, only the final adjusted models were taken into account.

Parental factors

Parents are the main people to search services for their child's behavioral and emotional problems, which probably explains the associations between many parent-related factors and children's use of mental health services. Studies have reported that

parents experienced issues such as economic, psychiatric or social burdens because of their child's problems increased children's use of mental health services (Ryan et al., 2015; Wichstrøm et al., 2014; Ford, 2008; Angold et al., 2002; Angold et al., 1998). They also stated that when parent's recognized their children's problems (Ryan et al., 2015; Ford et al., 2008; Tick et al., 2008) and perceived their needs (Ryan et al., 2015; Wichstrøm et al., 2014; Ezpeleta et al., 2002; Zahner & Daskalakis, 1997) this increase the probability of children using services. Parental issues also increased the chance that their children would use mental health services. These included parents' poor rearing styles that led them to reject their children and show little emotional warmth (Ezpeleta et al., 2002), poor parenting skills that were mediated by children's psychosocial problems (Nanninga et al., 2015), parents' own psychopathology (Ryan et al., 2015; Zimmerman, 2005; Pihlakoski et al., 2004; Farmer et al., 1999) and the parents' own use of psychiatric services (Cunningham & Freiman, 1996; Wu et al., 1999). Contradictory findings on these associations have been reported with regard to the quality of the parent-child relationship, the parents' educational levels and their employment status. According to a review by Ryan et al. (2015), some studies reported that poor parent-child relationships increased service use and some said that good relationships did. Parental education levels (Burns et al., 1995) and parental employment status (Zimmerman, 2005) have been used as indexes to measure socioeconomic status and these are discussed in the next chapter.

Family factors

A number of family related factors have been associated with children's use of mental health services. These include: family structure (Ryan et al., 2015; Tick et al., 2008; Zahner & Daskalakis, 1997; Cunningham & Freiman, 1996), socioeconomic status (Wichstrøm et al., 2014; Haines et al., 2002; Zwaanswijk et al., 2003; Cunningham & Freiman, 1996), health insurance (Zwaanswijk et al., 2003; Farmer et al., 1999; Burns et al., 1997), ethnicity (Ryan et al., 2015; Zimmerman, 2005; Zwaanswijk et al., 2003; Angold et al., 2002; Zahner & Daskalakis, 1997; Cunningham & Freiman, 1996) and family functioning (Brannan et al., 2003). They also include: social support from family and friends, such as help with childcare, homework and emotional or educational support (Nanninga et al., 2015; Bussing et al., 2003), family stress and negative life events, such as fights at home, parental divorce, family member being ill or family member's death and a lack of basic needs (Ezpeleta et al., 2002; Zahner & Daskalakis, 1997). Living in a single-parent family or with family members other than their two biological parents increased children's use of services. Contradictory findings were found in relation to socioeconomic status, as both lower (Wichstrøm et al., 2014) and higher status (Amone-P'Olak et al., 2010; Cunningham & Freiman, 1996) increased the likelihood of children using

services. The same contradictory was true for health insurance, which was reported to increase and decrease service use. Varying results on the effect of health insurance could, for example, depend on country's health care system. Belonging to an ethnic minority also increased and decreased (Zahner & Daskalakis, 1997) the use of services. These contradictory results can be explained by the complexity of the geographical, cultural, historical and race-related aspects of ethnicity (Ford, 2008). Poor family functioning increased the use of mental health services, while social support of family both increased and decreased service use. Family stress and negative life events increased service use.

Child factors

A number of child-related factors were associated with the use of child mental health services. These included the child's sex (Wichstrøm et al., 2014; Zimmerman, 2005; Bussing et al., 2003; Zwaanswijk et al., 2003; Haines et al., 2002; Zahner & Daskalakis, 1997; Fombonne & Vermeersch, 1997; Gasquet et al., 1997; Schonert-Reichl & Muller, 1996; Burns et al., 1995), age (Zwaanswijk et al., 2003; Ezpeleta et al., 2002; Wu et al., 1999; Zahner & Daskalakis, 1997), their birth order in the family (Zimmerman, 2005) and physical problems (Ford et al., 2008), both internalizing and externalizing psychiatric problems (Tick et al., 2008; Zimmerman, 2005; Pihlakoski et al., 2004; Sayal, 2004; Zwaanswijk et al., 2003; Angold et al., 2002; Sourander et al., 2001; Farmer et al., 1999; Verhulst et al., 1997a; Zahner & Daskalakis, 1997; Burns et al., 1995) and their severity (Ford et al., 2008; Zwaanswijk et al., 2003; Sayal, 2004). They also included disruptive behavior, temperament (Ezpeleta et al., 2002), social competence, educational and academic problems (Tick et al., 2008; Zwaanswijk et al., 2003; Verhulst et al., 1997a; Zahner & Daskalakis, 1997; John et al., 1995), functional impairment (Ezpeleta et al., 2002; Angold et al., 2000; Goodman et al., 1997) and the impact of child maltreatment (Barber et al., 1992). Most of the studies reported that parents sought help more often during childhood for boys than girls. In late adolescents, girls were more likely to use mental health services. The results relating to the children's age, suggested both increased (Zahner et al., 2007) and decreased service use by older children and adolescents. Psychiatric problems apparently increased service use and the increase was higher when the problems were severe. Some studies suggested that services are used more for externalizing than internalizing symptoms (Wu et al., 1999). Functional impairment and educational problems increased service use and child maltreatment both increased and decreased service use.

Other factors

Some studies also reported that a number of environmental factors, such as living in an urban area, increased the children's use of mental health services. Also teachers' and day care staff's perception of child's problems and need for help have studied to be associated with increased service use (Wichstrøm et al., 2014; Ford et al., 2008). General practitioners' experience, such as training and the availability of treatments, affected whether a child was referred to specialized care (Zwaanswijk et al., 2003).

The significant associations that were identified by some of the studies quoted above have not been systematically confirmed by other studies. There have also been contradictory findings on the associations between different factors and the use of mental health services. These may be explained by the different outcome variables related to service place, the help sought for some specific types of disorder or symptoms and the differences in measuring independent variables. Also, some studies adjusted associations for other factors, while other studies only investigated univariate associations. The study populations were also different. Some studied referred clinical samples, some samples were from specific geographical areas or other narrow selected samples and some were nationally representative samples. In addition, the age of participants presumably affected the results.

Table 6. Summary of factors associated with help seeking and mental health service use.

Parental factors	Family factors	Child factors	Other factors
• experienced economic, psychiatric and social burden • recognition of problems • perceived needs • parents' psychopathology and use of psychiatric services • parental skills • relationship with child	• family structure • socioeconomic status • health insurance • ethnicity • family functioning • social support • family stress • negative life events	• sex • age • birth order • physical problems • internalizing problems • externalizing problems • severity of psychiatric problems • temperament • social competence • educational and academic problems • functional impairment • impact of maltreatment	• living in an urban area • perception of problems and need for help by teachers and day care staff • general practitioners' experience • availability of treatments

2.6 Agreements on child's psychiatric symptoms and related problems between different informants

Parents are the main source of information about their children's problems, especially when they are very young and cannot speak for themselves. The parents are legally responsible for taking care of the child and their affairs and that include finding services that could help with any problems of child. However, it is important to use multiple informants, as they can provide important information about the child's situation from different angles. In addition to parental reports, children's self-reports can provide information on problems that others find it difficult to detect, for example internalizing symptoms, emotional loneliness and pain symptoms. Teachers view is also useful, as they usually have a broad point of view of the severity and frequency of problems. They can also assess the child's behavior against other children of the same age that they see on a frequent basis. Because peers are usually from the same age group, and they share the same generational environment, they may interpret and see things differently to adults. Different informants also represent different contexts, such as home, school and leisure activities. Many studies have investigated the agreement between different informants, such as parents, teachers, peers and the children themselves with regard to the child's psychiatric symptoms and related problems. The agreement between these parties concerning different phenomena are presented below. Only studies that investigated agreement levels between informants who evaluated the same individuals are included.

2.6.1 Agreement on psychiatric and psychosomatic symptoms

Some older studies from the 1980s investigated agreements on child's psychiatric symptoms between children and their parents and these showed low (Angold et al., 1987) and low to moderate agreement (Edelbrock et al., 1986). In the study by Angold et al. (1987) depressive symptoms were reported more by children than parents. Whereas in the study by Edelbrock et al. (1986) parents reported more behavioral and conduct problems compared to children while affective and neurotic symptoms were reported more by children than parents. More novel studies by Popp et al. (2017) reported low to moderate agreement on anxiety symptoms between parent and child measured with structured diagnostic interview for mental disorders and Fält et al. (2018) showed poor to fair agreement between parents and teacher in 3-5-year-old children's SDQ scores. Koskelainen et al. (2000) measured the inter-rater agreement in SDQ total difficulty scores between child-parent, child-teacher and parent-teacher pairs among children and adolescents aged 7-15 years. The Pearson's correlations coefficient for the total problem scores between the child-

parent pairs was 0.4, the child-teacher pairs was 0.38 and the parent-teacher pairs was 0.44, indicating moderate correlations. Children and adolescents reported higher difficulty scores than parents and teachers in this study. The studies on agreement between adults and adolescents showed the same pattern, with adolescents reporting more problems than their parents (Rescorla et al., 2013; Sourander et al., 1999; Achenbach et al., 1987) or teachers (Stanger & Lewis, 1993). In particular, when it came to emotional problems, parents and other adults tended to report symptoms much less than children and adolescents (Angold et al., 1987).

Somatic symptoms, such as headaches, abdominal pains or other pains and nausea, as well as sleeping problems, have often been associated with psychiatric symptoms. Studies on somatic symptoms have also shown disagreements between child and adult informants (Luntamo et al., 2012a; Haraldstad et al., 2011). According to many studies, children report more pain symptoms than their parents (Luntamo et al. 2012b; Santalahti et al., 2005), but some other studies have presented opposite results (Haraldstad et al., 2011).

Key points of the agreement of psychiatric and psychosomatic symptoms

- Low to moderate agreement between child and adult informants
- Children and adolescents have mainly reported more psychiatric problems than adults, namely parents and teachers
- Agreement on somatic symptoms have also shown disagreement between child and adult informants
- Contradictory results on which informant i.e. child or adult, reports more somatic problems

2.6.2 Agreement on bullying involvement

The agreement on bullying perpetration and bullying victimization between different informants has been frequently studied. According to Rønning et al. (2009) the agreements between child-parent, child-teacher and parent-teacher pairs were poor, both for bullying perpetration and bullying victimization, and they showed kappa coefficients that varied between 0.18-0.19 for perpetration and 0.11-0.22 for victimization. The percentages for frequent bullying were highest for teacher reports and the levels for frequent victimization were highest for child reports. Stockdale et al. (2002) also reported a higher prevalence of bullying when they asked students compared to their parents and teachers. A study of 3rd to 8th graders found that the agreement on victimization was moderate between the students and their parents and

was low between the students and their teachers (Demaray et al. 2013). In that study, the highest levels of victimization were reported by students and the lowest levels were reported by teachers. Also, in a study by Holt et al. (2008) 5th grade students reported higher rates for bullying perpetration and victimization than their parents. Agreement was moderate for victimization and less than moderate for perpetration. Furthermore, the agreement on victimization between mothers and children in a study by Shakoor et al. (2011) was modest among primary school children (kappa = 0.20) and secondary school children (kappa= 0.29).

The disagreements and differences in the levels of reported bullying perpetration and victimization between different informants can be explained by the fact that children are not that willing to report they carry out bullying, as it is an undesirable act. The fact that children report more victimization than adult informants can be due to the fact, that it can be difficult for adults to recognize some kinds of bullying, especially when it is indirect or relational bullying. Also, children can be reluctant to tell adults they are being bullied, because they feel ashamed and they are worried they may be bullied again if they do (Newman & Murray, 2005; Smith & Myron-Wilson, 1998). It has been reported that many children and adolescents do not tell their parents or other adults that they are being victimized by bullies (Mishna, 2004; Unnever & Cornell, 2004).

Key points of the agreement of bullying involvement

- Agreement on bullying involvement between child and adult informants has studied to be poor to moderate
- Children and adolescents have reported higher rates for victimization than adult informants
- Partly contradictory results on which informant reports higher rates for bullying perpetration
- Disagreement can be because of children's desire not to report the bullying act and victimization is difficult to detect for adult informants

2.6.3 Agreement on children's loneliness

Only a few studies have investigated the agreement between child and adult pairs on children's loneliness. Heiman (2002) showed that teachers reported higher scores for loneliness among boys than parents and children themselves, whereas girls reported higher loneliness scores than parents and teachers. However, this was a selected sample of children with learning disabilities.

Key points of the agreement of loneliness

- The studies on agreement of loneliness are sparse and more studies are needed
- The existing study have shown disagreement between informants

2.6.4 Consensus of the agreement

As shown in this thesis, the studies have mostly shown low to moderate agreement, especially between adult and child pairs who were asked about a child's psychiatric wellbeing and bullying involvement. It is important to measure the same information from different informants, as they may disagree, but they also complement each by other providing unique and valuable information (Achenbach, 2006; Garber et al., 1998). Differences in agreement can be explained by the age and sex of the children, the differences between the adult and child informants' knowledge of studied phenomenon, their experience of stigma, understanding of matters, expectations and communication and the health of the informant. There have also been differences in how agreement levels have been studied, for example correlations and comparing percentage differences have been used in different studies. Measuring the outcomes may also vary between different informants.

3 Aims and Hypotheses

The general aim of this thesis was to use four cross-sectional samples of eight to nine year-old children to study changes in children's psychiatric wellbeing over a 24-year period. The more detailed aims of the different three studies were:

1. To study changes in the prevalence of children's psychiatric symptoms, namely conduct problems, emotional problems and hyperactivity, over 24 years (study I).
2. To study changes in bullying perpetration and bullying victimization over 24 years (study I).
3. To study changes in bullying involvement between the two last assessment points when the anti-bullying program was launched (study I).
4. To study changes in children's use of mental health services among: a) the whole study population, b) children with different numbers of psychiatric problems and c) children considered to have problems according to their parents, their teachers or both (studies I and II).
5. To study changes in the prevalence of children's loneliness and friendships and to further study factors associated with children's loneliness (study III).

The overall hypotheses of the three studies were:

1. That there would be an increase in self-reported depressive symptoms from 1989-2013. This hypothesis was supported by previous studies concerning adolescents (Collishaw, 2015) and study of three first assessment points of LAPSET-study used in this thesis (Sourander et al., 2008).
2. That the prevalence of bullying perpetration and bully victimization would have decreased. This hypothesis was based on the estimated effect of anti-bullying intervention used in the study area, which have had positive effect on reducing bullying behavior (Kärnä et al., 2013; Kärnä et al., 2011b).
3. That there would be decrease in bullying involvement especially between the time points of 2005 and 2013 because of the launch of anti-bullying program.

4. That the use of mental health services would have increased over the study period. This hypothesis was supported by multiple studies reporting increase in service use both among children and adolescents (Gyllenberg et al., 2018; Olfson et al., 2015; Olfson et al., 2014; Sourander et al., 2008).
5. That there would have been an increase in children's loneliness and lack of friendships over the study period. This hypothesis was thought to be supported by studies of increased loneliness among adolescents and adults (Peltzer & Pengpid, 2016; Cacioppo et al., 2015).

4 Materials and Methods

This thesis is based on four cross-sectional studies carried out in 1989, 1999, 2005 and 2013. The data and study procedure are described in more detail below and in Figure 1.

4.1 Nationwide LAPSET study and 1989 data collection

The data from the first assessment year in 1989 was part of the Finnish Nationwide 1981 Birth Cohort Study, known as the LAPSET study (Almqvist et al., 1991 &1999a & 1999b). The target population was all Finnish children who were born in 1981 (n=60,007) and were still alive and living in Finland in 1989. The children were 8-9 years old and were mainly in their second year of primary school. A random sample of 10% of these children (about 6000 children) was collected from the five university hospital areas in Finland - Helsinki, Kuopio, Oulu, Tampere and Turku - which all had child psychiatry units. To ensure that the sample was well representative of the general population, various areas were selected from the different university hospital districts so that they represented different levels of urbanization, namely urban, suburban and rural. In small municipalities, all the children that belonged to the birth cohort were selected. In bigger municipalities, like Turku, representative subsamples were collected from school areas. Children were also included if they lived in a selected sample area, but went to a school that was not part of the study sample. Some children did not go to their local school because they had special educational needs or they wanted to go to a school that provided classes of a particular focus on subjects like language, art or music. Also children who belonged to the sample based on their birth year and home address were included even if they joined first or third grade. Children were excluded if they were seriously mentally disabled. The total study sample was 6017 children. The portion of children in Turku area was about 1000 children.

The aim of the LAPSET study was to gather information on the prevalence of psychiatric symptoms among Finnish children. Children, parents and teachers filled in paper questionnaires about the child's psychiatric health and background information on the child's family and parents. The data were collected in November

1989 with the help of teachers. Researchers contacted the schools and principals and asked their permission to carry out the study in their school. After that, they contacted the teachers of the targeted children and visited them at the school to explain how the study would work and deliver the research material. The children were given the parent's questionnaire to take home, together with the return envelope and study information. After the parents had filled in the questionnaire at home, they returned it to the school in the sealed envelope, via the child. After that, the children filled in their questionnaire in the classroom during a school lesson and gave it to the teacher in a sealed envelope. The teacher's questionnaire was in general filled in by the child's classroom teacher, who had most contact with the child and knew them best. Finally, the teacher returned all the questionnaires filled in by the parents, children and teacher to the research group in a pre-paid envelope.

The 1989 subsample from the Turku University Hospital district in South-West Finland was used in this thesis. The potential cohort was 1052 children, which was 12.6% of the age cohort in that area. The sample comprised all the children of that age from the smaller municipalities of Aura, Huittinen, Lieto, Masku, Piikkiö, Tarvasjoki and some of the schools from the larger municipality of Turku from South-West Finland. The actual number of children who participated was 986. The sociodemographic background information, socioeconomic status and the urbanization level of the study area were similar to the national general population (Almqvist et al., 1999a).

4.2 Data collection for the years 1999, 2005 and 2013

The LAPSET study and the data collection were carried out three more times in this part of South-West Finland, in 1999, 2005 and 2013. In 1999 and 2005 the data collection started in November and in 2013 it started in March. The target population for these study years were children aged 8-9 and they came from the same municipalities and school districts in South-West Finland that took part in the 1989 study. The sample area included about 1000 children at every time point: 1035 in 1999, 1030 in 2005 and 1114 in 2013. These children were born in 1991, 1997 and 2004, respectively. The studies were all carried out in the same way as in 1989: the data collection was organized with the help of the teachers and the children, parents and teachers filled in the same informant-related questionnaires as in 1989 study. Only some changes were made in questionnaires between different study years. Because of changes in the regulations related to consent after the 1989 study, written consent was provided from the parents in 1999, 2005 and 2013, so that their child and their child's teacher could fill in the questionnaires and that collected

information could be used in research purposes. In 1989 that separate parental consent was not required.

4.3 Response rates and missing data

In 1989, 95% of the children in the South-West Finland subsample area participated in the study and it was 93% in 1999, 90% in 2005 and 86% in 2013 (see Figure 1). The participation rates were based on a questionnaire being completed by at least one informant; child, parent or teacher. Even though the response rates were high in every study year, the percentage of participants decreased at every time point. This could be because there has been a general trend for fewer people to take part in different kinds of studies. There were also possibly more families and children living in the study area in most recent study years who could not speak Finnish, which was an inclusion criteria, and that could also have affected the response rates. Of participated children, the information from all three informants was available for about 94% of children in 1989, for 66% of children in 1999, for 75% of children in 2005 and for 93% of children in 2013.

In 1999, the questions on the child's sex and date of birth were missing from 180 of the child questionnaires because of a technical error. The information on sex and date of birth was used to link the different informants' questionnaires and this meant that these incomplete questionnaires could not be linked to the parents' and teachers' questionnaires and were left out of the analysis. It was impossible to contact all the children in the study area because some of their teachers refused to participate to the study. In 1999 and 2013, three teachers did not want to participate in the study and that is why the research group could not contact 73 children in 1999 and 23 children in 2013 at all. Of the 3749 children who participated in the time-trend study at the four assessment points, 1876 were boys and 1873 were girls.

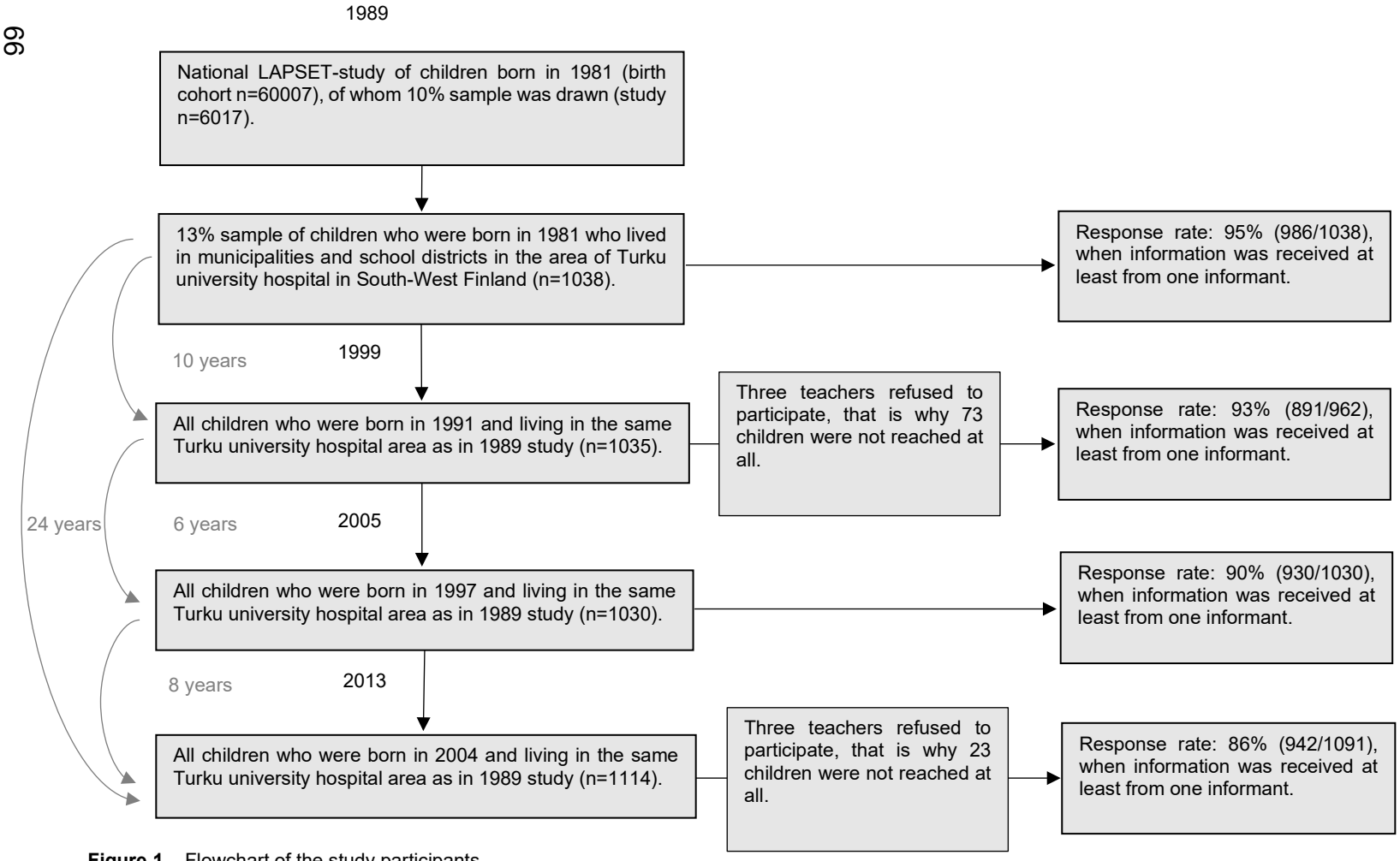


Figure 1. Flowchart of the study participants.

4.4 Measures

The factors asked at different time points are presented in more detail in Appendix A1.

4.4.1 Background and family factors

Family and background factors were used as covariates and explanatory variables in the different studies. The variables and the original answer alternatives are presented in the original publications and in the studies they were used as follows:

Sex: 1) boy, 2) girl (studies I, II and III).

Family structure: 1) biological parents, 2) single parents, 3) reconstituted family with step parent and 4) foster or adoptive parents or relatives (studies I, II and III). As a covariate, family structure was divided into two classes: 1) two biological parents and 2) other (study I).

Mothers' and fathers' vocational education: 1) No vocational education, 2) Vocational courses or vocational school and 3) college or university degree (study I). 1) lower vocational education (vocational courses or school or no vocational education) and 2) higher vocational education (college or university degree) (studies II and III). As a covariate, the information on the mothers' and fathers' vocational education was combined and used as follow: the highest pooled education was 1) college or university degree or 2) vocational courses or school or no vocational education (study I)

Mothers' and fathers' unemployment status (asked in 1999, 2005 and 2013 studies): 1) never been unemployed, 2) unemployed for 1-12 months, and 3) unemployed for over one year (study II). Unemployed during child's life: 1) no, or 2) yes (study III).

Negative life events (asked in 1999, 2005 and 2013 studies): "parents' divorce", "serious illness of parent", "death of mother" and "death of father". (Asked in just 2013 study): "serious illness of sibling", "death of sibling". Replies were used as: 1) no, not any negative life events or 2) yes, at least one negative life event during the child's life (study III).

4.4.2 Psychiatric symptoms

Children's psychiatric symptoms were assessed by the parents, teachers and the children themselves. At every time point, parents and teachers filled in the Rutter

questionnaires that measured the child's psychiatric symptoms. These questionnaires were developed in 1960s. The Rutter A2 parent's questionnaire (Rutter et al., 1970) measures the symptoms during the past 12 months and comprises 31 items, which are rated from zero to two, with zero meaning "does not apply", one meaning "applies somewhat" and two meaning "certainly applies". For a couple of the Rutter items the replies are "no", "yes, mild", and "yes, serious". The maximum total score is 62. The literature suggests that the cut-off score for the parent reported total score should be 13. In addition to the total score, there are also three subscales in the Rutter A2 questionnaire: conduct problems (five items), emotional problems (five items) and hyperactivity (three items). The items on conduct problems are related to stealing, breaking things, disobedience, lying and bullying and the maximum score is 10. The items on emotional problems are related to abdominal pain and vomiting, school phobia, sleeping problems, anxiety and fear of new things and situations and the maximum score in 10. The items on hyperactivity are related to restlessness, squirming and lack of concentration and the maximum score is six.

The Rutter B2 teacher's questionnaire (Rutter, 1967) comprises 26 items, which are also rated from zero to two, with zero meaning "does not apply", one meaning "applies somewhat" and two meaning "certainly applies". The maximum total score is 52 and the most frequently used cut-off score is nine. Having a score of nine or higher indicates that children have some disorders. There is no specified assessment time for problems in the teachers' questionnaire. As in the parent's questionnaire, there are also subscales for conduct problems (six items), emotional problems (four items) and hyperactivity (three items) in the teacher's questionnaire. The items of these subscales are mainly the same as in the parent's questionnaire, but there is one question more in the conduct problems scale, which is about arguing and fighting with other children. The items in the emotional problems scale are related to worry, depression and anxiety, fear and school phobia. The items in the hyperactivity scale are the same as in the parents' questionnaire. The maximum subscale scores are, therefore, 12, eight and six, respectively. The validity and reliability of both the parent and teacher questionnaires have been studied in many countries, including Finland, and they have proved to be good (Rutter & Graham, 1966; Rutter, 1967; Kresanov et al., 1998). The validation has also been confirmed with longitudinal studies, which have shown that these measures of psychiatric symptoms independently predict psychiatric problems later in life.

Children filled in the Children's Depression Inventory (CDI), which measures depressive symptoms among young people (Kovacs, 1981 & 1992). The questionnaire comprises 27 items and each of these items has three alternative statements, which describe mild or no symptoms, some symptoms and severe symptoms, and are rated from zero to two. Two example questions in children's questionnaire are: 0) I'm sometimes sad 1) I'm often sad 2) I'm always sad, and 0)

Many things are bothering me every now and then 1) Many things are bothering me often 2) Many things are bothering me all the time. The question about suicide in children's questionnaire was excluded from the nationwide LAPSET study in 1989, and in the other three studies that followed it. The researchers felt that it was inappropriate to ask children aged 8-9 this question in a classroom without a comprehensive discussion on the topic with adults. The maximum total score was, therefore, 52. The children were asked to report their symptoms and feelings during the past two weeks. The CDI questionnaire is widely used internationally and the reliability and validity of the questionnaire has been reported to be good (Myers & Winters, 2002), albeit for example a Finnish data did not support solely to use the CDI instrument measuring children's psychiatric problems (Kresanov et al., 1998). A cut-off score of 13 has been recommended for screening clinical populations and cut-offs of 16-19 in epidemiological studies have been used to minimize the number of false positive cases (Kovacs, 1981).

The Rutter total and subscale scores and CDI total scores were used as both continuous and categorical variables in different studies that are part of this thesis. The total and subscale scores were counted if the informant had answered at least 75% of the questions on that scale. The cut-off scores for different combinations of subscales and total scores are presented in Table 7. Sex-specific cut-off scores were used for the Rutter subscales, as previous studies have suggested to do that to reveal psychiatric deviance (Kumpulainen et al., 1999; Wong, 1988).

In study I, both continuous and categorical Rutter and CDI variables were used. The cut-off points used to create the categorical variables for the Rutter total score were 13 for the parents and nine for the teachers, both for boys or girls. The cut-offs points used to create the categorical subscale variables were based on 90th percentile, according to the baseline data in 1989. This means that the 10% of the children who scored over the cut-off point had the most symptoms. The subscale cut-offs for boys and girls and for the parent and teacher reports were defined separately. The cut-off score for the CDI was 17 in study I. This cut-off score has been used in previous Finish studies (Sourander et al., 2008; Almqvist et al., 1991) and it has separated about 5-10% of the children.

In study II, the Rutter subscales scores were used as both continuous and categorical variables. The scores of the same subscales from the parents and teachers were pooled together. The number of items in the same parent and teacher subscales differed slightly and that is why the pooled variables were created calculating first the mean values of both informants' subscales and after that calculating the mean value of these two mean values. A pooled subscale variable was not created if the parent or teacher information was missing. As the mean values of subscales varied between 0 and 2, also the mean value of the two mean values had the same range. The pooled subscale variables were also categorized using sex specific 90th

percentile cut-off points (Table 7), which were defined based on the baseline 1989 data and naturally varied somewhere between 0 and 2. These pooled and dichotomized subscale variables were also combined to create a variable that categorized the children into: 1) those who didn't have problems, 2) those who had the problems in one subscale and 3) those who had the problems in two or three subscales. In the additional analysis, the separate parent and teacher subscales were used as categorical variables when we wanted to separate those children who had: 1) no problems according to their parent or teacher, 2) problems according to just their parent and 3) problems according to just their teacher and 4) problems according to both their parent and teacher. In these situations the 90th percentile cut-off points for the parent and teacher subscales were based on the baseline 1989 data and these were defined separately for boys and girls.

In study III, the same Rutter parent and teacher subscale scores were added together using the variables of the original scale to provide pooled data. After that, the combined scores were used as continuous variables.

Table 7. Cut-off scores for the different psychiatric measures used in the different studies

	Study I			**Study II**			**Study III**		
	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both
Rutter parent									
Total score	≥ 13	≥ 13	≥ 13	-	-	-	-	-	-
Conduct	≥ 4	≥ 3	-	> .600	> .250	-	-	-	-
Emotional	≥ 4	≥ 4	-	> .600	> .600	-	-	-	-
Hyperactivity	≥ 3	≥ 2	-	> .667	> .334	-	-	-	-
Rutter teacher									
Total score	≥ 9	≥ 9	≥ 9	-	-	-	-	-	-
Conduct	≥ 5	≥ 2	-	> .667	> .167	-	-	-	-
Emotional	≥ 3	≥ 3	-	> .500	> .500	-	-	-	-
Hyperactivity	≥ 4	≥ 2	-	> 1.33	> .334	-	-	-	-
Combined Rutter parent & teacher									
Total score	-	-	-	-	-	-	-	-	-
Conduct	-	-	-	> .567	> .250	-	-	-	-
Emotional	-	-	-	> .500	> .525	-	-	-	-
Hyperactivity	-	-	-	> .834	> .334	-	-	-	-
CDI	≥ 17	≥ 17	≥ 17	-	-	-	-	-	-

4.4.3 Bullying perpetration and bullying victimization

Bullying perpetration and bullying victimization were studied in study I. The information was collected from parents, teachers and the children themselves. The answers from the parents were based on the past 12 months and children's answers were based on past two weeks. There was no definition of bullying perpetration or victimization, so it could have been interpreted as traditional or cyberbullying, direct or indirect and physical, verbal or relational bullying.

In the parents' questionnaire the items were: "The child bullies other children" and "The child is bullied". The possible answer for both questions were: zero for "doesn't apply", one for "applies somewhat" and two for "certainly applies". In the teacher's questionnaire the items were: "The child bullies other children" and "The child is bullied often". The answer alternatives were the same as in the parent's questionnaire. The items to choose from that best described child him- or herself in the children's questionnaire for bullying perpetration were: "I usually do not bully other children", "I sometimes bully other children" and "I bully other children almost every day". For bullying victimization they were: "Other children usually do not bully me", "Other children bully me sometimes" and "Other children bully me almost every day".

The possible answers for bullying perpetration and victimization for the different informants were changed to "no", "sometimes" and "frequently" and these names were used in the study I.

4.4.4 Loneliness and friendships

Children's loneliness and friendships were studied in study III. The questions on loneliness and friendships were part of the Children's Depression Inventory. The child was supposed to choose the alternative which best described his or her feelings. The alternatives for loneliness were: "I do not feel alone", "I often feel alone" and "I always feel alone". These alternatives were later named "never", "often" and "always" in the study III. For friendships the alternatives were: "I have lots of friends", "I have some friends, but I wish I had more" and "I do not have any friends". These were later named as "many", "some" and "none".

Parents and teachers were also asked about the child's friends in 2005 and 2013, but not in the previous two survey years. The question that they both answered was similar to the one in the child's questionnaire: "The child has a lot of friends", "The child has some friends, but he or she could have more" and "The child has no friends". As in the child's questionnaire, these alternatives were later named as "many", "some" and "none".

4.4.5 Mental health service use

The considered and reported mental health service use, was reported in studies I and II. The question for the parents was: “Have you considered a referral to services because of your child’s conduct or emotional problems?” The answer alternatives were: “No, we have not”, “Yes, we have considered ” and “We have sought help”. The question for teachers was: “In school, have you considered referring the child or family to treatment or services because of the child’s conduct or emotional problems?” For teachers the answer alternatives were “No”, “Have considered” and “Have referred to”. The parent and teacher answers were pooled together to create a variable with three categories: 1) parent and teacher both answered no, 2) either parent had considered or teacher had considered or referred and 3) parent had sought help. These three categories were named as “no”, “considered use” and “reported use” in study II and “no considered or referred”, “considered” and “referred” in study I. Both the parent and teacher responses had to be available to place the child in the first or second category. Only the parent’s report was taken into account in the last category, as it is only possible for teachers to refer the child to services with the parent’s permission and therefore only parents’ reports on actual service use are valid.

In 1999, 2005 and 2013, the parental questionnaire included questions about whether they had sought help from school health services, child guidance clinics, child/adolescent psychiatric services, a private doctor or another source because of the child’s conduct and emotional problems. In 2005 and 2013 there was also questions about whether they found this help useful, varying from zero (no use at all) to four (very useful).

4.5 Ethical issues

The study was approved by the Ethics Committee of Turku University Hospital for every study year, in 1989, 1999, 2005 and 2013. The school authorities and municipalities, school principals and teachers were also asked for consent. Parents were asked for their written consent in 1999, 2005 and 2013. In 1989 the rules were different and filling in the parent’s questionnaire was regarded as consent.

Participation was voluntary at every time point. Children had the opportunity to refuse to participate, even if their parent had given their consent for the child. The results were reported so that it was not possible to recognize the respondent.

4.6 Statistical methods

Changes in psychiatric symptoms, bullying behavior, loneliness and service use between different assessment years (studies I-III):

Changes over time in conduct and emotional problems, hyperactivity, total problem scores and depression were studied separately for boys and girls. Binary logistic regression with categorical variables and analysis of variance (ANOVA) with continuous variables were used, and the analysis were controlled for family structure and the parents combined highest vocational education. The strength of association was measured using the odds ratio (OR) and its corresponding 95% confidence interval (95% CI) in the logistic regression analysis and with p-values and effect sizes of Cohen's d in the variance analysis. In pairwise comparisons, Bonferroni correction was used for variance analyses to prevent the likelihood of significant false results.

Changes in bullying perpetration and bullying victimization were studied separately for sexes with ordinal logistic regression, which is suitable for ordinal outcomes. In situations where the assumptions were not met, multinomial logistic regression was used. These analysis were adjusted with family structure and the parents' combined highest vocational education and the strength of association was measured with the cumulative odds ratio (COR) and 95% CI.

Changes in children's loneliness and friendships were studied separately for boys and girls with multinomial logistic regression.

Changes in service use over time were analyzed both for total data and separately for boys and girls using multinomial logistic regression. The separate analyses for the sexes were adjusted with family structure, the parent's combined highest vocational education and both the Rutter parent and teacher total scores. The total data analysis were adjusted with the number of psychiatric problems.

Associations between outcomes and explanatory variables (studies II-III):

The association between the different explanatory variables (see Table 8) and outcomes of service use and loneliness were studied with multinomial logistic regression in single predictor and multiple predictor models. The models were built in three phases. The first loneliness models tested the predictors one at a time, the intermediate models included family related variables in one model and psychiatric variables in the other. The final model included all the significant variables from the intermediate models, plus the year variable. The first models for service use adjusted every explanatory variable for sex. The second models were adjusted for both sex

and year. The final model was adjusted for every other explanatory variable that were measured at every time point.

The explanatory variables were tested for the interactions between year and sex. The ORs, corresponding 95% CIs and *p* values were calculated for all associations.

Agreement between different informants (study III):

Bowker's test for symmetry, which is a generalization of McNemar's test, was used to measure the agreement on the number of friends the child had between the child-parent, child-teacher and parent-teacher pairs (Krampe & Kuhnt, 2007). The strength of association was measured with a weighted kappa coefficient.

Differences between sexes (study III):

The difference between the boys' and girls' loneliness and friendships were investigated using Pearson's chi-square test.

In all the analyses, the level of statistical significance was a two-sided *p* value of < 0.05, except in the interaction analyses, where a significance level $p < 0.1$ was used. Interaction analyses study if the effect of one explanatory variable on outcome depends on the other explanatory variable in a non-additive manner (Altman & Matthews, 1996). As it is a weaker test, that is why the significance level for *p*-value was chosen to be higher in these interaction analyses (Thiese et al., 2016). All the analyses were carried out using statistical software SAS for Windows version 9.4 (SAS Institute, Cary, NC, USA).

Table 8. Statistical methods used in the different studies.

Study	Outcome	Explanatory variables	Method	Strength of association	Analysis adjusted for
I	Rutter parent and teacher reported total, conduct, hyperactivity and emotional scores. Child reported CDI.	Year	Analysis of variance, Bonferroni correction in pairwise comparisons.	*p*-value Cohen's *d*	Family structure and parents' combined highest vocational education.
I	"	Year	Binary logistic regression.	Adjusted ORs and 95% CIs	Family structure and parents' combined highest vocational education.
I	Family structure, mothers' and fathers' vocational education.	Year	Multinomial logistic regression.	ORs and 95% CIs	-
I	Bullying and bully victimization.	Year	Ordinal and multinomial logistic regression.	Adjusted Cumulative ORs and 95% CIs	Family structure and parents' combined highest education.
I	Service use.	Year	Multinomial logistic regression.	Adjusted ORs and 95% CIs	Family structure, parents' combined highest vocational education, Rutter parent and teacher total scores.
II	"	Year	Multinomial logistic regression.	Adjusted ORs and 95% CIs	Number of psychiatric problems.
II	"	Year, sex, family structure, mothers' and fathers' vocational education and employment status. Parent and teacher reported child's conduct and emotional problems, hyperactivity.	Multinomial logistic regression.	Adjusted ORs and 95% CIs	**First model:** Every explanatory variable adjusted with sex. **Second model:** Every explanatory variable adjusted with sex and year. **Third model:** Every explanatory variable adjusted with every other explanatory variable, except for mothers' and fathers' employment status.

III	Loneliness and friendships.	Sex	Pearson's chi-square test.	*p*-value	
III	"	Year	Multinomial logistic regression.	ORs and 95% CIs	
III	Loneliness.	Year, family structure, negative life events, mothers' and fathers' unemployment status and education. Child's conduct and emotional problems, hyperactivity.	Multinomial logistic regression.	Adjusted ORs and 95% CIs	**Single predictor model:** Every explanatory variable, with no adjustments. **Intermediate models:** Model 1 adjusted with family-related variables and model 2 adjusted with psychiatric symptoms. **Final model:** Year, family structure, conduct problems, emotional problems and hyperactivity.
III	Friendships.	Agreement between different informants.	Bowker's test for symmetry.	Weighted kappa coefficient.	

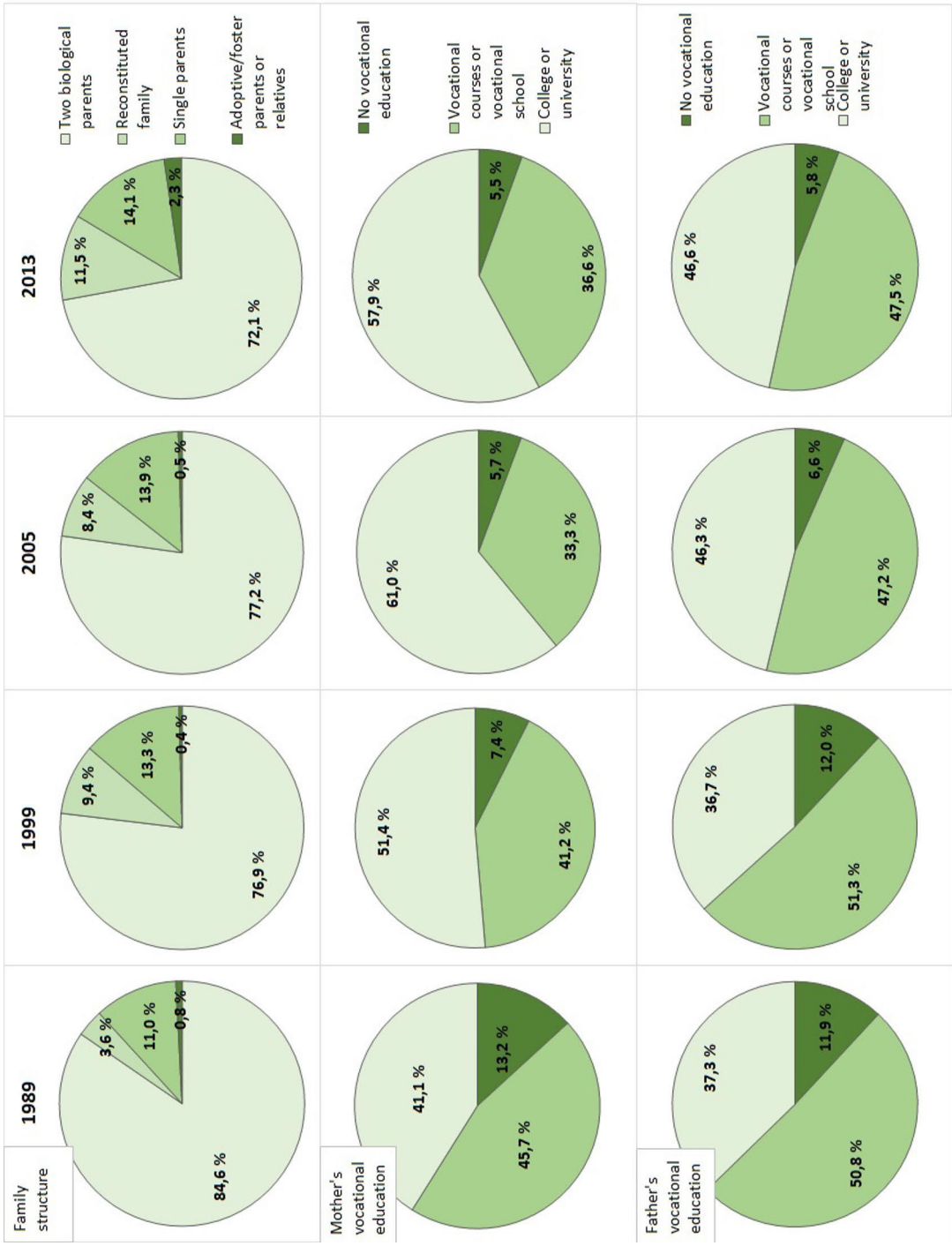
5 Results

5.1 Changes in background factors

The sex distribution of the participants was fairly equal between boys and girls at every time point. The percentages of girls in the different assessment years were: 51.7% in 1989, 52.6% in 1999, 50.1% in 2005 and 45.4% in 2013.

Figure 2 shows the distributions of background factors for the parents and families, such as the family structure, the mothers' and fathers' education and unemployment status in different assessment years. The family structure changed significantly over time, as the percentages of children living with two biological parents decreased and the proportion of families with single parents and reconstituted families increased (see study I). Also, the proportion of highly educated mothers and fathers increased significantly (see study I). Long-term unemployment, for more than one year, seemed to decrease with time, both among mothers and fathers, and the percentages of parents who had never been unemployed during the child's life increased (unpublished results). The statistical significance of these results has not been tested.

The percentage of children who had experienced at least one negative life event during their life was 23.5% in 1999, 21.9% in 2005 and 29.0% in 2013 (unpublished results). This showed that the younger generation of children had experienced negative life events more than children who took part in the previous studies. The most common negative life event was their parents' divorce.


Family structure
1989
1999
2005
2013
Two biological parents
Reconstituted family
Single parents
Adoptive/foster parents or relatives
84,6 %
3,6 %
11,0 %
0,8 %
76,9 %
9,4 %
13,3 %
0,4 %
77,2 %
8,4 %
13,9 %
0,5 %
72,1 %
11,5 %
14,1 %
2,3 %
Mother's vocational education
No vocational education
Vocational courses or vocational school
College or university
45,7 %
41,1 %
13,2 %
41,2 %
51,4 %
7,4 %
33,3 %
61,0 %
5,7 %
36,6 %
57,9 %
5,5 %
Father's vocational education
50,8 %
37,3 %
11,9 %
51,3 %
36,7 %
12,0 %
47,2 %
46,3 %
6,6 %
47,5 %
46,6 %
5,8 %

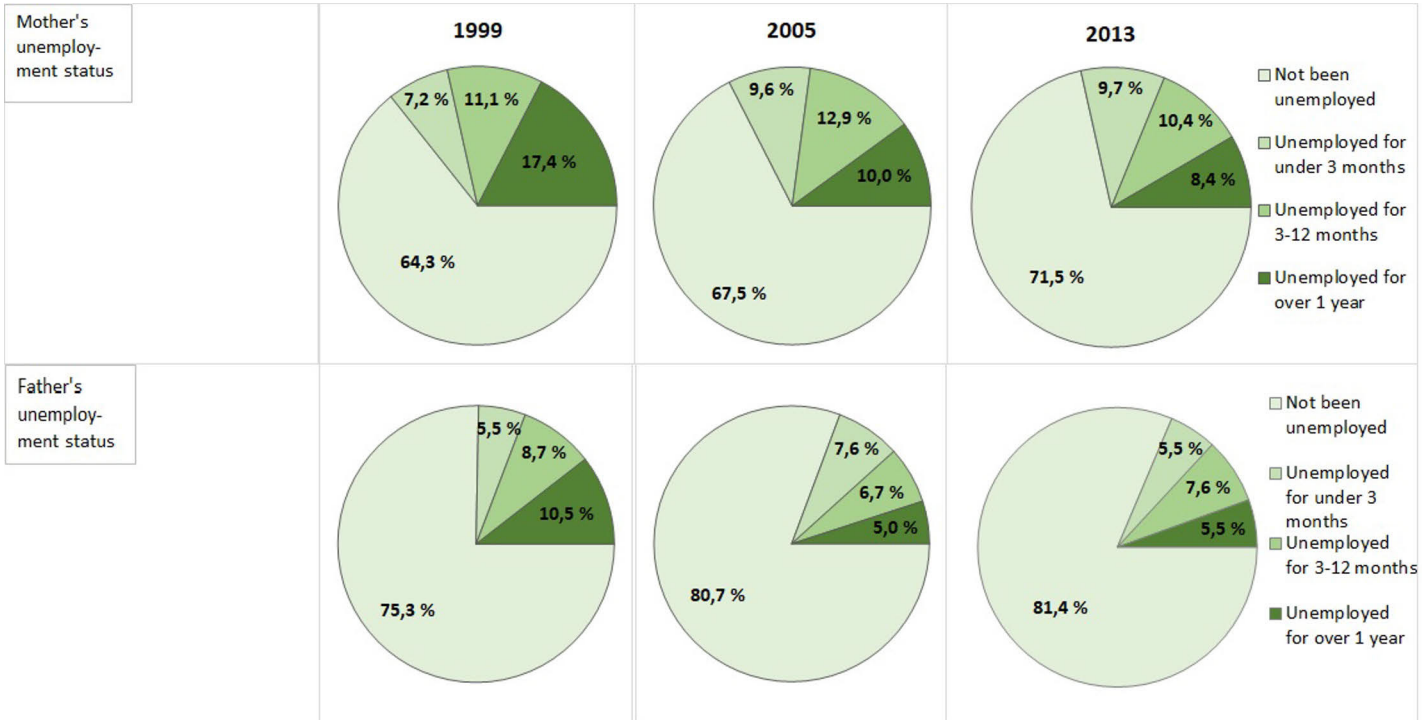


Figure 2. Distributions of the background factors in the different assessment years.

5.2 Changes in the prevalence of children's mental health problems over the 24-year study period (study I)

According to parent, teacher and child reports there were no increases in the children's psychiatric symptoms when comparing the first and last assessment points of the 24-year study period. Figures 3a-d for boys and 4a-d for girls present the mean values and standard deviations for the children's psychiatric symptoms in 1989, 1999, 2005 and 2013, based on their own reports and the reports from their parents and teachers. All the significant changes between the consecutive years, or between the years 1989 and 2013, are illustrated. The exact p-values for the differences between the various assessment years are presented in Table 9. As the figures show, only minor changes were seen in the boys' and girls' psychiatric symptoms during the 24-year study period. Parent-reported emotional and conduct problems for boys and emotional problems for girls decreased when 1989 and 2013 were compared and no significant changes occurred between the last two measurement points, 2005 and 2013.

Almost the same study results were seen, when the psychopathology scales were analyzed as categorical variables. This was done using the cut-off points of the 90th percentile for the Rutter subscales, the recommended cut-offs for the Rutter totals and the previously used cut-off points for the CDI, which separated out those children with the most severe problems. When the categorical variables were accounted for, the parent-reported conduct and emotional problems and the Rutter total problems decreased between 1989 and 2013 among boys (Figure 5), as significantly fewer boys had high scores in these problem scales in 2013. However, no significant changes were seen in girls' problems between 1989 and 2013 when categorical variables were used (Figure 6). Neither in linear nor in categorical analysis, there were no significant changes in boys' or girls' conduct problems, emotional problems, hyperactivity, depression and total scores between 1989 and 2013 when the teacher and child reports were studied.

Table 9. *P*-values of the differences in psychiatric symptoms' between the different assessment years, measured by analysis of variance.

		1999 vs. 1989			2005 vs. 1999			2013 vs. 2005			2013 vs. 1989		
		Parent	Teacher	Child	Parent	Teacher	Child	Parent	Teacher	Child	Parent	Teacher	Child
Boys	Conduct	<.001	.004		1.000	.067		1.000	1.000		.001	1.000	
	Emotional	.006	.427		1.000	.830		.860	1.000		<.001	1.000	
	Hyperactivity	1.000	.001		.127	.026		.627	1.000		1.000	1.000	
	Total score	.013	<.001		1.000	.006		1.000	.313		.217	1.000	
	CDI			.421			.628			1.000			1.000
Girls	Conduct	1.000	1.000		.674	.899		1.000	1.000		1.000	1.000	
	Emotional	1.000	.565		1.000	.018		.073	1.000		.002	.857	
	Hyperactivity	.014	1.000		.173	.182		1.000	1.000		.750	.572	
	Total score	.533	1.000		.090	.017		1.000	1.000		.328	.406	
	CDI			.867			.258			.184			.743

CDI = Children's Depression Inventory
Analyses were adjusted with family structure and parents' combined vocational education.
P-values were corrected using the Bonferroni technique.

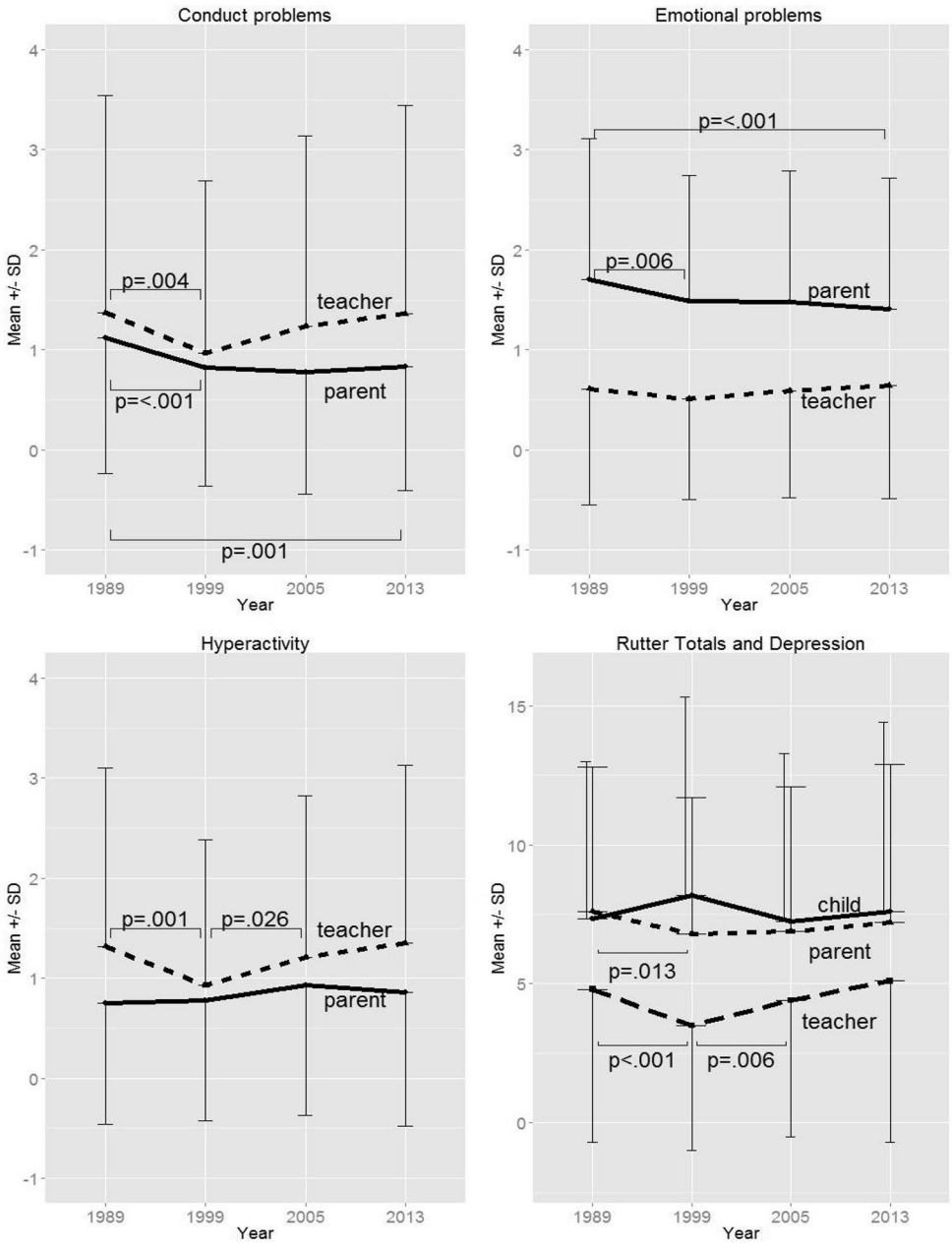


Figure 3a-d. Mean values and standard deviations of the parent, teacher and child reported psychiatric symptoms for boys in the different assessment years. Significant differences between the consecutive years and the first and last assessment years are presented in the figures.

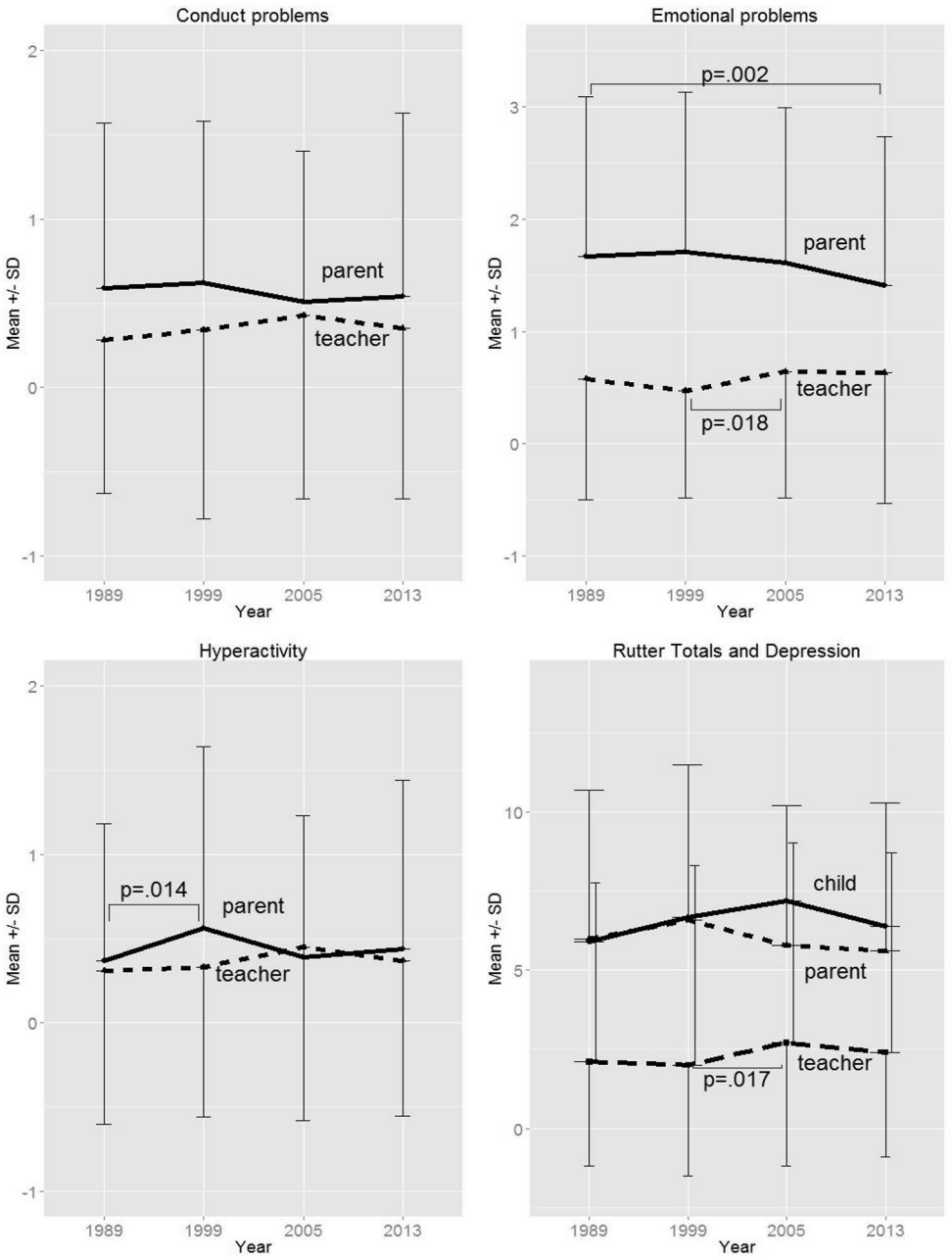


Figure 4a-d. Mean values and standard deviations of the parent, teacher and child reported psychiatric problems for girls in the different assessment years. Significant differences between the consecutive years and the first and last assessment years are presented in the figures.

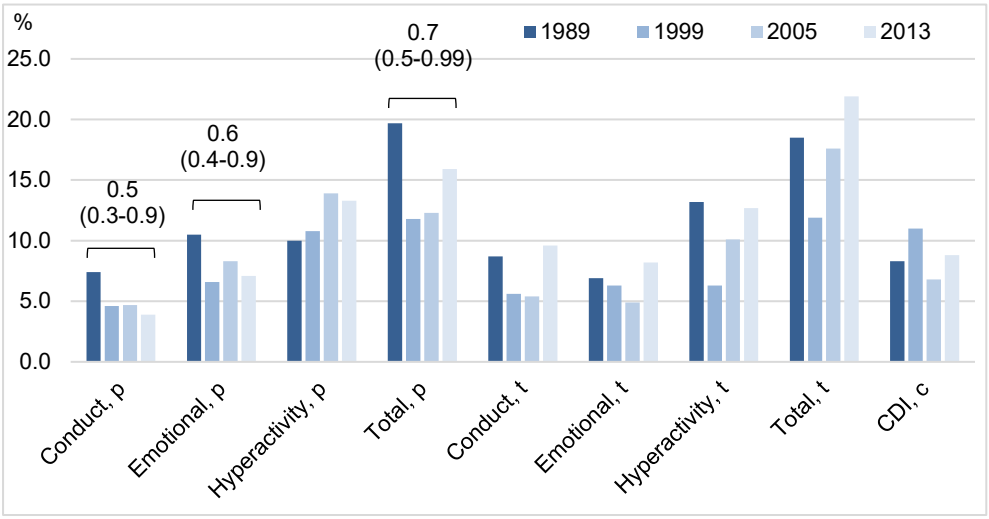


Figure 5. The percentages of boys scoring above the 90th percentile cut-off point at the different time points and the odds ratios and 95% confidence intervals only for significant differences between the first and last assessment years, if existed. The reference year was 1989. p=parent, t=teacher, c=child.

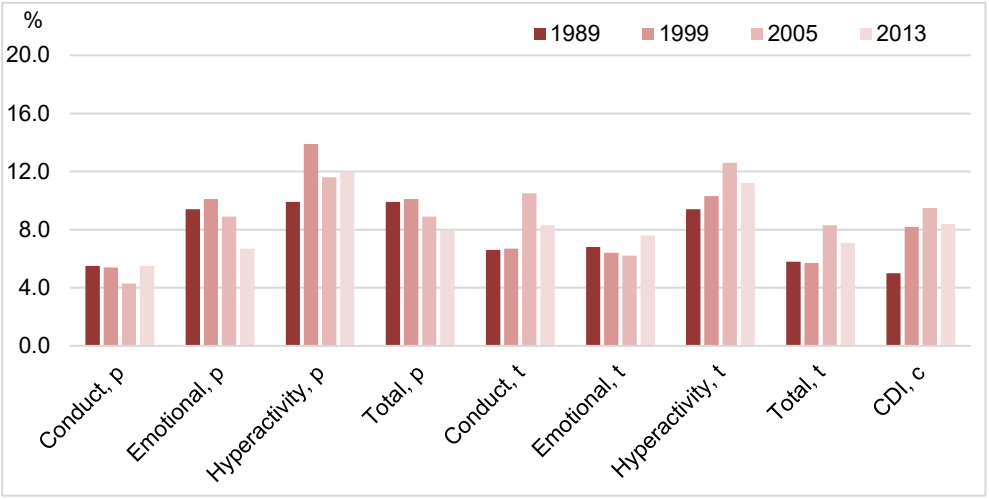


Figure 6. The percentages of girls scoring above the 90th percentile cut-off point at the different time points and the odds ratios and 95% confidence intervals only for significant differences between the first and last assessment years, if existed. The reference year was 1989. p=parent, t=teacher, c=child.

5.3 Changes in the prevalence of children's bullying perpetration and bullying victimization over 24 years (study I)

5.3.1 Changes in bullying perpetration and victimization in general

Figures 7 and 8 present the percentages of bullying perpetration and bullying victimization reported by children, parents and teachers at different assessment years, separately for boys and girls. The percentages for both bullying perpetration and victimization were higher for boys than for girls, according to every informant. Both boys and girls reported much higher percentages of bullying victimization than parents or teachers. Bullying perpetration (OR 0.6, 95% CI 0.5-0.9) and victimization (OR 0.6, 95% CI 0.5-0.9) among boys decreased during the study period according to parents (see Figures 7 and 9) when comparing year 2013 to the assessment year 1989. According to the child and teacher reports, no significant changes in bullying perpetration or victimization occurred among boys when 1989 and 2013 were compared. Among girls, there was decrease in parent-reported bullying perpetration (OR 0.4, 95% CI 0.2-0.8) and bullying victimization (OR 0.6, 95% CI 0.4-0.9) between 1989 and 2013. Girls' self-reported bullying perpetration decreased significantly (OR 0.5, 95% CI 0.3-0.9) between the same assessment years as above (see Figures 8 and 9).

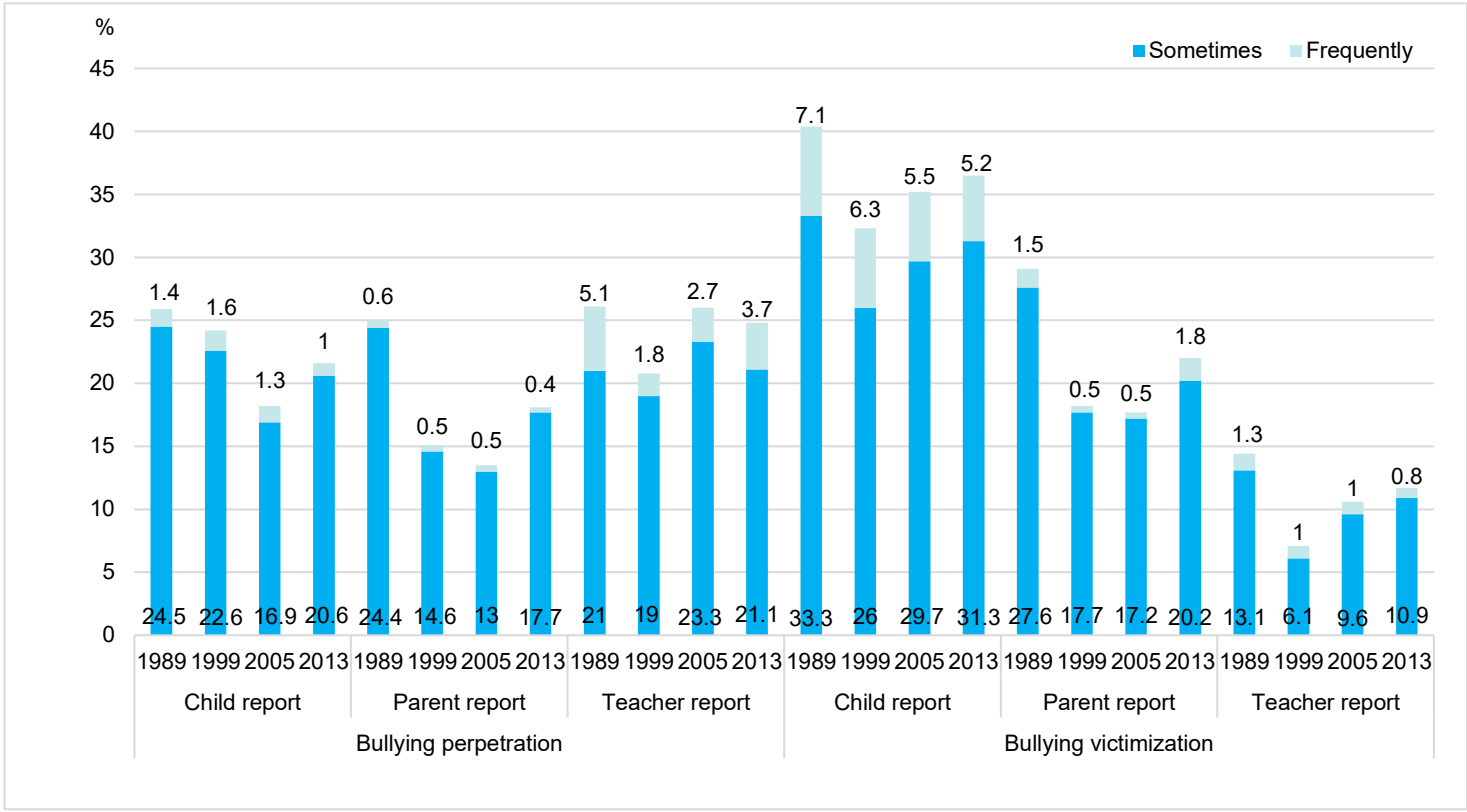


Figure 7. Percentages of boys who bullied others or were victims of bullying sometimes or frequently, based on child, parent and teacher reports. The percentages for the “sometimes” category are shown at the bottom of the bars and the percentages for the “frequently” category are shown above the bars.

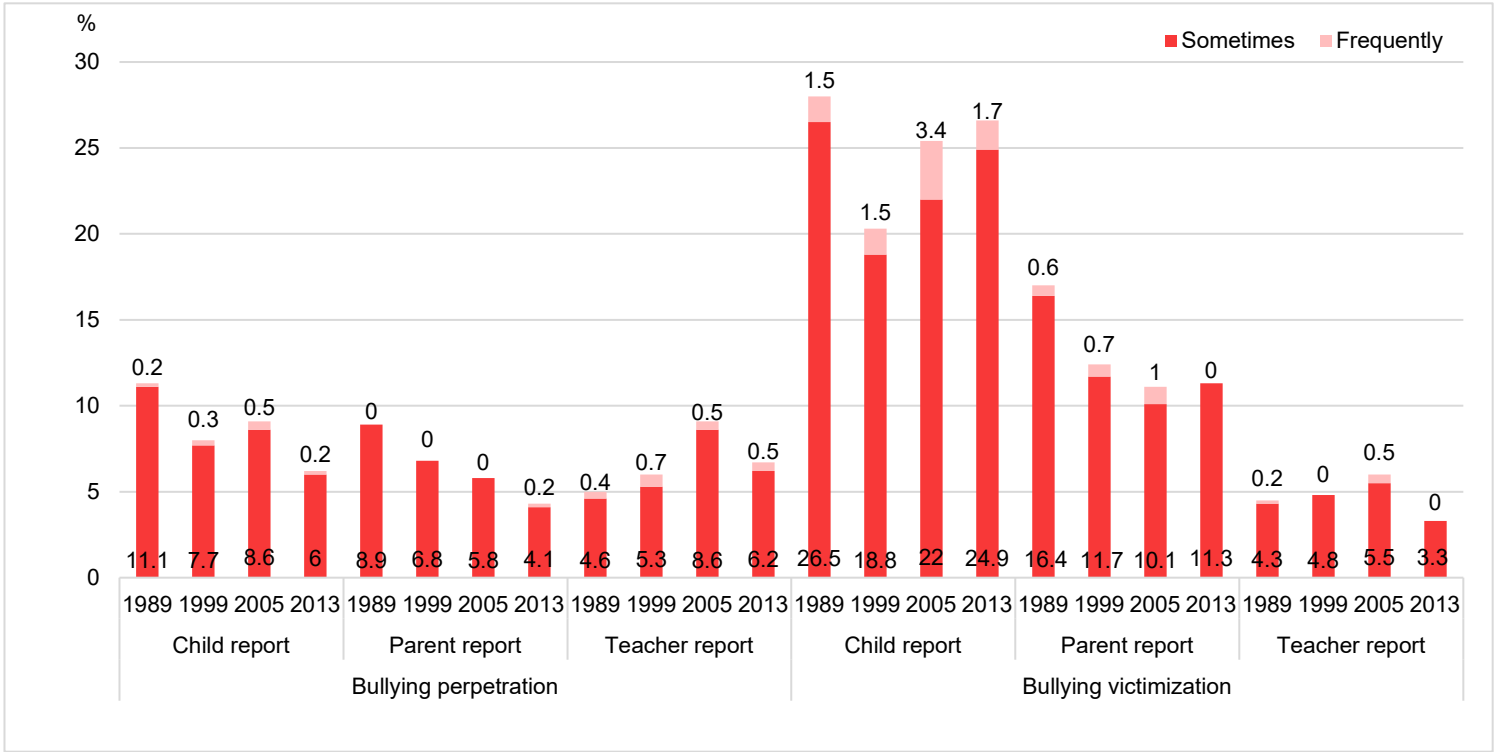


Figure 8. Percentages of girls who bullied others or were victims of bullying sometimes or frequently, based on child, parent and teacher report. The percentages for the "sometimes" category are shown at the bottom of the bars and the percentages for the "frequently" category are shown above the bars.

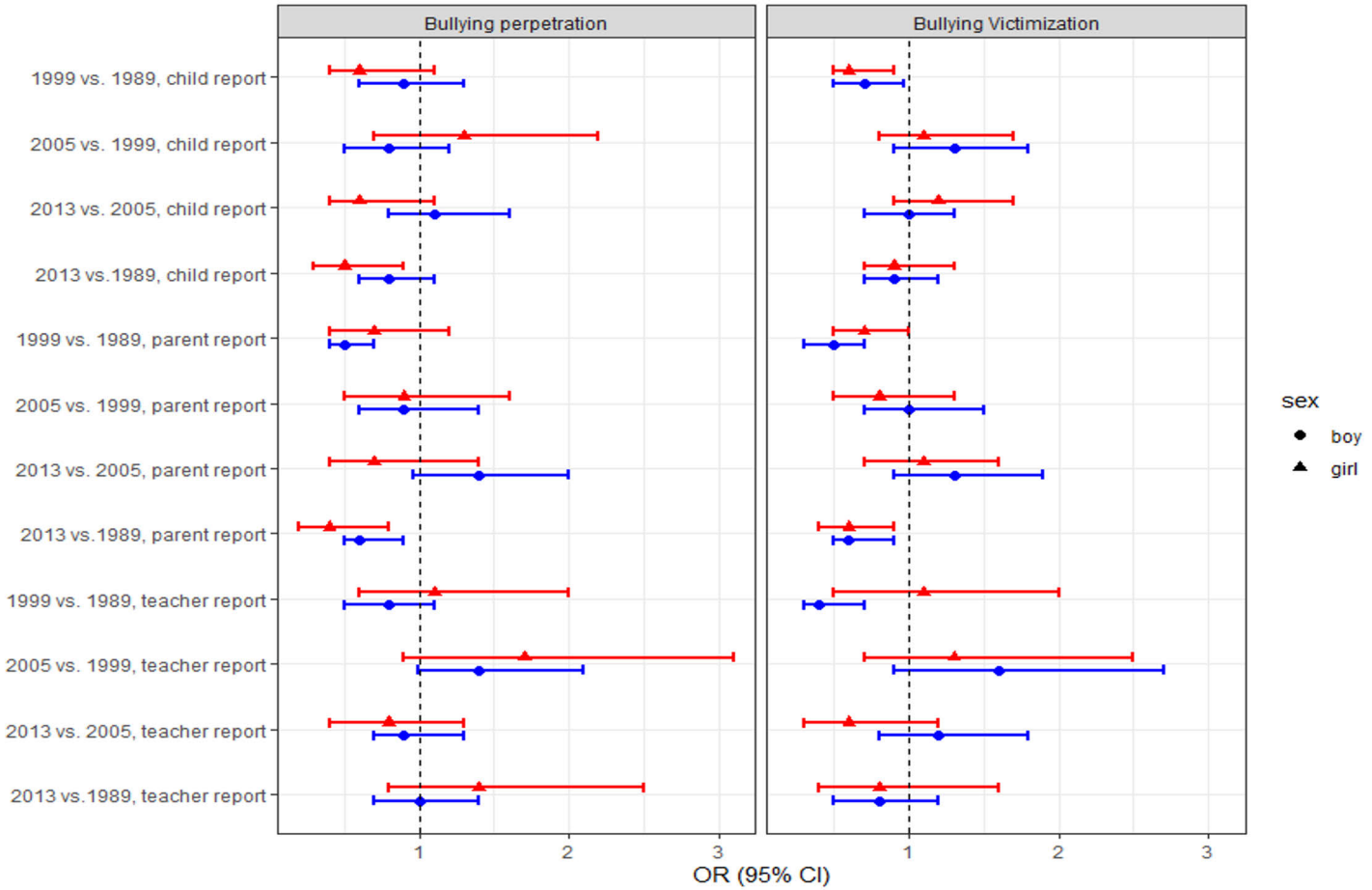


Figure 9. Association between assessment years and bullying involvement, based on child, parent and teacher reports.

5.3.2 Changes in bullying perpetration and victimization after national KiVa anti-bullying program

There were no significant changes between the last two assessment years, 2005 and 2013, in any of the child, parent or teacher reported percentages of bullying perpetration and victimization among boys and girls. This was despite the fact that the KiVa anti-bullying program was introduced to schools in 2009, between the last two assessment points. When the analysis were conducted only for schools which have used KiVa-program, the results remained the same and no changes were detected between 2005 and 2013. Figure 10 presents the percentages of bullying perpetrators and victims in 2005 and 2013, before and after the anti-bullying program.

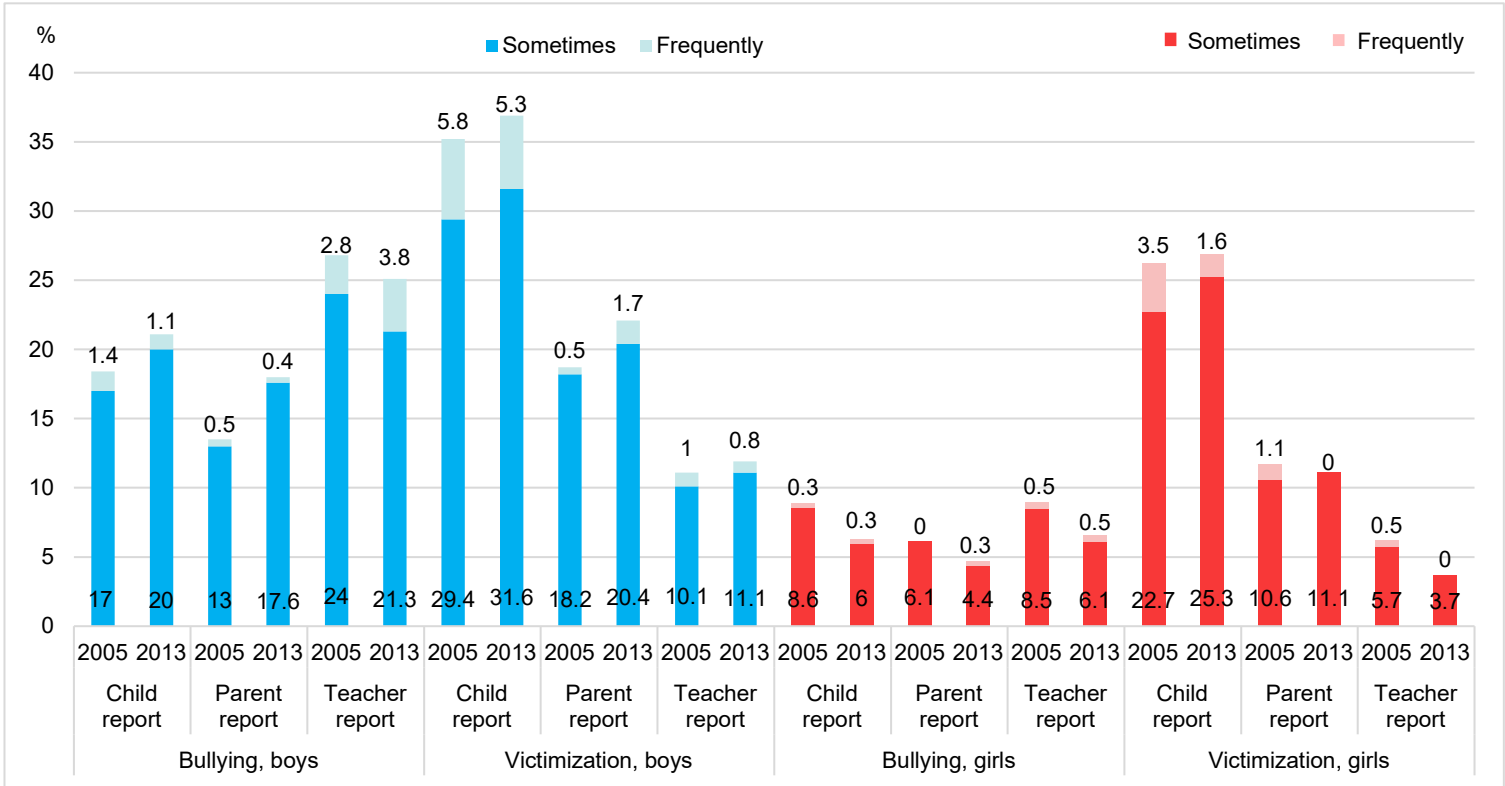


Figure 10. Percentages of boys and girls who were bullies or victims sometimes or frequently, based on child, parent and teacher reports. Only those schools were included which had used KiVa anti-bullying program. The percentages for the "sometimes" category are shown at the bottom of the bars and the percentages for the "frequently" category are shown above the bars.

5.4 Children's loneliness over 24 years (study III)

5.4.1 Prevalence changes in children's loneliness and friendships

Figure 11 shows the percentages of loneliness in boys and girls for different assessment years. Children's loneliness was common and about 20% of both boys and girls reported being lonely often or always at every time point. Thus the trend was stable. About 5% of children reported that they were always lonely. However, there were some differences between how serious their loneliness was: boys reported always being lonely more than girls and girls reported being lonely often more than boys. The regression analyses confirmed the results, as when the associations between the assessment years and loneliness were studied, there were no significant changes between consecutive years or between 1989 and 2013 in children's loneliness (Figure 11).

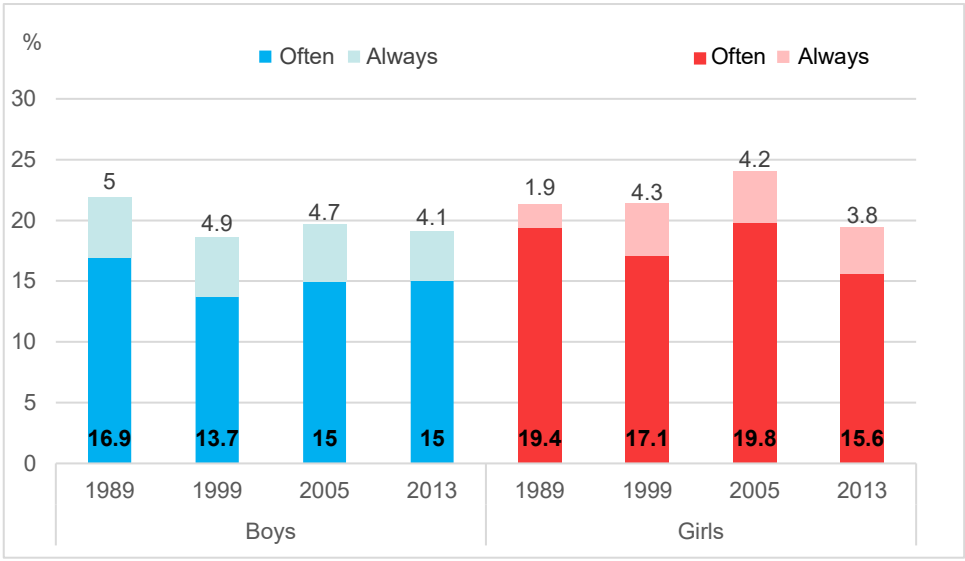


Figure 11. The self-reported percentages of children who were often or always lonely at different time points. The percentages for the "often" category are shown at the bottom of the bars and the percentages for the "always" category are shown above the bars.

Children also reported that the amount of friends they had was stable and no significant changes between different assessment years were found (Figure 12). About 25% of children reported that they had some friends, but they wished they had more friends. When parents and teachers were asked the same question about the amount of friends the children had, the percentages of lack of friends were higher

than in the children's reports and these varied from about 30% to 40% in different years for both the adult informant groups (Figure 12). This highlighted a disagreement with regard to the child's friendships between the different informants and significant disagreements were found both between child-parent and child-teacher pairs (Table 10). The parents' reports also differed significantly when it came to girls and boys (p <.001), as they reported that smaller percentage of girls had lack of friends compared to boys.

Table 10. Measures of agreement on the child's friendships between different informant pairs.

	Measures of agreement	
	Weighted Kappa	Agreement difference, *p*-value
Informant pairs		
child-parent	0.2073	<0.001
child-teacher	0.1629	<0.001
parent-teacher	0.3451	0.4176

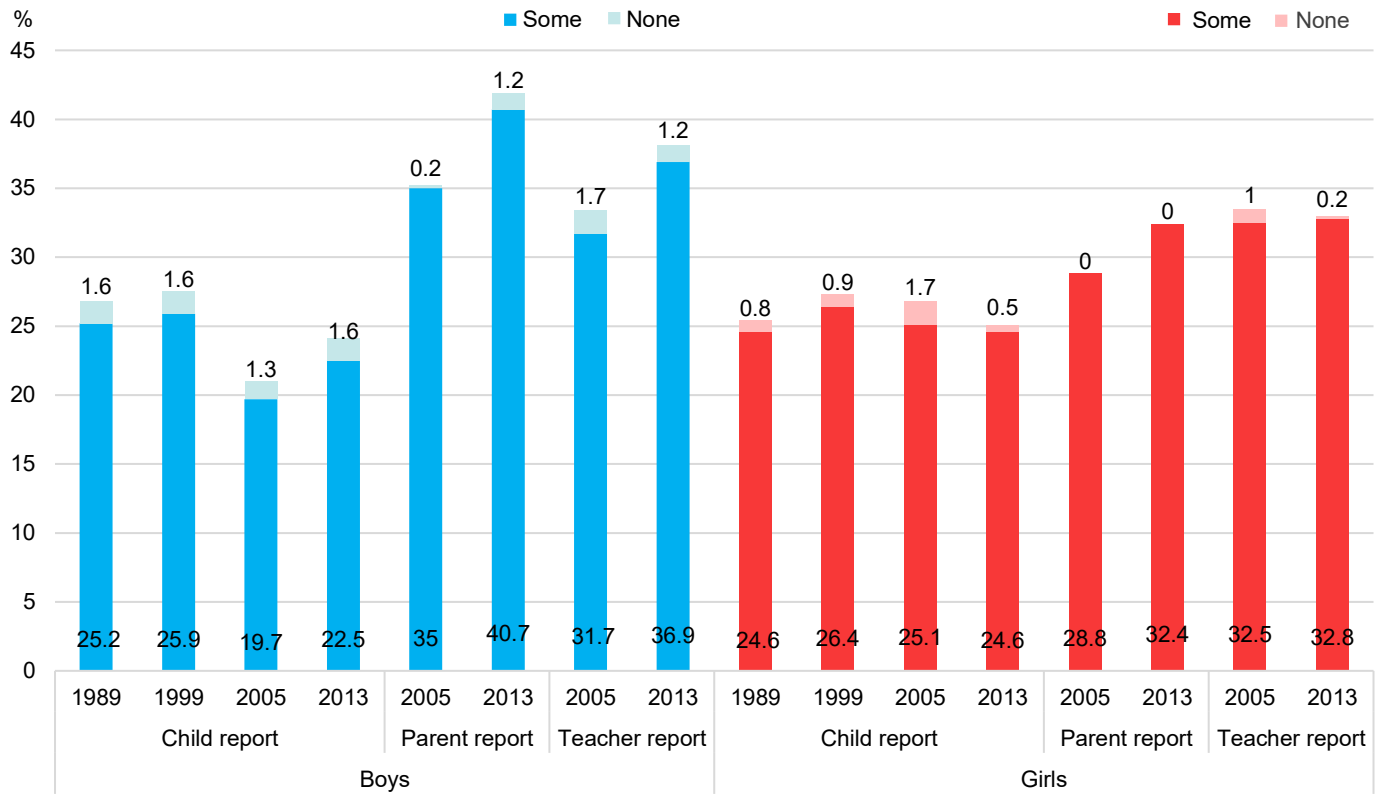


Figure 12. The self-reported percentages of the amount of friends children had at different time points and parent and teacher reported percentages of the amount of friends children had at the last two time points. The percentages for the "some" category are shown at the bottom of the bars and the percentages for the "none" category are shown above the bars.

5.4.2 Association between family and psychiatric factors and children's loneliness

Figure 13 shows the odds ratios and 95% confidence intervals of the associated factors for children's loneliness and it compares children who were often or always lonely to children who said they were not lonely. The association was significant if the confidence interval is shown as under or over a score of one. When the association between explanatory variables and loneliness was studied one variable at the time, all the psychiatric symptoms (namely conduct problems, emotional problems and hyperactivity), family structure, mothers' and fathers' education for both sexes and negative life events for girls were significant in the single predictor model. Two intermediate models were also created, one for psychiatric variables and one for family related variables. The final multiple regression model included all the significant variables from the intermediate models plus the year variable. This showed that conduct problems, emotional problems and hyperactivity were independently associated with loneliness among the boys and family structure, conduct problems and hyperactivity among the girls (Figure 13).

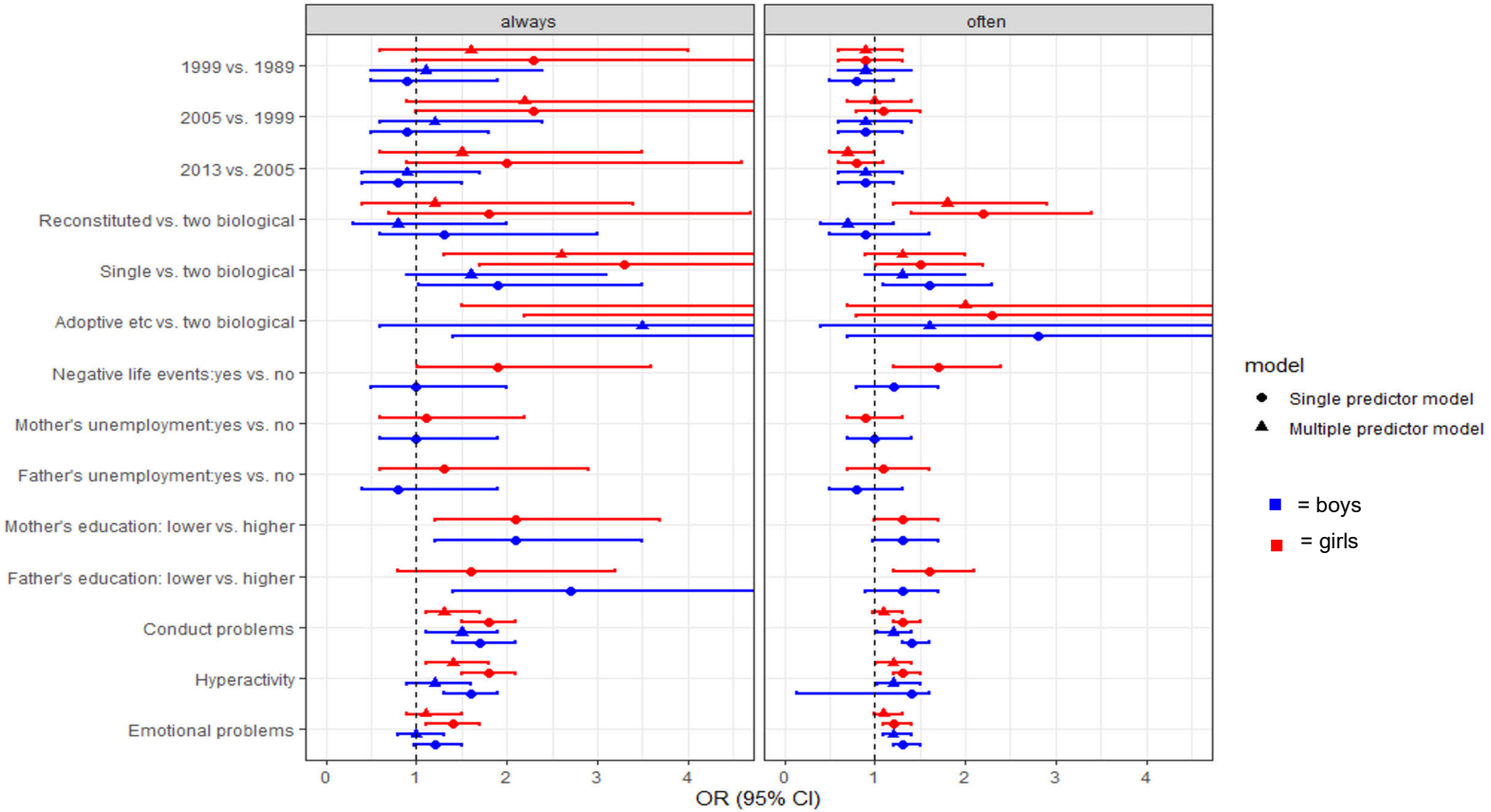


Figure 13. The association between explanatory variables and children's self-reported loneliness for boys and girls in single predictor and multiple regression models. The multiple regression model included all significant variables from the intermediate models, plus year variable. OR = odds ratio, CI = confidence interval. The reference category for loneliness was "Never lonely". The ORs reflect the change of the standard deviation for continuous psychiatric explanatory variables.

5.5 Children's considered and actual use of mental health services over 24 years (studies I and II)

5.5.1 Changes in considered and actual use of services among the whole study population

Figure 14 shows the percentages of considered and actual use of mental health services, separately for boys and girls and for both sexes together. These were based on reports from parents and teachers. The considered and actual reported use of services because of the child's conduct and emotional problems increased in nearly every assessment year both for boys and for girls. For the pooled sexes, considered service use increased from 6.6% to 10.0% and the actual reported use of services increased from 2.4% to 11.0%. The increase in actual service use was particularly remarkable from 1989 to 2013: for boys it rose from 4.2% to 15.1% (OR 6.1, 95% CI 3.2-11.5) and for girls it rose from 0.9% to 6.1% (OR 12.4, 95% CI 3.5-44.2). The increase for considered service use from 1989 to 2013 was not so considerable as the actual services use among boys, but the increase from 9.2% to 11.6% (OR 1.9, 95% CI 1.2-3.1) was still statistically significant. Considered service use for girls increased from 4.1% to 8.1% (OR 2.6, 95% CI 1.3-5.0) from 1989 to 2013.

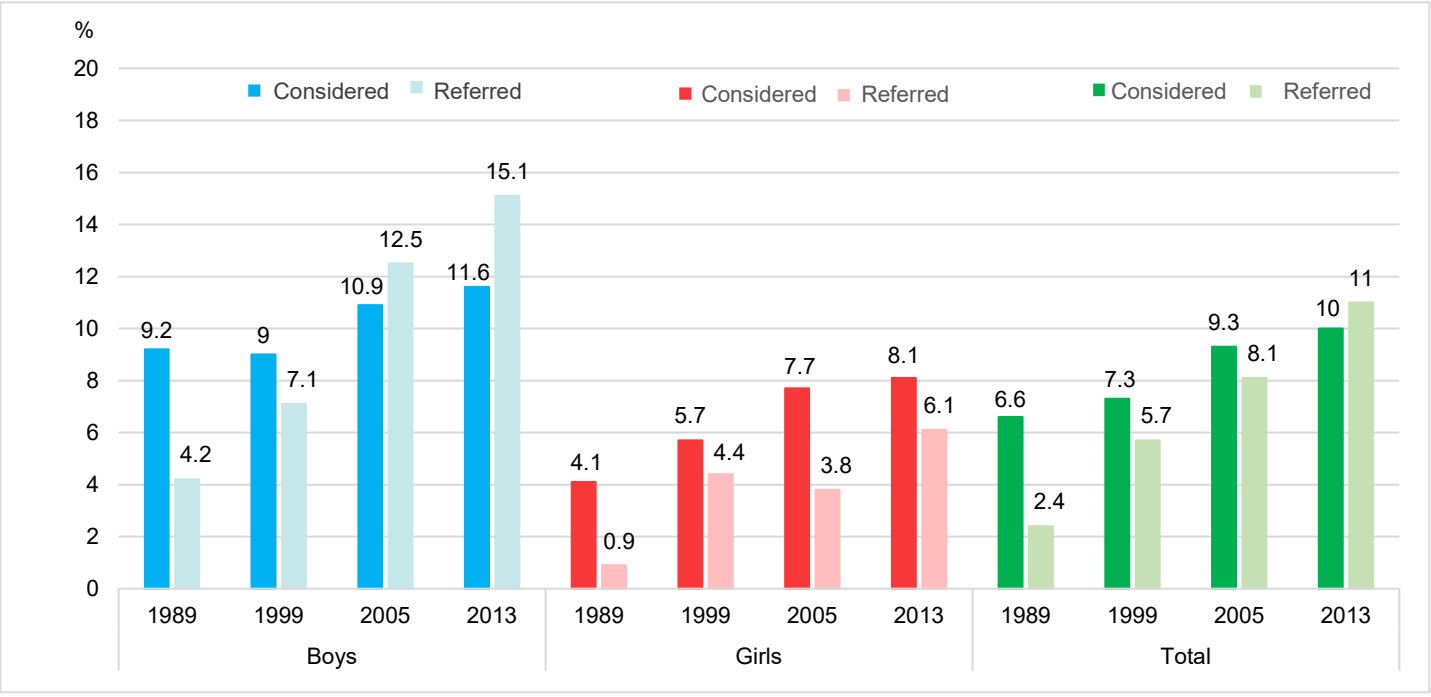


Figure 14. Parent and teacher reported percentages of children who were considered to need mental health services and parent-reported percentages of children who had actually used mental health services at different time points. The percentages for the "considered" and "referred" categories are shown above the bars.

5.5.2 Changes in considered and actual service use among children with different numbers of mental health problems

Figure 15 combines teacher and parent reports to presents the percentages of service users broken down by children with no problems, those with problems in one psychiatric symptom domain and those with comorbid psychiatric problems. The percentages of children who were reported to have used services increased from 0.7% to 4.1% among children with no problems, from 2.9% to 24.1% among children with problems in one domain and from 18.3% to 50.7% among children with comorbid problems. However, in 2013, the percentages of children who had not used services, and whose parents and teachers had not considered their need to use services, was still 31.3% among those with comorbid problems and 50.4% among those with problems in one symptom domain. Children who belonged to "no problems" group, were subsequently judged to have no issues based on cut-off scores and might still have some problems, which explains the use of services in this group.

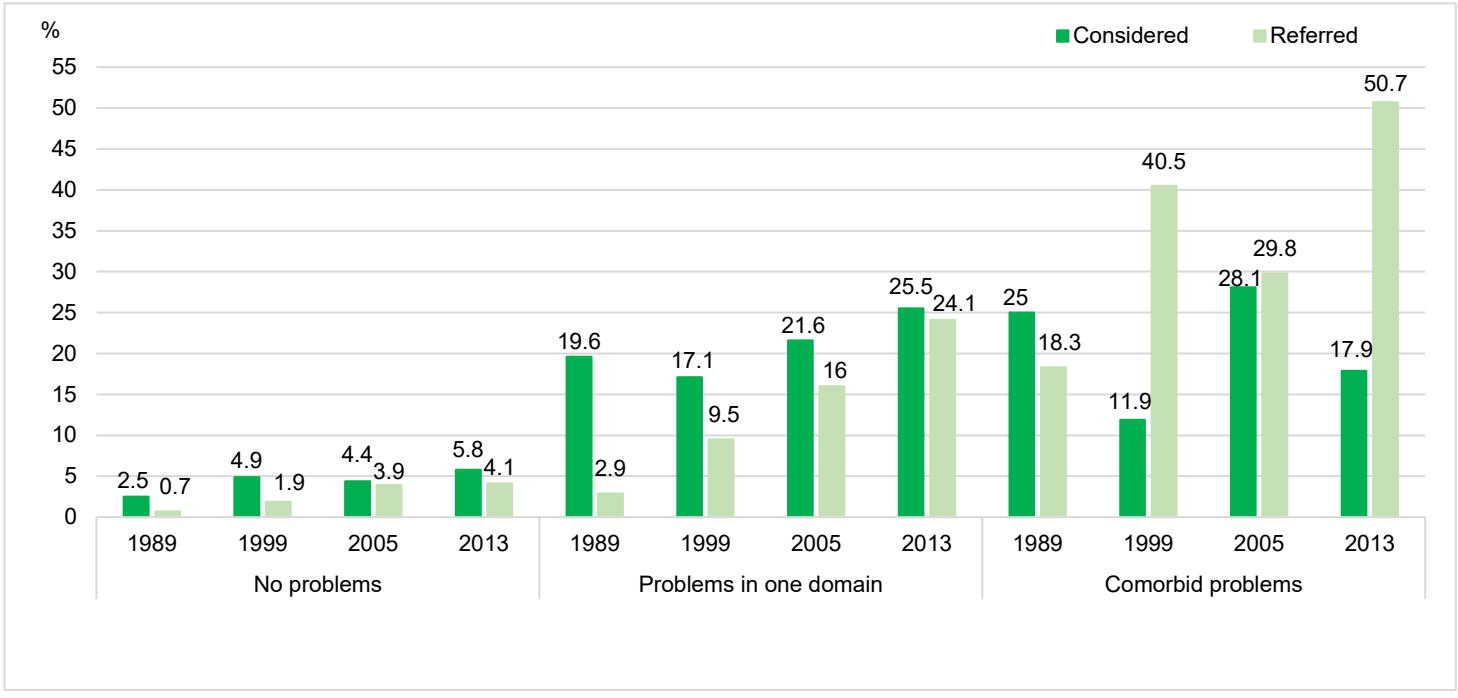


Figure 15. Different psychiatric problem groups at different time points. Based on percentages of parents and teachers who had considered to use mental health services for child and parent-reported percentages of children who had actually used mental health services at different time points. The percentages for the "considered" and "referred" categories are shown above the bars.

When the children's problems were assessed with the total Rutter scores, there was an increase in actual reported service use from 10% in 1989 to 38% in 2013 (p <.001), among children who scored above the 10% cut-off points in the parent or teacher scales (Figure 16). The percentages increased from 33% to 61% among children who were above the cut-off points for both the parent and teacher scales. Being above the 10% cut-off indicated more severe psychiatric symptoms.

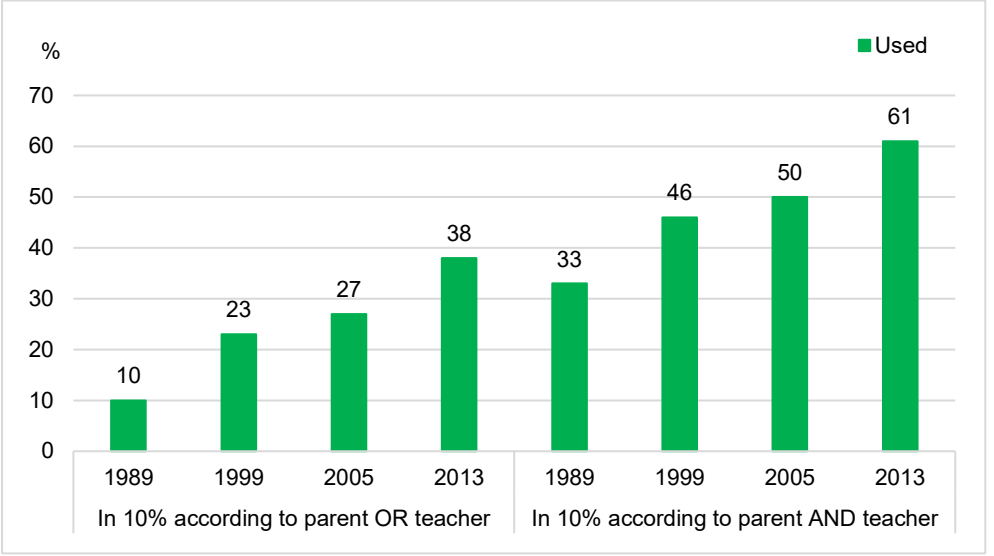


Figure 16. Percentage of children who had been reported to use services based on children scoring above the 10% cut-off points in the parent and/or teacher scales. The percentages for the "used" category are shown above the bars.

5.5.3 Changes in service use among children who were symptomatic in one psychiatric scale according to different informants

Finally, considered and actual reported service use was studied with regard to the different psychiatric symptom domains and according to different informants. When the psychiatric scales were studied separately, children who had problems, according to both their parents and teachers, had the strongest association with considered and actual service use compared to those with no problems. In addition, when only parents and only teachers reported high scores in different subscales, those scores were associated with service use. We also looked at what happened when we compared both informants reporting high scores with just high scores from teachers or just high scores from parents. This showed that the scores remained significant predictors of actual reported service use in every subscale. These results verify the findings that both parents' and teachers' reported problems lead to seeking help for

the child, but help is more likely to be sought if the child is having problems at both home and at school.

5.5.4 Association between family and psychiatric factors and children's considered and actual use of mental health services

Associations between the explanatory variables and considered and actual mental health service use were studied. One analysis was adjusted for just the study year and another analysis was adjusted for the study year and the child's sex. Figure 17 shows the odds ratios and 95% confidence intervals for these associations. The assessment year was significantly associated with both considered and reported service use. The similar ORs in both of the adjusted models and same significant variables, which were the child's sex, family structure, mothers' education and employment status, fathers' education and all psychopathology scales, indicated that the study year did not affect the association between other variables and service use. We also examined all the variables in a full multivariate model, with the exception of the mothers' and fathers' employment status, because that information was not asked in 1989. This showed that almost all the remaining factors, namely all psychiatric scales, assessment year, child's sex and family structure, were still independently associated with considered and reported service use (Figure 17).

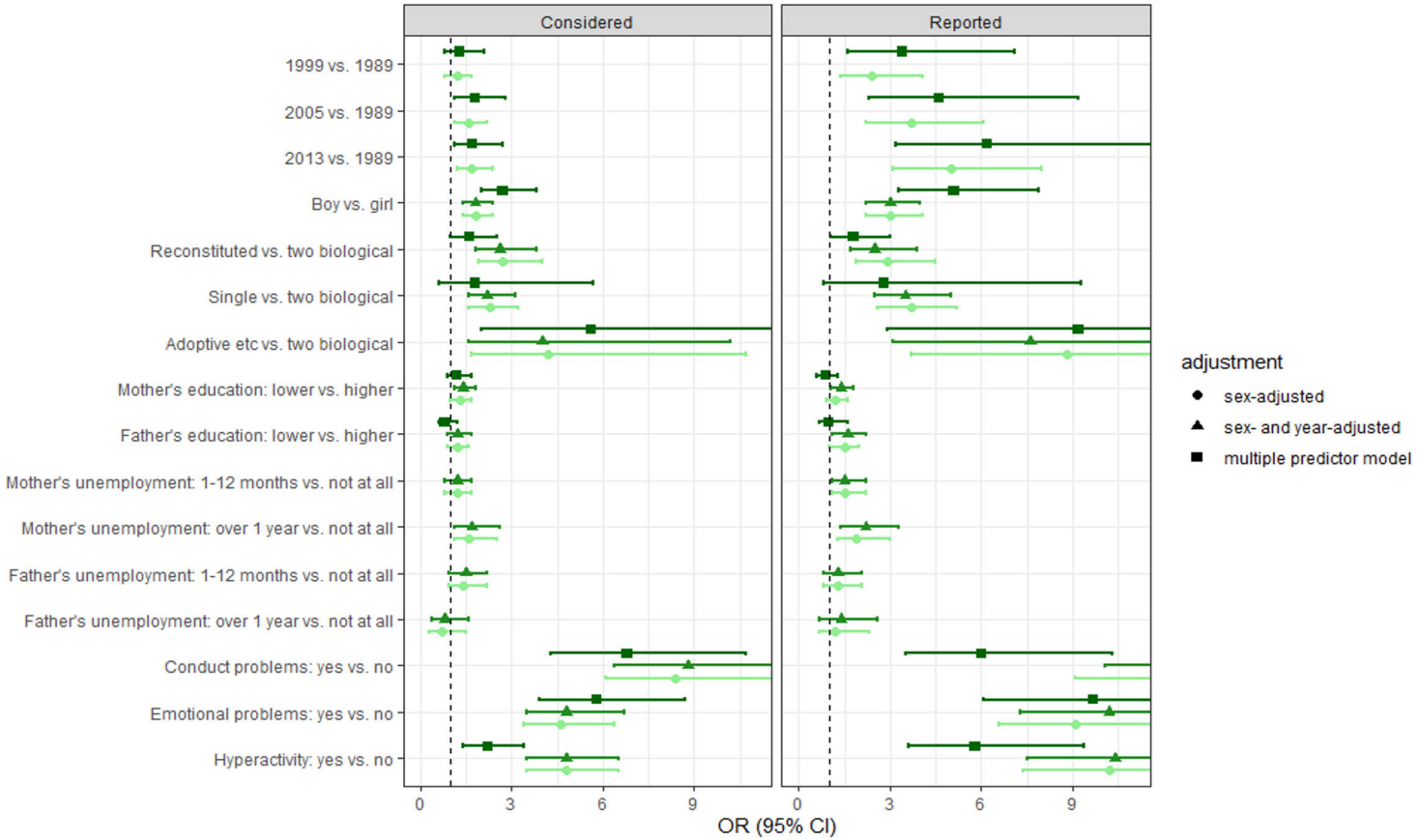


Figure 17. Associations between explanatory variables and considered and reported service use, based on multivariate models adjusted for year, for year and sex and for all other significant explanatory variables. OR = odds ratio, CI = confidence interval. The reference category for service use was “no considered or referred”.

6 Discussion

6.1 Main results of the study

This thesis examined changes in children's psychiatric symptoms, bullying behavior, loneliness and mental health service use over the 24-year period from 1989-2013. It showed only minor changes in the prevalence of psychiatric symptoms, a decrease in bullying behavior, a stable level of loneliness and a substantial increase in service use. No increases in conduct problems, emotional problems and hyperactivity were reported by parents and teachers when first and last assessment poinst were compared over a period of 24 years. However, considered and reported service use, because of the children's emotional and behavioral problems, constantly increased at every assessment year. Over the study period the reported use rose by almost four times among boys and six times among girls, thus those increases did not correspond to the stable levels or decreases seen in psychiatric symptoms. The increase was also seen when service use was investigated in different problem groups.

Both bullying perpetration and bullying victimization decreased among boys and girls according to their parents, but, with those exceptions, mainly stable trends were seen over the 24-year period. However, no significant changes occurred during the last two assessment points, in 2005 and 2013, despite the national anti-bullying program KiVa, which was launched in 2009 in almost every participant school. Children themselves reported much higher rates of being victimized by bullies than their parents and teachers, but the measurements of bullying involvement for children differed from the ones used by parents and teachers. Children's loneliness was common and stable during the whole study period, which meant that about 20% of children were lonely at every time point and 25% of children wished they had more friends. There was a disagreement between the reports from children and adults with regard to the child's friends, with both parents and teachers reporting that the children has fewer friends than the children themselves.

6.2 Discussion of study methodology

6.2.1 Study procedure and design

Four different issues need to be assessed when considering the quality of study designs used to measure changes in the prevalence of mental health. The first is how comparable the different datasets are in terms of measures and samples. The second is how well the study represents the whole population. The third is how the study takes into account the challenge of changes in reporting. The fourth is how hypothesized explanatory factors, such as sosioeconomic status, family structure and sex, are taken into account (Collishaw, 2015). All the sub-studies in this thesis used population-based, cross-sectional questionnaire data that were collected from 8-9-year-old children using similar study procedures and methods at the four time points. The study design incorporated many features of qualified time-trend studies. The advantages were the long time period of 24 years, multiple assessment points, three different informants who assessed the same phenomenon, the same geographical study area and identical measures used at every time point. The studies also included information on other explanatory variables. However, because of the long time period of 24 years, some changes may have occurred with regard to the data collection and processing that could have led to differences in the datasets at different time points. These could have included changes with regard to legislation, the guidance that the teachers, parents and children received on how to complete the questionnaires or carry out the study, the data entry processes and the statistical analyses. In addition, some changes in schools and school districts took place during the study period, as some schools were closed down or combined with other schools and some new schools were established. However, these changes were small and the effect they had on the datasets from the different years were probably non-existent.

The study focused on the Turku University Hospital area in South-West Finland. Municipalities covering urban, suburban and rural areas were included and the study sample was representative of the target population. Therefore, the results could be generalized into the population in the area of South-West Finland. However, in order to generalize our results to the whole Finnish population we would have to take into account variations in different parts of the country, for example the availability of existing mental health services. However, when comparing the results of total LAPSET-study data of 1981 birth cohort including almost 6000 children from all hospital districts (Almqvist et al., 1999b) to the results of the subsample of 1981 born children from Turku University Hospital district, the mean scores for mental health problems seem quite similar. Thus it can be thought that the results of the time-trend study could be somehow generalized also to a wider area of Finland. The participating schools were the same at every assessment year with the exception of

the small changes mentioned above. Turku was the only municipality where not all schools belonged to the sample and thus it could be speculated if it is possible that certain school districts have changed during study period so that the population living in that area is different than previously. Despite this, the sample from Turku was comprehensive covering about half of the schools from that area and it could be assumed that changes in population in certain school districts have no effect on the results.

The data were collected from three informants, which means they provide important information on children's mental health problems from different perspectives. It also makes the interpretation of children's situation more reliable, as the agreement between different informants, especially children and adults, has been shown to be quite low (Koskelainen et al., 2000; Angold et al., 1987) and a wider perspective is useful. However, the reports of the different informants were not totally comparable in these studies, as the assessment periods varied. For the parents it was mainly the past 12 months and for the children it was the past two weeks. No assessment time was specified in the teachers' questionnaire. This means that the time frame for when the problems occurred was different for the different informants, but as these differences were the same at all time points, they should not have had any effect on the time-trend comparisons. There was also variation in respondents in parents' questionnaire. The information on respondent was reliably available only in 2013 and 2005. The most often the respondent in 2013 was mother (67% of cases), second parents together (20% of cases) and third father (6% of cases). In 2005 mothers accounted for 79% of respondents and fathers 10% of respondents. It could be speculated, that mothers and fathers give different assessments on child's symptoms. Some studies show good interrater agreement between parents (Fält et al., 2018; Duhig et al., 2000), but according to some studies, mothers see problems more often than fathers (Luoma et al., 2004), and some other studies have also reported father's to report more problems (Davé et al., 2008). The parent ratings are also affected by personal charasteristiques of parents, such as his/her mental health problems (Luoma et al., 2004; Treutler & Epkins, 2003). Also the child's sex may affect to the assessment of parent (Jensen et al., 1988). If the distribution of respondent of the parent questionnaire has varied a lot between assessment time points in this study, it can have some effect on the study results, but it is quite speculative to assess the direction as the study results of parent's agreement are contradictory.

The data were collected using questionnaires for general population. Using questionnaire-based data always includes the uncertainty of how respondents understand and interpret the questions, but any possible bias is likely to be random and similar for every assessment year. The advantages of using questionnaires are that they offer anonymity as the questionnaire is filled faceless, compared with, for

example, interview studies. This means that people can maybe answer more honestly, without fear of being judged for their responses. This may reduce the stigma they are experiencing. Children filled in their questionnaires during school lesson. It could be speculated, if the environment was safe enough to answer to the sensitive questions. If feeling shame or fear that others will see the answers affected to the answering, it could be that some adverse phenomena are underreported. However, the situation has been the same at every time point. Children sealed the questionnaires into the envelope by themselves, which was the idea to increase the privacy of children's answers. Using questionnaires can also save time and money, as there is no need to train and use interviewers. Questionnaires can also provide wider data on the prevalence of mental health symptoms in the general population than registry-based studies, because registers only record information on people who have actually sought help. For example, registry-based studies may not include people who have not sought help for mild symptoms or because of stigma.

This study included also an unique possibility to study changes in bullying perpetration with a design akin to a natural experiment, as the anti-bullying program KiVa was launched in 2009, between the two last assessment points. Natural experiment is one kind of cohort study design where individuals are divided into exposed and unexposed groups, but it differs from ordinary experiment as the individuals are not assigned to these groups by investigator. Instead, the division is made by chance or at least it is hardly in control of the affected people (Schwartz & Susser, 2006).

6.2.2 Study methods and measures

The same study methods and questionnaires were used at every time point. The Rutter parent and teacher questionnaires and the Children's Depression Inventory that were used in these studies are all validated and internationally used questionnaires that measure child's psychiatric symptoms. The questionnaires have also been translated into Finnish and have been validated in Finland (Kresanov et al., 1998). Validation studies of Rutter parent and teacher questionnaires are slighly older (Pereira et al., 2008; Berg et al., 1992), but CDI questionnaire has been validated in the 2010s for example in Japan and Portugal showing still good validity (Ozono et al., 2019; Bento et al., 2013). The cut-off scores used for total scores of Rutter parent and teacher questionnaires and CDI have also been investigated using Receiver operating characteristic (ROC) analysis (Kresanov et al., 1998; Berg et al., 1992). An addition their validity has proven to be good as their estimates on psychiatric difficulties at age eight have studied to independently predict later psychiatric symptoms (Sourander et al., 2005). Thus, the data should provide quite

reliable information on the children's psychiatric symptoms, which was the main study interest in this thesis.

The items that had the highest scores in Rutter parent and teacher questionnaires and in Children's Depression Inventory were approximately the same at every assessment point. This also indicates that the questionnaires have measured the problems in similar way during the study period.

However, the study methods did have some limitations. First, the validated questionnaires did not cover all the outcomes of interest to the study. Only single direct questions were used for bullying perpetration, bullying victimization and loneliness and no definitions for these phenomena were presented in the questionnaires. Therefore, we could not identify different aspects of bullying, namely traditional, cyber, direct, indirect, physical, verbal or relational bullying. It also meant we could not differentiate between social and emotional loneliness. On the other hand, some sources also favor the simplicity of one direct question and the advantage of this study was that these questions were also asked in a similar way in every assessment year. For example, the single question on loneliness has been found to have similar reliability and validity to measures of loneliness that use multiple items (Bowling, 2005; Russel, 1982) and association between loneliness and health has studied to be similar whether the loneliness has been measured with single or multiple items (Eccles et al., 2020). It is important to keep difference in measurement methods in mind when comparing our results with other studies that focus on these outcomes. Second, some of the questions were not included in the questionnaires at every time point. This was because the interests of the researchers changed or grew over the long study period. Thus, interesting information on all covariates was not available for every assessment year.

The dataset of this thesis did not provide information on the real diagnoses of the children's mental health problems, as it focused on questionnaire reports from the three informants. These real diagnoses have been increasing for example because of changes in the diagnostics and treatment of children's mental health problems. However, increased knowledge and maybe more positive attitudes towards mental health problems can increase the ability to recognize, and the willingness to report, these problems. This can increase how many people seek help and subsequent diagnoses. It is, therefore, impossible to verify if the observed changes in the prevalence of mental health problems are because of these factors. However, we did control the results for confounding factors, such as the child's sex, family structure and the mother's and father's education and employment status, which was used to represent their socioeconomic status. Nevertheless, it is impossible to be sure if every potential factor was included in the analysis and measured adequately (Rutter & Smith, 1995).

The statistical analyses methods were selected so that they were comparable with previous studies. This enabled us to compare the results in this thesis with previous studies done using part of the same dataset (Sourander et al., 2008; Sourander et al., 2004) and with other time-trend studies that used the same, or similar, questionnaires and focused on comparable ages and target populations (see tables 1 to 3 and 5). The relatively discrete distribution of some variables, notably the Rutter subscales, raises a question about whether using analysis methods for continuous variables are suitable for these variables. That is why categorical variables have also been used, along with suitable analysis methods. The confounding factors were taken into account by using them as covariates in the logistic models and analysis of variance. When we examined the associations between the explanatory variables and loneliness or service use, it was not possible to identify any causal relationships, because of the cross-sectional nature of the samples.

6.2.3 Sample and participants

At every time point in the study, about 1000 children and their parents who were living in selected study areas were contacted with the help of teachers. The sample size was large enough to use the statistical methods that were needed for a study like this. Even though the response rates were high at every time point, the attrition rate increased with each assessment year. The increasing number of non-respondents is a phenomenon that has been seen in many questionnaire-based studies in previous years. Unfortunately, we did not have any information about the children and parents who did not answer the questionnaires or those who refused to let the child and, or, the teacher fill in the questionnaire. There has been some debate about whether those families with the most problems are also the most unwilling to participate in studies (Anckarsäter et al., 2011). Taking this into account, together with the increased attrition rate, it could be assumed that the number of children with problems was under-represented in the later assessment points. Also, the growing number of immigrants may have increased the number of non-respondents in the later assessment years, as the questionnaires were only in Finnish. This might have created some kind of bias. If we had managed to collect fuller data, the number of children with reported problems could have been higher than detected at the later assessment points. However, the response rates can still be regarded high.

According to official statistics, the participants were also representative of the general population in the target area. The number of boys and girls were equal at every time point. The percentages of children who had compeleted questionnaires from all three informants varied from about 66% (in 1999) to 94% (in 1989). The low percentage in 1999 is possible explained by the technical error, which happened that year and why almost 200 children's questionnaires could not be linked to

parents' and teachers' questionnaires. This technical error is however thought to be random. Missing questionnaires from some informants may also be explained by insufficient language skills to complete the questionnaire, by being away from school on the day others filled out the questionnaires or simply by an unwillingness to participate in the study.

6.3 Discussion of study results

6.3.1 Trends in psychiatric symptoms reported by parents and teachers

Our study showed that the common childhood psychiatric symptoms reported by parents and teachers did not increase during the 24-year study period when comparing assessment years 1989 and 2013. Instead, there were decreases in the conduct and emotional problems that parents reported for boys and the emotional problems they reported for girls. As previously pointed out (see 6.2.3), the attrition rate was low at every assessment time point, but it increased with time. This may have decreased the prevalence of children who had problems in later years, if it is assumed, that having problems decreases people's willingness to participate in studies.

The results related to conduct problems were in line with many other trend studies (see Table 1) that showed declining rates of conduct problems (Sawyer et al., 2018; Langley et al., 2018; Sellers et al., 2015; Henriksen et al., 2012; Sourander et al., 2008). As the parent reported conduct problems decreased among boys, and the girls' symptoms stayed at the same level, the gap between the sexes narrowed. The same phenomena have been seen in other studies, which have reported greater changes in boys' conduct problems or other psychiatric symptoms and the convergence of mental health problems in boys and girls (Sellers et al., 2015; Achenbach et al., 2003; Sourander et al., 2004). It is generally considered that conduct problems are more common in boys and emotional problems are more common in girls and that trend was also partly seen in our study. However, it possible that this division has become less clear as behavioral patterns have widened, role expectations have changed and it is more acceptable for boys and girls to express all kinds of emotions. The declining in parent reported conduct symptoms among boys occurred mainly between 1989 and 1999 and symptoms then stayed fairly similar during other assessment years. There was also decrease in teacher reported conduct problems among boys between 1989 and 1999. The decrease might be explained by the fact that the study procedure was different in 1989 than 1999. No consent was required from parents and the data collection was organized across whole country even though only the dataset from South-West Finland was used in these analyses.

It has also been speculated that the decrease in conduct problems may be because of parents' increased educational level and also increased focus to psychosocial health in Finnish school health services (Sourander et al., 2008). Also the increased service use may have decreased the problems.

Parent reported emotional problems decreased among both boys and girls. Some previous studies have also shown declining trends (Pitchforth et al., 2019; Sellers et al., 2015) in children's emotional problems. A review by Costello et al. (2006) concluded that epidemiological studies have not shown increases in depressive symptoms in children, even though many studies have shown increasing rates in emotional problems among adolescents. This is not surprising, as the onset of depression increases in puberty (Thapar et al., 2012; Angold & Costello, 2006). Thus, the perceived increasing use of antidepressants, and the number of diagnoses for depression in Finland and many other countries, may reflect the increase in symptoms among older populations, rather than among children. An interesting finding of our study was that, at the same time that parents reported that emotional problems had decreased among both boys and girls, there was an increasing trend in girls' self-reported depressive symptoms during study period. It is frequently speculated that other people, such as parents and teachers, may find it difficult to detect children's internalizing problems, such as anxiety and depression. That is why self-reports are needed. They provide an important addition to the assessment of psychiatric problems, even among young children like the boys and girls in our study. Similarly with conduct symptoms, decrease in parent reported emotional problems among boys occurred mainly between years 1989 and 1999, while for girls the decrease was more even.

The hyperactivity and attention problems reported by parents and teachers showed stable trends during the 24-year study period when comparing the first and last assessment time points. This was in line with the meta-regression analysis by Polanczyk et al. (2014), which concluded that there had not been any increases in the diagnosed prevalence of ADHD in children over three decades. However, some changes were seen in teacher reported mean values of hyperactivity among boys and parent reported mean values of hyperactivity among girls. Among boys, hyperactivity decreased between 1989 and 1999 and then increased between 1999 and 2005. Among girls, there was an increase between 1989 and 1999. Most of the studies presented in Table 1 showed also decreasing or stable trends and only three studies showed increases in hyperactivity. However, ADHD diagnoses and medication use have increased considerably in Finland and many other countries, in line with the increased use of medication for depression. A number of factors may explains this trend. The diagnostic definition has improved and specialized health care may be reaching ADHD cases better than before, which has driven the increase in the number of ADHD cases. Alternatively, children may have become more

vulnerable to the neuropsychiatric development and the actual incidence may have increased. This vulnerability may results from the fact that preterm children are now surviving at even younger gestational ages and this has resulted in lower birth weights and lower levels of neurodevelopment (Sucksdorff et al., 2015). In addition, parents are having children at the older age and their medication taking for depression has increased. That can cause neurodevelopmental problems for children, because fetuses are more likely to be exposed to them in the womb (Collishaw, 2015; Frans et al., 2013; Rai et al., 2013).

As a concensus, our results on children's mental health changes are somehow in line with other time-trend studies, which have used similar questionnaires and participants of the same age. However, there can still be differences in the study methods used by various researchers. This complicates comparisons between studies. Results from different countries may also reflect cultural differences and the different time periods when studies were carried out can also be a factor. However, the studies that have been published do not provide overall support for the view that children are doing worse than previously. This partly incorrect view has been widely presented in media, in the talk of general population and voiced also by some educational and health care professionals. The reason behind these views, or assumptions, might be that people are now more aware of psychiatric problems, not that the actual levels have increased. For example, teachers and parents may be more likely to notice and recognize these problems in children and this may increase also the conversation about those problems. Some studies have also stated that the definition of "normal behavior" has become tighter and that behavior that was previously seen, and approved, as normal is not thought to be normal anymore (Collishaw, 2015). It has also been stated that there has been polarization in the wellbeing of children, meaning that the difference between those who are doing well, and those who are not, is wider than previously. For example, children with mental health issues have more serious symptoms. One way to measure polarization is to test the differences in the variance of symptoms at different time points (von Soest & Wichstrøm, 2014). This was not tested in our study, but standard deviations of children's psychiatric symptoms did not differ much between the different assessment years, which indicates that there would not have been much differences in variance either. Also the number of children scoring above the cut-off points did not increase, indicating that the gap between children's wellbeing had not increased.

One considerable reason for the view or assumption of increased number of problems is changes in the school environment and the experience of going to school. School world has changed during our study period in Finland and for example, the national core curriculum in basic education changed twice during the study period, in 1994 and 2004. The changes in 1994 made schools more interactive and increased schools' and teachers' decision opportunities (Rokka, 2011). In 2004, reforms to the

curriculum underlined, among other things, children's rights to receive teaching and support that is targeted to their developmental level and needs, the development of special education and the use of new techniques (Holappa, 2007).

There were a number of changes during the 1990s, and at the beginning of the 2000s, such as the inclusion of children with special education needs in mainstream classes and schools. Some special schools and special classes were also disbanded (European agency, 2020). The aim of this transformation was that the resources needed by children with special needs would be provided in mainstream classes and schools. However, according to some references (OAJ, 2020; OAJ, 2017), the necessary resources have not followed the children, which has created a clear burden for the teachers for example in the forms of increased workload and bureaucracy and lack of professional skills (OAJ, 2017; Pesonen et al., 2015). The support system also changed along with the curriculum changes. In 2011 a new three-stage support system was launched: general, intensified and special. According to this support system, children who have been assessed as needing special support should have a personal plan that specifies how their teaching should be organized. This naturally requires more resources from teachers. At the same time, the reforms suggest that teaching should be more tailored to individual needs, including both talented children and those who need more help. The trends of making children repeat a year if they have fallen behind or postponing the school start are descending. It can be thus concluded, that the role and practical work of teachers has changed. There has also been a lot of discussions about teachers' legal rights and responsibilities in classrooms and in schools. The increased use of technology, smart devices and systems in teaching, students' increased use of technology and new virtual communication systems between teachers and parents, have opened up lots of possibilities. But these changes can also be time consuming, place a burden on teachers and cause disorder and attention problems in classes. This suggests that all these changes have placed more demands on teachers.

The use of mental health services, and the diagnosis and medical treatment of psychiatric problems, have increased, but the symptom levels have stayed fairly stable or decreased. This somehow inconsistent situation may reflect changes in the impact that children's mental health problems have had on their ability to function and on their parents and teachers (Sellers et al., 2015). It may also reflect changes in awareness, recognition and seeking help. A previous study showed that, even if the mean number of symptoms among those children who experienced problems decreased over time, the impairment and distress at home and at school were more common in the later assessment years (Sellers et al., 2015). It has been said that children are now living in more demanding environments. These demands have been created by the rapidly increased use of smart devices and other technology, which have affected their school and leisure time. They have experienced increased stress

related to their school performance (West & Sweeting, 2003), and changes in media and culture have affected their social lives. Their parents are also facing a more demanding world, with issues such as less secure employment and social media and less concreate help from example grandparents because of decrease in communal living. These demands are likely to be one explanation for the view or experience of increased problems, as these days even milder symptoms cause problems and create a burden. It is also possible that the study outcomes with three answering alternatives did not reflect changes in the severity of problems or that increased service use has decreased the number of reported problems by parents and teachers.

Studying changes in the environment, such as socioeconomic and policy changes, can provide new ways to understand the demands that children and families are facing these days. It could also explain the obtained view of media of increases in children's mental health problems and the widely reported phenomenon that children's symptoms are more severe.

6.3.2 Trends in self-reported depressive symptoms

The LAPSET time-trend study that this thesis is based on is almost the only time-trend study to date that has studied children's self-reported emotional problems. Based on the results of the previous three assessment points of the LAPSET study (Sourander et al., 2008), namely years 1989, 1999 and 2005, and other time-trend studies that used adolescents' self-reports (Fleming et al., 2014; Torikka et al., 2014; Collishaw et al., 2010; Sweeting et al.,2010; Sigfusdottir et al., 2008; Tick et al., 2008), we hypothesized that there would be an increase in girls' self-reported depressive symptoms. However, no significant changes were found between last two assessment points and girls' depressive symptoms began to decrease after the 2005 assessment. The increasing trends that were detected in earlier years, namely years 1999 and 2005, compared to 1989, can be explained by a number of factors (Sourander et al., 2008). These include earlier puberty, increased pressure at school (Wiklund et al., 2012; West & Sweeting, 2003) and on physical appearance, which are more common for girls than for boys, and earlier exposure to sex than previously. They also include changes in media and culture (Sweeting et al., 2010), for example social media, which places different expectations on today's children than in the past (O'Keeffe et al., 2011). The changes that may have taken place during the 1990s and early 2000s may not have continued to effect the 2013 cohort.

6.3.3 General trends in bullying perpetration and bullying victimization

Bullying perpetration and victimization, reported by parents, decreased among boys when the results for the first and last assessment points of 1989 and 2013 were compared. The decrease had already taken place between 1999 and 1989 and remained in 2013 when comparing it with 1989. Self-reports and teacher reports did not show any significant changes in boys' bullying perpetration or victimization between the first and last assessment points. When it came to girls, parent and self-reported bullying perpetration and parent-reported victimization decreased between 1989 and 2013. Like boys, no significant changes were seen in the teachers' reports among girls. Thus, the largest changes were seen in the home environment, as the parent reports showed most often significant decreases both in bullying perpetration and victimization.

Other time-trend studies concerning bullying involvement have shown contradictory results with regard to trends and the results of our study were in line with those that showed declining rates, as detailed in Table 2 (Sarková et al., 2017; Chester et al., 2015; Vieno et al., 2015; Perlus et al., 2014; Shetgiri et al., 2013; Melzer et al., 2012). Declining trends may be explained by increased knowledge, awareness and interventions targeted at bullying, changes in society, such as increased maternal education, and policy decisions and legislative changes to counteract bullying involvement. The decrease may also reflect the declining trends in conduct problems that have been detected. The different aspects of bullying, including traditional and cyber-bullying were not defined in our study, which may complicate comparisons between studies. Many other time-trend studies have been carried out in schools using HBSC data, definitions of bullying and self-reports. This approach differed from ours, as we had three different informants, different environments where bullying could occur and direct questions on bullying perpetration and victimization, without any definitions in the questionnaires. This might make comparing our results with other studies difficult.

The difference in the prevalence of bullying victimization between informants was high. Teachers and parents probably reported bullying perpetration and victimization that were visible, such as direct physical or verbal bullying. Parents may have also reported bullying or arguing between siblings. However, teachers and parents only actually see a quite narrow part of the child's day and some kinds of bullying, such as indirect, relational bullying and cyber bullying, are more visible to the children themselves. In addition, being a victim is a subjective feeling, which others can find hard to detect. Children are also the only informants who experience and see both the home and school environments and probably also the cyber environment. That may explain why children reported much higher rates of

victimization than parents or teachers and why it is important to ask children questions about victimization when developing anti-bullying interventions.

6.3.4 Changes in prevalence of bullying perpetration and victimization before and after the nationwide anti-bullying program was implemented

Our hypothesis that bullying involvement would decrease after launching a KiVa anti-bullying program was not confirmed, as there were no significant changes in bullying perpetration or victimization between 2005 and 2013 among boys or girls. There could be a couple of explanations for this. First, the anti-bullying program used in the study schools focused on the school environment. As a result, it may not have been so effective when bullying happened in the home environment or during the children's free time and leisure activities. Second, educating children about bullying might increase reporting of the phenomenon without increase in the actual amount, which is called a sensitization problem (Frey et al., 2005). Third, the program might have been more suitable for older children and not had such strong effects on younger children. Fourth, the implementation of different programs has proved to be difficult and programs often change when they are implemented in real-life settings, as personnel do not follow the program's protocol (Haataja, 2016). That explains why real-life effects are generally not as good as in the research phase. It can also be, that even if the program was ostensibly in use in some schools, the real use of program could have been low. Fifth, the anti-bullying program did not focus on psychiatric factors and mental health problems, which have been strongly associated with bullying involvement. Alternatively, the program could have been missing some aspects of bullying, such as cyber-bullying. These could explain why the bullying did not decrease between the two last assessment points, but this finding still needs more examination.

These results were contradictory to the results among Finnish adolescents (Tiiri et al., 2020). In the study by Tiiri et al. the same "natural experiment" of KiVa program was taken place and there was a reduction in traditional bullying victimization before and after implementation of anti-bullying program. However, the cyber-victimization remained quite stable. One reason, in addition to older age, to explain the difference in the results of children and adolescent could be, that adolescents have most likely used the program for a longer time than children during their school years and are more assimilated with the program and its practices.

6.3.5 Trends in loneliness and its associated factors

As far as we know this was the first study to investigate changes in the prevalence of loneliness using the time-trend design and just data on children. The study results showed that the level of lonely children stayed the same at different time points, but it is worrying that 20% of children were lonely at every time point and 25% wished that they would have more friends. These results were not in line with those previous studies carried out among children and adolescents, which showed increasing trends in loneliness and a lower prevalence of loneliness than our study (Madsen et al., 2019; Peltzer Pengpid, 2016) and decreasing trends (Pengpid & Peltzer, 2020a&b, Chen et al., 2014). However, it has to be taken into account that we measured loneliness using just one question and that differed somewhat from the questions used in other studies. Also the small number of studies restricts the reliability of any comparisons. As discussed earlier, having problems may decrease the likelihood of people taking part in studies, which means that the number of cases of loneliness could have been underestimated in the later assessment years because higher attrition rate. Children can also be ashamed to admit they are lonely and that could decrease them from reporting it during studies.

Many factors can affect, and change, why children feel lonely. These can include changes in society, in the composition and lives of their families and in technological developments. Factors that can increase loneliness can include higher divorce rates, which mean that more children are not living in traditional two-parent families, widening income gaps between families, increased awareness of the phenomenon of loneliness and more time using electronic devices and the Internet. Economic recessions during our study period also decreased the activities and services offered to children and families and parents having a more demanding working life could increase loneliness. On the other hand, increased awareness of loneliness and other problems has also increased the number of interventions. In addition, social media and the increased use of technology have provided new ways for children to be in contact with others.

Same factors that can explain prevalence changes of loneliness, were also associated with loneliness in our study. Living in alternative family structures, rather than with two biological parents, increased the child's risk of being lonely. This may reflect the direct impact of the home environment or other factors that are associated with separation and divorce, such as lack of attachment and safety, parents' psychiatric problems, substance use in the family and reduced contact with relatives. Children's own psychiatric symptoms were also associated with loneliness. This means that they were closely linked, but it is not possible to make any assumptions on causality, concurrence or the possibility that loneliness was part of the psychiatric symptoms. Psychiatric illness may cause rejection and loneliness and being lonely and isolated from others may cause psychiatric symptoms, such as depression and

anxiety. These study results provide important information on loneliness for teachers, school nurses, social workers and doctors working with children and families. It encourages them to pay attention to children's loneliness when their parents separate or divorce and when a child has psychiatric symptoms.

6.3.6 Agreement between informants

In our study the children, parents and teachers evaluated the child's psychiatric symptoms, bullying involvement and friendships. As discussed earlier, emotional problems decreased over the study period, according to the parents, but the girls reported increases during the first three assessment points. When it came to bullying victimization, children reported much higher rates for being victimized than parents and teachers. Contradictory, parents and teachers reported more lack on children's friendships than children themselves.

All emotional problems, bullying victimization and experience of friendships are subjective and inner experiences and it can be difficult for others to see and identify them. This might explain why the informants disagreed about the prevalence of emotional problems and bullying victimization. Even though no change was seen in the amount of friends the children had according to any informant, children reported lower rates on lack of friendships. This might be because they felt embarrassed about being excluded by others and felt it was more socially desirable to say they had lots of or enough friends. It has been also speculated, that because mental health concerns may occur in different context, the agreement between informants can be affected by different factors. A meta-analysis by De Los Reyes et al. (2015) showed that things like informant pair, domain of mental health, and methods for measurement moderated magnitudes of observed agreement.

With regards to bullying victimization, the questions for adult and child informants were slightly different and this could explain the perceived difference in prevalence between adults and children as the adults only saw more obvious victimization. There were also differences in perceived changes, as parents were the only group to report significant, decreasing changes in victimization. In emotional problems, however, the disagreement has been different kind of, related to the direction of change.

6.3.7 Trend in use of mental health services

Children's use of mental health services because of emotional and behavioral problems increased during the study period, which was in line with previous studies (Olfson et al., 2015; Tick et al., 2008). As discussed earlier, this increase could be explained by increased awareness and recognition, reduced stigma, increases in the

number of services available and the increased burden child's problems have on caretakers or children, together with changes at school and in society as a whole. It has also been speculated that getting a child diagnosed with mental health problems has become more important, because it enables the parents and children to get some social or financial support for the child's problems or encourage schools to provide them a decision for special educational support. That could increase the number of parents who search for help. It is also possible that there is greater clarity now about what services are available for families and how they can reach these services. Chapter 2.5.1. described changes in the Finnish mental health service system. These changes definitely had an impact on the development of both increases and decreases in service use. One possibility is, that increased service use for children's problems reflects also increases in parents' problems as help for these problems may be searched via child.

However, according to our study, and to many other studies (Jansen et al., 2013; Zwaanswijk et al., 2011), there are still a great number of children and adolescents who have mental health problems who are not in contact with the relevant services. There have been a lot of discussions in the Finnish media about how difficult it is to get help for children's problems and this indicates that there is still a higher need for different kind of services. In particular, low-threshold services should be available at an earlier stage, when children are younger. This could reduce more serious problems at a later age. The positive development in the increased use of services is that service use has particularly increased among those children with the most severe problems or comorbidities. That development was identified by our study and many other studies.

If children had conduct and emotional problems, the parents were most likely to seek help from a child guidance clinic or child psychiatric services. School health services were also an important source of help. According to studies of adolescents, teachers were often approached for help (Feehan et al., 1990). This is understandable, as the connections, relationships and trust already exist between adolescents and teachers. In addition, the threshold for asking teachers to help may, in some cases, be lower than the threshold for asking someone they don't know for help. It is possible that the same pattern would be observed among younger children's parents, as asking their child's teachers for help could be one natural path. In our study, there were no option to choose teachers as a source of help in the questionnaire, but they were important actors who guided and referred children towards services, according to our dataset. School health care and educating teachers to detect and handle children's mental health problems could, therefore, be a solution to providing low-threshold services for problems at an early stage.

6.4 Implications for the future on the basis of this dataset

There are a few suggestions for the future studies that have arisen on the basis of this thesis. First, one important thing is to study if there is polarization in children's mental health wellbeing. This could be done for example by studying the differences in standard deviation and distributions of the symptoms scores between different assessment years. Second, it would also be interesting to study the prevalence changes of some single items, which accounted for high scores in these Rutter and CDI questionnaires. This could possibly confirm the trends that have been seen in different symptom scales or provide new information on changes childrens mental health. Third, one interest is to study if there are differences in prevalences of children's psychiatric symptoms reported by mothers, fathers, other caregiver or parents together. Especially as it is more common nowadays for children to live in two different homes, the assessments from mothers and fathers may differ more. If there is a clear difference in symptoms reported by different caregivers, this should be taken into account in future studies like this and possibly also in clinical work too to broaden the overall picture of a child's problems. Also agreement and disagreement between parents related to other symptoms such as loneliness and bullying is under interest.

New data from new assessment points will be collected and development of trends in mental health problems will be in importance to study also in future. Also studying trends compared to assessment year 1999 would be interesting as it appeared that the trends in teacher reported hyperactivity and conduct problems among boys might be different and increasing when comparing latest assessment year to the year 1999 instead of 1989. This can also explain the increased service use and talk about increase in children's problems in media.

7 Conclusions

This thesis aimed to increase the knowledge of time-trend changes in children's psychiatric wellbeing. The overall picture that emerged showed that children's psychiatric symptoms, and the related mental health phenomena, namely bullying and loneliness, mainly decreased or stayed the same when comparing the first and last assessment points. However, mental health service use increased constantly during 24-year study period, especially among children with most problems. The psychiatric wellbeing of children is one of the main health concerns in Finland at the moment. Specialized health care services have constantly reported that increasing number of children are being referred to services (Sotkanet; Pirkola & Sohlman, 2005) and their symptoms tend to be more severe, and media writes about children's increased problems. Also, the number of children who have been taken out of home into custody is increasing all the time. At the same time, there have been considerable changes in the school environment and these have had considerable effects on both teachers and children. The working life of parents is also more demanding, as there has been a trend toward more short-term jobs. Life is probably more hectic and families maybe do not have as much help from grandparents and communities as previously because of long distance with grandparents (Kaikkonen et al., 2012, Halme et al., 2010). Social media and the development of technology have increased both opportunities and pressure (Hautamäki, 2001) and there are big environmental and social changes happening in the world, like climate change, natural catastrophes and the increased number of refugees. The COVID-19 epidemic is also expected to increase mental health problems among children in the future (Mastnak, 2020). Taking all of this into account, it is somehow surprising, but positive, that the level of children's mental health problems have decreased or stayed at the same level. Only mental health service use increases reflect the media's view that children's mental health has worsen. However, these results may possibly reflect changes in attitudes, awareness, resources and economic factors, as well as factors such as family structures and education.

Even though bullying involvement decreased or stayed at the same level during the 24 year study period, it is notable that there were no decreases in bullying involvement after the anti-bullying intervention. Further studies are required to find

out reasons for that. Also the high, yet stable, level of loneliness set the need of further research on the interventions related to the children's loneliness and also knowledge about the long-lasting consequences of childhood loneliness using longitudinal cohorts are needed.

These results of our study provide important evidence-based knowledge for policy-makers to use when developing services and ensuring that adequate resources are made available for children's and families' wellbeing. Preventing children's mental health problems is important, as it can decrease the burden and problems that children, parents and teachers face. Responding to the need for help of children, parents and teachers, and studying these changes regularly, is very important if we are to prevent later problems and the negative consequences that these problems are causing. If early interventions are not available, and problem solving is postponed to a later age, the problems that already exist will start to increase and become more severe. That is why low-threshold help and interventions for children and families should be available in school, health care and social care settings as early as possible, when the problems are milder. Awareness of these services should also be increased.

Some studies have suggested that emotional problems are permanent as early as two years of age and services and interventions should be available and targeted already during early childhood education. Resources for school health care and teachers would also be needed to tackle problems at an early stage. Investigating children's feelings about loneliness and bullying more frequently and systematically in school health surveys could be one possibility. As mental health problems are clearly linked to bullying involvement and loneliness, it is important to address the mental health aspects of these phenomena when planning health prevention strategies and developing interventions for children. Policy decisions and anti-bullying programs around Europe, and in Finland, have shown good results by decreasing bullying involvement. However, more effort is needed to reduce bullying involvement and to address different forms of bullying and include these in interventions, namely direct, relational, traditional and cyber-bullying. Some new low-threshold services for children's conduct problems and anxiety have been developed and implemented in Finland since 2010 and these have showed promising results, by improving externalizing problems (Sourander et al., 2018). Further studies will increase our knowledge of the effects of these interventions on children's wellbeing, but using technology to treat psychiatric symptoms is certainly one thing that will increase in the future. It is also important to study changes on the impact of children's mental health problems and what aspects are causing the increased burden. For example, we need to know if the actual problems have stayed at the same level, but the increased burden is being caused by more parents seeking support for children with milder symptoms. Data that have already been collected from school health surveys, extensive health examinations and school surveys in collaboration

with the WHO could be used to study trend changes in loneliness among Finnish children and adolescents.

As the changes identified by different studies are contradictory, future research should pay attention to making study methods more consistent, as this would make it easier to compare results within and between studies. When considering the issue from a global perspective, and looking at the findings of the literature review in this thesis, it is clear that it is also important to study children's mental health changes in low-income and middle-income countries, as research is very limited in these settings. Research is also needed in these countries, as there are fewer resources and changes in social circumstances are faster that could lead to increased burdens for people and on any services that do exist (Collishaw, 2015).

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Appendices

Table A1. Items included in different informants' questionnaires at different assessment points.

	1989	1999	2005	2013
Parent				
Rutter A2	x	x	x	x
Service use	x	x	x	x
Bullying perpetration & victimization	x	x	x	x
Friendships			x	x
Screen time			x	x
Background information and life events	x	x	x	x
Teacher				
Rutter B2	x	x	x	x
Service use	x	x	x	x
Bullying perpetration & victimization	x	x	x	x
Friendships			x	x
Child				
CDI	x	x	x	x
Bullying perpetration & victimization	x	x	x	x
Friendships	x	x	x	x
Screen time			x	x

Table A2. Search used in PubMed, PsychINFO and SCOPUS for literature review.

Theme	Source of information	Search phrase	Number of results (date)
Changes in children's psychiatric symptoms	PubMed	("Mental Health/trends"[Mesh] OR mental health*[tiab] OR mental illness*[tiab] OR mental problem*[tiab] OR mental disorder*[tiab] OR psychiatric health*[tiab] OR psychiatric problem*[tiab] OR psychiatric symptom*[tiab] OR psychiatric disorder*[tiab] OR psychiatric illness*[tiab] OR psychosocial health*[tiab] OR psychosocial illness*[tiab] OR psychosocial symptom*[tiab] OR psychosocial problem*[tiab] OR psychosocial disorder*[tiab]) AND ("trends"[Subheading] OR time trend*[tiab] OR time-trend*[tiab] OR timetrend*[tiab] OR trend[tiab] OR trends[tiab]) AND (change[tiab] OR changes[tiab]) AND ("Child"[Mesh] OR child*[tiab] OR kid[tiab] OR toddler*[tiab] OR preteen*[tiab])	363 (2.11.2018)
	PsychINFO	(exp Mental Health/ OR mental health.mp. OR mental illness*.mp. OR mental problem*.mp. OR exp Mental Disorders/ OR mental disorder*.mp. OR psychiatric health.mp. OR exp Psychiatric Symptoms/ OR psychiatric symptom*.mp. OR psychiatric problem*.mp. OR psychiatric disorder*.mp. OR psychiatric illness*.mp. OR psychosocial problem*.mp. OR psychosocial health.mp. OR psychosocial disorder*.mp. OR psychosocial illness*.mp. OR psychosocial symptom*.mp.) AND (exp Trends/ OR time trend*.mp. OR time-trend*.mp. OR timetrend*.mp. OR trend.mp. OR trends.mp.) AND (change.mp. OR changes.mp.) AND (child*.mp. OR kid*.mp. OR toddler*.mp. OR preteen*.mp.)	518 (2.11.2018)
	SCOPUS	TITLE-ABS-KEY("mental health*" OR "mental illness*" OR "mental problem*" OR "mental disorder*" OR "psychiatric health*" OR "psychiatric symptom*" OR "psychiatric problem*" OR "psychiatric disorder*" OR "psychiatric illness*" OR "psychosocial problem*" OR "psychosocial health*" OR "psychosocial disorder*" OR "psychosocial illness*" OR "psychosocial symptom*") AND TITLE-ABS-KEY("time trend*" OR "time-trend*" OR timetrend* OR trend OR trends) AND TITLE-ABS-KEY(change OR changes) AND TITLE-ABS-KEY(child* OR kid* OR toddler* OR preteen*)	515 (2.11.2018)

Changes in children's bullying involvement	PubMed	("Bullying"[Mesh] OR bullies[tiab] OR bully*[tiab]) AND ("trends"[Subheading] OR time trend*[tiab] OR time-trend*[tiab] OR timetrend*[tiab] OR change[tiab] OR changes[tiab] OR trend[tiab] OR trends[tiab]) AND ("Child"[Mesh] OR child*[tiab] OR kid*[tiab] OR toddler*[tiab] OR preteen*[tiab])	2036 (2.11.2018)
	PsychINFO	(exp BULLYING/ OR bully*.ti,ab. OR bullies.ti,ab.) AND (exp Trends/ OR time trend*.ti,ab. OR time-trend*.ti,ab. OR timetrend*.ti,ab. OR change.ti,ab. OR changes.ti,ab. OR trend.ti,ab. OR trends.ti,ab.) AND (child*.ti,ab. OR kid*.ti,ab. OR toddler*.ti,ab. OR preteen*.ti,ab.)	399 (2.11.2018)
	SCOPUS	TITLE-ABS-KEY(bully* OR bullies) AND TITLE-ABS-KEY("time trend*" OR "time-trend*" OR timetrend* OR trend OR trends) AND TITLE-ABS-KEY(change OR changes) AND TITLE-ABS-KEY(child* OR kid* OR toddler* OR preteen*)	22 (2.11.2018)
Changes in children's loneliness	PubMed	("Loneliness"[Mesh] OR "Social Isolation"[Mesh] OR loneliness*[tiab] OR solitude*[tiab] OR social isolati*[tiab]) AND ("trends"[Subheading] OR time trend*[tiab] OR time-trend*[tiab] OR timetrend*[tiab] OR change[tiab] OR changes[tiab] OR trend[tiab] OR trends[tiab]) AND ("Child"[Mesh] OR child*[tiab] OR kid*[tiab] OR toddler*[tiab] OR preteen*[tiab])	359 (2.11.2018)
	PsychINFO	(exp LONELINESS/ OR loneliness*.mp. OR exp Social Isolation/ OR social isolati*.mp. OR solitude*.mp.) AND (exp Trends/ OR time trend*.mp. OR time-trend*.mp. OR timetrend*.mp. OR change.mp. OR changes.mp. OR trend.mp. OR trends.mp.) AND (child*.mp. OR kid*.mp. OR toddler*.mp. OR preteen*.mp.)	525 (2.11.2018)
	SCOPUS	TITLE-ABS-KEY (loneliness* OR solitude* OR "social isolati*") AND TITLE-ABS-KEY("time trend*" OR "time-trend*" OR timetrend* OR trend OR trends) AND TITLE-ABS-KEY(change OR changes) AND TITLE-ABS-KEY(child* OR kid* OR toddler* OR preteen*)	38 (2.11.2018)
Changes in children's mental health service use	PubMed	("Mental Health"[Mesh] OR "Mental Health Services"[Mesh] OR mental health*[tiab] OR mental illness*[tiab] OR mental problem*[tiab] OR mental disorder*[tiab] OR psychiatric*[tiab] OR psychosocial*[tiab])	487 (2.11.2018)

	AND (service use*[tiab] OR help seek*[tiab] OR help-seek*[tiab] OR "mental health care"[tiab] OR psychosocial care*[tiab] OR psychiatric care*[tiab]) AND ("trends"[Subheading] OR time trend*[tiab] OR time-trend*[tiab] OR timetrend*[tiab] OR change[tiab] OR changes[tiab] OR trend[tiab] OR trends[tiab]) AND ("Child"[Mesh] OR child*[tiab] OR kid*[tiab] OR toddler*[tiab] OR preteen*[tiab])	
PsychINFO	(exp Mental Health Services/ OR mental health service*.mp. OR exp Mental Disorders/ OR mental disorder*.mp. OR mental illness*.mp. OR mental problem*.mp. OR psychiatric*.mp. OR psychosocial*.mp.) AND (service use*.mp. OR help seek*.mp. OR help-seek*.mp. OR mental health care*.mp. OR psychosocial care*.mp. OR psychiatric care*.mp.) AND (exp Trends/ OR time trend*.mp. OR time-trend*.mp. OR timetrend*.mp. OR change.mp. OR changes.mp. OR trend.mp. OR trends.mp.) AND (child*.mp. OR kid*.mp. OR toddler*.mp. OR preteen*.mp.)	483 (2.11.2018)
SCOPUS	TITLE-ABS-KEY("mental health service*" OR "mental disorder*" OR "mental illness*" OR "mental problem*" OR psychiatric* OR psychosocial*) AND TITLE-ABS-KEY("service use*" OR "help seek*" OR "help-seek*" OR "mental health care*" OR "psychosocial care*" OR "psychiatric care*") AND TITLE-ABS-KEY("time trend*" OR "time-trend*" OR timetrend* OR trend OR trends) AND TITLE-ABS-KEY(change OR changes) AND TITLE-ABS-KEY(child* OR kid* OR toddler* OR preteen*)	71 (2.11.2018)

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